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Publishing Details

Publisher Name: International Research Organization for Life & Health Sciences (IROLHS)

Registered Office: L 214, Mega Center, Magarpatta, Pune - Solapur Road, Pune, Maharashtra, India – 411028. Contact Number: +919759370871.

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International Journal of Scientific Study

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International Journal of Scientific Study
February 2021 • Vol 8 • Issue 11

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International Journal of Scientific Study
February 2021 • Vol 8 • Issue 11

International Journal of Scientific Study
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International Journal of Scientific Study
February 2021 • Vol 8 • Issue 11

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Report

Case Report of Phyllodes Tumor in Early Pregnancy with Impact of Review a Molecular and Genetic Update

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ABSTRACT

Introduction: Phyllodes tumors (PT) are biphasic tumor consisting of epithelial and stromal components. It is rare fibro epithelium tumor which is 0.3–1% of all breast tumors. According to the World Health Organization, they are benign, borderline, and malignant, which are based on several histological features and grading of the tumor. The exact etiology of PT and its relation to fibroadenoma is still unclear. A 30-year-old female, 20 weeks of gestation, presented with painless right side breast lump for 4 months and involved all four quadrant of the breast. Her fine-needle aspiration cytology showed benign PT; then, we planned for lumpectomy with 1 cm away from the normal tissue. Local recurrences are associated with mitosis, tumor border, surgical margin, and type of surgery while age and tumor size are not associated with local risk. Some author had found molecular alteration in allelic loss in TP53 and D22S264 may be responsible for progression of FA to PT. I would like to say that a gestational PT even tumor has large we must consider for breast preserving surgery to maintained natural feeding as well as feeling of motherhood.

Key words: Cystosarcoma phyllodes, Huge fibroadenoma, Lactational tumor

INTRODUCTION

Phyllodes tumors (PT) are biphasic tumor consisting of epithelial and stromal components. It is rare fibroepthelium tumor which is 0.3–1% of all breast tumors.[1]

This tumors was first described in 1774 as giant type of fibroadenoma and named: as "cystocarcoma phyllodses" by Johannes Muller, in 1838, while the World Health Organization (WHO) has adopted the term "PT" in 1982 as classification of breast tumors.[2,3] It is derived from "Greek words" sarcoma it denote flesh appearance, while phyllon means leaf like. The classification of PTs proposed by the W.H.O. into benign, borderline and malignant which are based on histological features of stromal cellularity, nuclear atypia, mitotic activity, stromal over growth, and tumor margin appearance.[2]

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

The incidence of benign PT has 34.5% of benign, 24.1% of borderline, and 39.7% malignant PT and mean tumor size was 3.5 cm in benign PT, 5.6 cm borderline, and 4.6 cm in malignant tumor.[4] The exact etiology PTs and its relation to fibroadenoma are still unclear. Noguchi *et al.* showed[5] that fibroadenoma has polyclonal elements behave like as hyperplastic rather than neoplastic lesion, whereas PT made up a both monoclonal and polycolonal cells components due to this it content both epithelial and stromal component it behave like neoplasma of the stromal cells.

They have suggested local recurrence (LR) and progression of the tumor supported by clonality of PT, while somatic mutation occurred due to monoclonal analysis and its histological indistinguishable from the polyclonal elements.

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They also revealed that estrogen activity increase in trauma, pregnancy, and lactation so stromal overgrowth occurring in PT.

CASE STUDY

A 30-year-old female, 20 week of gestation, presented with painless right side breast lump for the past 4 months which was rapidly growing. On physical examination, she had massive swelling which involved four quadrant of the breast about 10 × 10 cm. size, boselated surface, well defined mobile, and cystic consistency with nipple areola complex-shifted medially and down ward. There was dilated vein over the lump and skin was free from underlying lump, as well as pinched out all over the lump. There was no axillary lymphadenopathy. Now her personal history, she attained menarche at 14 year of age, she has one miscarriage and one alive child. There was no history of trauma, previous breast disease, and no history of breast cancer of first grade relative in her family.

Preoperative picture of case study

We did work up of the patients an ultrasonography of the right breast reveled a large well define solid heteroecohic predominantly hypoechic lobulation of mass lesion. Fine-needle aspiration cytology showed fibro epithelial lesion suggestive of benign PT.

Hence, we plan for lumpectomy that consist of excision of lump through transverse elliptical incision was given over the upper outer and inner quadrant of breast which excised whole of the lump 1 cm away from the normal tissue, nipple areola complex had not involved, and its vascularity intact so we had not removed.

The patient had uneventful recovery and comfortable after the surgery. She was discharged on 10th post-operative day with advised for proper follow-up.

Her delivery was normal vaginal delivery. She had fed both side of breast her baby after delivery. There was no recurrence after 5 years.

Intraoperative picture of case study

DISCUSSION

PT usually presents as a breast mass which is painless and rapidly growing tumor. The treatment of surgical excision or a wide local excision of tumor with adequate margin of at least 1 cm is necessary for benign PT, while radiotherapy and chemotherapy are controversial, but clinical and radiological follow-up is mandatory.[4] Grossly, tumor showed multinodular mass with relatively smooth margin, grayish on cut surface, with small cystic degeneration.

Histopathologically shown as benign stromal proliferation, this is lined by cubodial epithelium with no atypia and <5 mitosis/10 HPF. Benign PTs are well circumscribed, atypia and heterogeneous elements were not observed.

Alipour *et al.*[4] did systemic review and polled 43 cases with gestational PTs of these 37 patients had unilateral while six patients at bilateral gestational PT. They also review method of surgery in benign PT of this they found that seven cases were operated for mastectomy and five operated for lumpectomy and follow-up of the patient minimum 27 months and maximum 5 years. They were found no recurrence and also we have not found in our case. They also reviewed USG findings and revealed most of the tumor has either heteroechoic and hyperechoic and lobulation of mass lesion. The same USG finding occurred in our case.

Lu *et al.*[5] They had also reviewed a cause of LR rate and were found 8% for benign, 13% for border line, and 18% for malignant PT. The risk factor for LR was mitoses,

tumor border, stromal cellularity, stromal atypia, stromal over growth, tumor necrosis, type of surgery, and surgical margin status may be risk factor for LR in PT, while age and tumor size not associated with local risk. So same in our patients, she was a huge tumor size.

Gross pathology of case study

Advancement of genomic land scape and sequencing provides insight in to molecular pathogenesis/histogenetic relation between fibroadenoma and PT with its tumor grading which helps to improve diagnostic accuracy. Hence, we have provided an update overview of the some molecular alteration found in PT. Nowadays, many literature are available according to Hodges *et al*.[6] They suggested that fibroadenoma and PT are clonally related and allelic loss TP53 and D22S264 may be responsible for progression of FA to PT. The most recent genomic sequencing studies have been identified frequent MED12 early somatic mutation in fibroadenoma and phyllodes because they have involved same origin and genetic etiology and mutation found 59–67% in fibroadenoma and 45–60% in PTs and 50–70% in uterine leiomyomas.[7]

CONCLUSION

New genomic landscape sequencing would be advantage for planning of surgery, especially in gestational PT. The patient has to be maintained her motherhood feeling as well as natural feeding of child after delivery of baby, for which we need further study that enrolled large series of gestational PT.

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How to cite this article: Jalaj A, Shrivastav BR, Shrivastav A, Jalaj VJ, Rai S, Jyotsna. Case Report of Phyllodes Tumor in Early Pregnancy with Impact of Review a Molecular and Genetic Update. Int J Sci Stud 2021;8(11):1-3.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Report

Adenoid Cystic Carcinoma of Mandible – A Rare Site of Presentation

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Abstract

Adenoid cystic carcinoma (ACC) of mandible is very rare. We are presenting a case of ACC of mandible in 35-year-old female. Mandible is very rare site of this carcinoma. ACC is locally invasive tumor. In our case, it was involving mandible and extending into floor of mouth involving deep muscle of tongue. We did radical surgery by doing wide local excision with near total glossectomy, along with mid-arch mandibulectomy and neck dissection reconstruction with free fibula flap. The patient was given radiotherapy post-operatively.

Key words: Adenoid cystic carcinoma, Glossectomy, Mandibulectomy

INTRODUCTION

Adenoid cystic carcinoma (ACC) is malignant tumor of salivary glands. It accounts for 10 percent of all the salivary gland tumors.[1] It commonly occurs in minor salivary glands, which accounts for 60% of all the ACCs. Common sites of occurrence of ACC in the oral cavity include hard palate, lower lip, retromolar trigone, sublingual gland, and buccal mucosa. Extraorally, it is found in submandibular gland and parotid gland. ACC is a slow growing, locally invasive tumor. It is usually present as a painless swelling initially, which becomes painful in the advanced stage of the disease due to its perineural invasion. It can metastasize through lymphatics to the cervical lymph nodes and can also spread to the lungs through bloodstream. We, hereby, report are a case of ACC in the mandible, which is a rare site of its presentation.[2,3]

CASE REPORT

A 35-year-old female patient presented to us, with a swelling over left side of her face since 1 year. Initially, the swelling was painless, but it grew progressively, over a period of time to its current size. The patient also complained of pain over the swelling since the past 3 months accompanied with difficulty in swallowing. On extraoral examination, a 6 cm × 5 cm swelling was seen over the chin area. Intraorally, the swelling was observed to be arising from the lower alveolus in the midline, involving the floor of mouth, accompanied with restricted tongue mobility. On intraoral palpation of the swelling, an induration was present over the right dorsal surface of the tongue extending up to the ventral surface bilaterally. The base of the tongue was also involved, more over the left side, crossing the midline and involving the right side also.

Indirect laryngoscopy examination revealed normal valleculae, larynx, and hypopharynx. Neck examination demonstrated absence of palpable, involved lymph nodes bilaterally. A biopsy was taken from the mass and sent for histopathological examination which confirmed the diagnosis of ACC of the midline of the mandible. Contrast-enhanced computer tomography (CECT) of the swelling exhibited an ill-defined enhancing mass in the midline of the mandible involving the overlying and adjacent soft tissue. The tumor mass measured 6 cm × 5 cm × 4 cm in dimensions. The destruction of the cortex of mandible was evident, along with its posterior extension, along the floor of mouth on the left side with involvement of hypoglossal, geniohyoid, and genioglossal muscles [Figure 1]. Bilateral submandibular glands were normal. Few enhancing level 2 subcentimetric lymph nodes were present on the left side of the neck.

Access this article online

www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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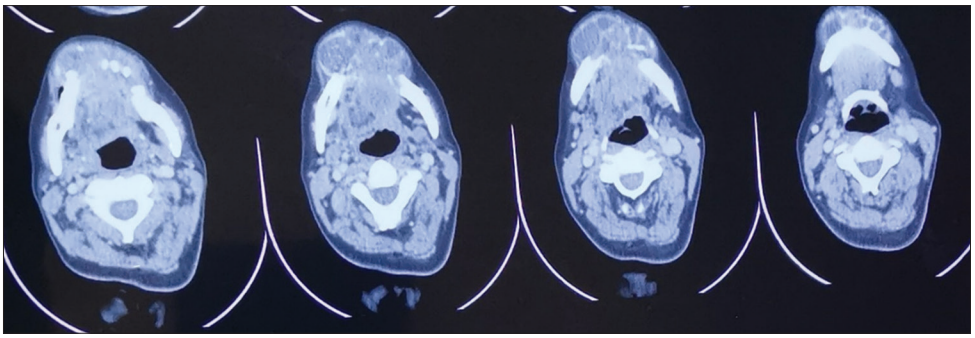

Figure 1: Computed tomography scan shows contrast enhancing mass involving mandible and extending to floor of mouth

On complete evaluation of the tumor mass, surgery with composite resection of the tumor mass, with near total glossectomy, along with mid-arch mandibulectomy was planned. Reconstruction of the post-operative defect with free fibula flap with left sided, supra-omohyoid neck dissection, was also decided. Surgery was performed, along with temporary tracheostomy. Post-operative healing was uneventful and the patient recovered completely. The excised specimen was sent for complete histopathological examination. The latter revealed an ACC with perineural invasion involving the mandible. All the bony and soft-tissue margins were free of tumor. Neck dissection specimen showed three positive nodes out of a total of 10 for the presence of tumor deposits. Consequently, the patient was referred for post-operative adjuvant radiotherapy, due to perineural invasion and lymph node metastasis.

DISCUSSION

ACC forms 10% of the all head and neck cancers.[1] It is a slow growing, locally invasive tumor mass which often presents with perineural invasion. Parotid gland is a major site of ACC, but majority of the cases arise from minor salivary glands in the oral cavity, nose, and paranasal sinuses. Mandible is a very uncommon site of this tumor. Even though, the origin of this particular type of tumor is still largely unknown, some theories have been put forward, to elucidate the reason of incidence of this malignant salivary gland tumor within the central jawbones. Some of them include entrapment of ectopic salivary gland tissues in jawbones; neoplastic transformation of epithelial lining of a cyst or sinus epithelium.[4]

Diagnostic modalities for detection of this tumor include fine-needle aspiration biopsy from major salivary glands, like parotid, but in vast majority of minor salivary gland tumors, a confirmatory biopsy becomes mandatory. Radiological examination is of utmost importance, to know the extent of the disease, invasion of the adjacent vital structures, and also to determine the perineural invasion. Computed tomography scan helps in determining the involvement of bony structures, while magnetic resonance imaging assists in defining the soft-tissue extent and perineural invasion. In our case, we did CECT scan because the tumor was arising from mandible.

The treatment of ACC of minor salivary glands requires wide local excision with neck dissection. In our case, we did wide local excision with near total glossectomy accompanied with mid-arch mandibulectomy. Left supraomohyoid neck dissection was then performed followed by reconstruction with free fibula flap.

Prognosis of ACC depends on the tumor site, stage, histology, perineural invasion, and lymph node metastasis. ACC of major salivary glands has a better prognosis when compared to minor salivary gland ACC. The stage of the tumor is a fine indicator of its prognosis. A higher stage of the tumor, usually, foretells a worse prognosis. There are three histological types of ACC; tumor mass with a predominant tubular pattern; with a greater cribriform pattern and a pronounced solid pattern. Tubular pattern has the best prognosis; cribriform pattern usually depicts a moderate prognosis, while the solid pattern is associated with the most adverse outcomes.[5,6] The overall 5-year survival rate is lower (48%) for the patients having lymph node metastasis compared to those without lymph node metastasis (77%).[7] Therefore, the lymph node metastasis is a significant predictor of prognosis of ACC cases in oral cavity.

Radiotherapy is always preferred, following a radical surgery of an ACC tumor mass, as it eradicates any residual microscopic disease, and thus, associated with a better outcome. Radiotherapy of 60 Gray (Gy) or higher is usually preferred on account of improved results.[8] Additional radiotherapy can be administered in cases exhibiting perineural invasion without positive margins for superior outcomes. The overall 5-year survival rates of patients with head and neck ACC have been reported to be approximately 90.3%. Our patient had a locally advanced ACC of mandible, with significant local invasion, along with lymph node metastasis and perineural invasion, but

all surgical cut margins were free. Hence, we referred the patient for post-operative radiotherapy.

CONCLUSION

Mandible is a rare site for occurrence of ACC. ACC in this location can significantly invade local structures and can metastasize to cervical lymph nodes. Therefore, a locally invasive ACC, post a radical surgery, should be certainly followed by post-operative radiotherapy for a superior prognosis and an enhanced outcome.

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How to cite this article: Singh GP. Adenoid Cystic Carcinoma of Mandible – A Rare Site of Presentation. Int J Sci Stud 2021;8(11):4-6.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Report

Osteomyelitis of Maxilla Mimicking Mucormycosis: A Clinical Puzzle

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Abstract

Diseases with path gnomic signs are easy to diagnose clinically. Challenging is those situations when the disease entity resemble the other disease. Same is our case wherein the clinical features of the osteomyelitis coexist with that of mucormycosis leading to dilemma. Since the occurrence of the disease is rare, it is often misdiagnosed. Incorrect diagnosis changes the treatment plan which ultimately affects life expectancy. This case also encompasses the role of radiological advancement which is cone-beam computed tomography our case. This case is complete in the sense that entire procedure, beginning from diagnosis till treatment has been mentioned. The importance of diagnosis is justified when the patient gets the maximum benefit out of it. Post-operatory rehabilitation is equally important for the patient to continue the normal lifestyle which is very well provided in this case to the patient.

Key words: Moth eaten appearance, Mucormycosis, Necrosis, Osteomyelitis

INTRODUCTION

Osteomyelitis of jaw refers to the inflammatory condition of bone and bone marrow.[1] Osteomyelitis of maxilla is rare due to its high vascularity and porosity of the bone. It has peculiar feature which is mandibular involvement, pus discharge, recent history of extraction, etc. It is seen to involve patient with hampered immunity such as patient with long-term history of use of corticosteroid, and antibiotics uncontrolled diabetes mellitus.[2] This case is unique in the sense that maxilla was involved commonly than mandible and all these features imitated clinical features of mucormycosis which led to a diagnostic challenge for us to come to any specific conclusion based on clinical examination.

CASE REPORT

A 65-year-old male reported with the complaint of difficulty in having food and water since 1 month. He also complained about the nasal regurgitation and nasal twang to his voice which he has been observing since 1 year. The patient gives history of multiple extractions of teeth around 1 year back. There was history of pus discharge preceding and succeeding the extraction. No abnormality is detected extraorally except with lower vertical dimension. The patient was a known diabetic but was not taking medication due to ignorance. On intraoral examination, a hollow bone defect roughly oval in shape measuring 3 cm × 2 cm in diameter is seen on the right side of maxilla [Figure 1]. It extends 1cm away from midline present on the right side of maxilla. The defect is seen to be filled by necrotic slough and bony fragment. There is loss of epithelium over the defects. Adjacent mucosa appears to be blanched and slightly swollen. Apart from the defect, there is an ulcer measuring approximately 1 cm × 1 cm in diameter present on the left buccal mucosa with yellowish base and keratotic border which is seen to be associated with the root piece of 24. Based on the clinical presentation, differential diagnosis chronic suppurative osteomyelitis with maxilla and mucormycosis was also considered due to the involvement of maxilla and the compromised immunity of the patient. For investigation initially, an occlusal radiograph was taken to know about the expansion of the defect [Figure 2]. It revealed fragments of destructed bone most commonly resembling moth eaten appearance. Extending the

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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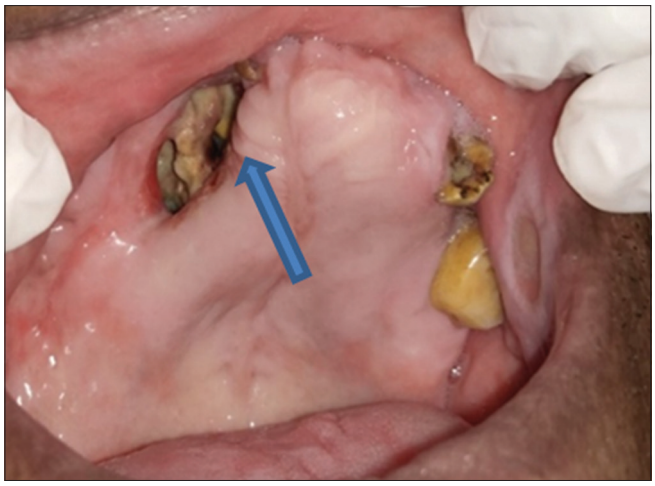

Figure 1: Intraoral bone defect

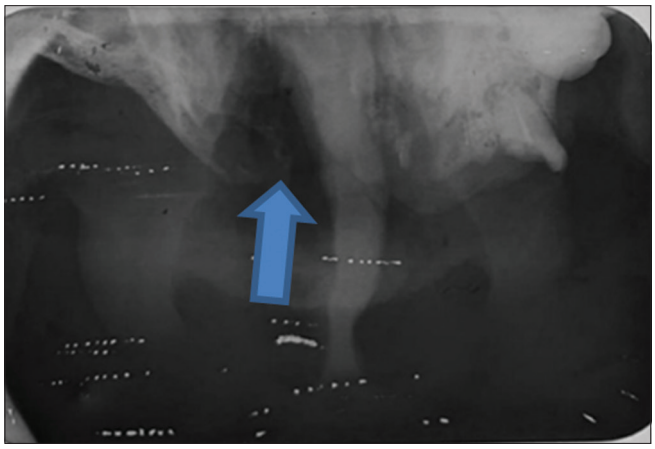

Figure 2: Occlusal radiograph show an ill-defined radiolucency involving maxillary bone extensively, bone appears to be moth-eaten

radiologic investigation further ahead, a cone-beam computed tomography of maxilla was done to know about the actual extent of the lesion [Figure 3a-c]. Based on the above findings, a radiologic diagnosis of chronic osteomyelitis was given. The patient was further referred to the department of oral surgery and sequestrectomy was done. The patient was kept under rigorous antibiotic regime [Figure 4a and b]. Sample sent for histopathological evaluation revealed chronic suppurative osteomyelitis [Figure 5]. Prosthetic rehabilitation was done by giving flexible dentures [Figure 6].

DISCUSSION

Chronic osteomyelitis is a bone disease that is characterized by inflammatory processes of bone and bone marrow.[3,4] Few most common cause of osteomyelitis includes infection of dental origin, post-extraction complication, improper debridement of socket, and impaired immunity. Classical signs include pain, fever, swelling, pus discharge, and fistula. Radiographs are required to confirm the diagnosis. On radiograph, lesion appears as a radiolucent area with bone destruction and sequestrum formation.[3]

On histopathological examination, there is presence of chronic inflammatory cells, increased number of osteoblasts, thickened trabeculae, and fibrous bone marrow.[5] This case highlights the role of various systematic radiological investigations which should be followed while suspecting osteomyelitis. This case is intriguing in the sense that the clinical features of the lesion were same as mucormycosis which is commonly seen in maxilla in patients with poor

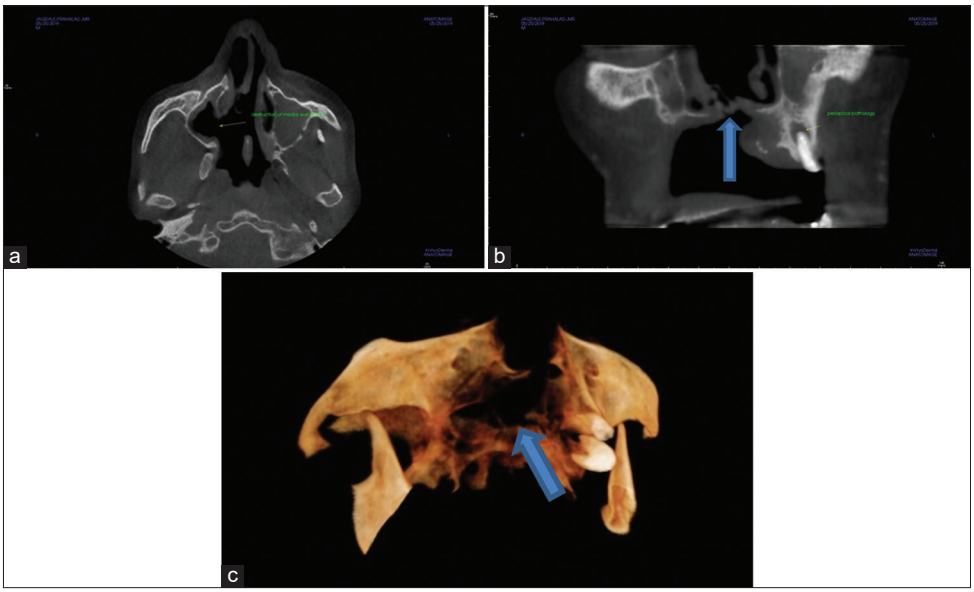

Figure 3: (a) Axial section of cone-beam computed tomography (CBCT) showing invasion of lesion superiorly and posteriorly causing destruction of medial wall of the right maxillary sinus, (b) coronal section of CBCT showing destruction of nasal floor, and (c) volume render in CBCT-showing extensive involvement of maxilla and nasal floor

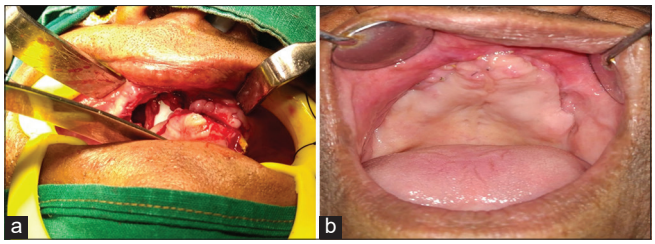

Figure 4: (a) Sequestrectomy and (b) Healed defect

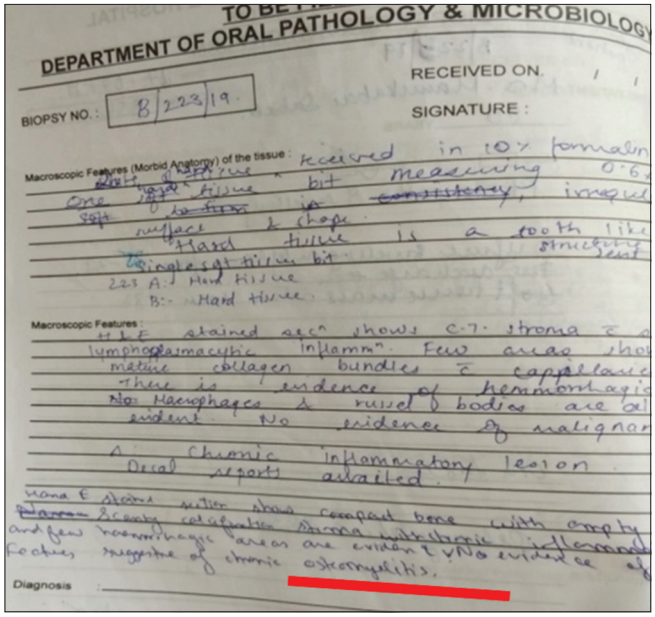

Figure 5: Histopathology report

immunity. The path of entry of microorganism is through nose and mouth. Hence, clinically, it was a difficult to differentiate suppurative osteomyelitis with mucormycosis. It was only after radiological evaluation and histopathology, final diagnosis of chronic suppurative osteomyelitis was given. Therefore, care must be taken before coming to any diagnosis in such cases as it changes the treatment approach.

Figure 6: Flexible denture with maxilla

CONCLUSION

As the osteomyelitis affects individuals which impaired immunity, individuals in extreme ages should be suspected for the disease if they are found have any of the above symptoms. Only identifying disease should not be the primary concern of the physician, equal importance to treatment and post-operative rehabilitation should also be given.

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How to cite this article: Joshi C, Khare V, Saleem A, Das S, Waghela M, Naren S. Osteomyelitis of Maxilla Mimicking Mucormycosis: A Clinical Puzzle. Int J Sci Stud 2021;8(11):7-9.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Report

A Case Report of Flexometallic Laryngeal Mask Airway Used in Tonsillectomy

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Abstract

Tonsils and adenoids are part of Waldeyer's ring of lymphoid tissue and are often sites of acute and chronic inflammation. Children are prone to recurrent adenotonsillitis, causing obstructive airway problems requiring the need for surgical removal. Airway problems are a major concern in adenotonsillectomy procedures. This is related both to the underlying clinical problem and the shared airway between the anesthesiologist and surgeon. Until recently, the airway is usually managed with either an endotracheal tube (ETT) or right angle endotracheal tube for this procedure. With the introduction of flexible laryngeal mask airway (FLMA), designed for use in head and neck, oral surgeries, these procedures can be done with a superior recovery profile and fewer bronchospasm incidences, laryngospasm, oropharyngeal trauma, than an ETT. The FLMA provides better protection of lower airway and esophagus from blood and secretions than the ETT. Herewith, we present a case of adenotonsillectomy done in a 10-year-old child using FLMA.

Key words: Adenotonsillectomy, Airway management, Flexible laryngeal mask airway, Laryngeal mask airway, Laryngospasm

INTRODUCTION

Airway management is one of the most important skills in anesthesiology, and inability to secure the airway can lead to catastrophic results. Before 1980, only the face mask and the endotracheal tube (ETT) were the available airway devices. Since then several supraglottic airway devices have been developed, of which the laryngeal mask airway (LMA) is the only time tested and widely used device, introduced by Dr Archie Brain. Supraglottic airway devices fill the gap between the face mask and the tracheal tube. The first supraglottic airway device, LMA–Classic, became available in 1988.[1] There are many LMA devices available now, some of which appear similar to the LMA family and others that work in a different concept. The LMA is designed to provide and maintain the seal around the laryngeal inlet. The most important feature of LMA is that they provide rapid control of the airway. They are faster and easier to insert than endotracheal intubation. LMA is commonly used in both adults and pediatrics patients. Over the years, they have earned an important place in difficult airway management.[2]

Many surgeries, particularly procedures performed on the oral and nasal cavities, require the anesthesiologist and surgeon to share access to the airway. Conventionally, special ETTs with a spiral coil built into them to increase the tube's flexibility and prevent kinking have been used to allow the surgeon to manipulate the ETTs during surgery to gain access to the operating field. To make an LMA specifically for head and neck procedures, a similar spiral coil was incorporated into the LMA's shaft, creating the flexible LMA (FLMA), introduced into clinical practice in 1994. The FLMA has since been used successfully in patients undergoing a variety of head and neck, oral surgeries.[3]

FLMA

The FLMA has the same parts as LMA classic [Figure 1]; it differs from LMA classic in having an airway tube flexible,

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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wire-reinforced.[3] This tube is longer and narrower than the airway tube of LMA classic. It is available in the sizes shown in Table 1.

The cuff sizes are the same as that of LMA classic. A single-use version is also available. The sizes for the single-use version are the same as for the multiuse one.

Williams *et al.* (Br. J. Anaesth. 1993), 104 patients were allocated randomly to receive anesthesia for adenotonsillectomy through either a reinforced LMA or a tracheal tube. Airway maintenance and protection were assessed during and after surgery. The authors concluded that the reinforced laryngeal mask did not interfere with surgical access; it resisted compression and protected the lower airway from contamination with blood. In children, recovery was less eventful in the LMA group, with less airway obstruction ($P < 0.001$) and better airway acceptance ($P < 0.05$). The reinforced LMA provided a clear, secure airway until recovery of protective airway reflexes.[4]

Brimacombe *et al.* (Anaesth Analg 1999), the authors conducted a randomized, controlled, cross-over cadaver study to test the hypothesis that the efficacy of seal for ventilation and airway protection, anatomic position, and airway patency with the FLMA is altered by the application of a Boyle Davis gag. They also determined the airway sealing pressure at which the FLMA prevents aspiration when large volumes of fluid are placed above the cuff. Efficacy of seal for airway protection was determined by flooding the mouth with 55–135 mL of water, reducing intracuff pressure until aspiration was detected fiber optically and measuring airway sealing pressure at this intracuff pressure. The mean airway sealing pressure at which aspiration occurred when large volumes of fluid were placed above the cuff was 11 (7–15) cmH_2O. They conclude that the FLMA forms an effective seal for ventilation and protection of the airway that is unaffected by applying a mouth gag that provides surgical access to the oropharynx.[5]

A 10-year-old boy of weight 25 kg, belonging to American Society of Anesthesiologists I category with mouth opening of 4 cm was posted for tonsillectomy. The patient was pre-medicated with inj. midazolam 2 mg with inj. atropine 0.6 mg IM 20 min before induction. The patient was shifted to the operating room and monitors were connected; electrocardiography, non-invasive blood pressure, and pulse oximeter. Baseline values were re-corded. IV access was secured on the left forearm with 22G cannula. Intravenous fluid Ringer's lactate was started. Inj. fentanyl 50 mcg IV was given. The patient was induced with inj. propofol 60 mg, inj. atracurium 12.5 mg IV, mask ventilated with N_2O 66% with oxygen and sevoflurane 2% for 3 min.

A flexo metallic LMA of 2.5 sizes were used for the patient, based on weight. We used a malleable stylet to make the airway tube stiffer and to facilitate insertion. In this case, LMA was inserted using the standard technique with cuff fully deflated. Thirteen milliliter of air was used to inflate the cuff. Bilateral air entry was checked by auscultation. LMA secured was in the midline with adhesive plasters over the mandible, as shown in Figure 2. Sister Rose positioning required for tonsillectomy was done. Doughty's mouth gag with a groove for the air-way tube was applied after adequate lubrication. The distance between the angles of the mouth to the angle of mandible was used to predict the size of the blade. The airway tube, inflation system tubing was kept in the midline within the groove.

AQ1 **Table 1: ???**

Mask size	Weight	Cuff volume
2	10-20 kg	10 ml
2.5	20-30 kg	15 ml
3	30-50 kg	20 ml
4	50-70 kg	30 ml
5	70-100 kg	40 ml

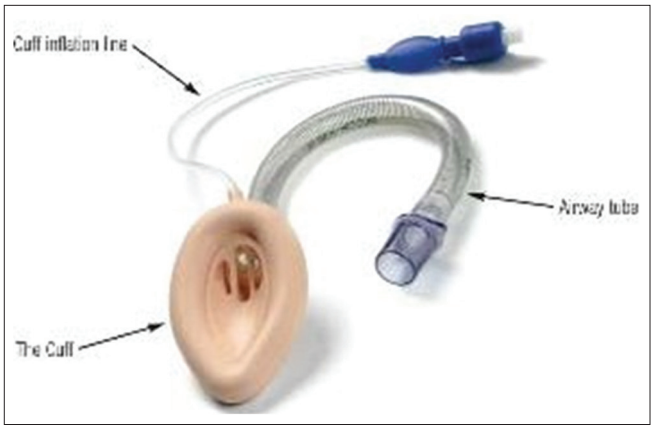

Figure 1: Laryngeal mask airway flexible device description

Figure 2: Laryngeal mask airway secured was in the midline with adhesive plaster

DEVICE FIXATION

Anesthesia maintained with N_2O/O_2 in the ratio of 66: 33% and sevoflurane 1%. Inj. atracurium was used intermittently to maintain muscle paralysis. During the intraoperative period, the patient was monitored continuously for hemodynamic disturbances, desaturation, and airway obstruction. The intraoperative period went uneventfully. At the end of the procedure, Doughty's mouth gag was removed with care after achieving adequate hemostasis. Thorough oral suctioning was done under vision. Both the tonsillar fossae were inspected for bleeding and retained cotton balls. The blood staining of LMA was seen only on the dorsal surface, and the laryngeal surface was free of blood. The patient was reversed with inj. neostigmine 1.25 mg and inj. glycopyrrolate 0.25 mg. The patient became conscious, obeyed verbal commands; muscle power was adequate, airway reflexes recovered fully. The LMA was removed. In the post-operative period, the patient was monitored with oxygen supplementation in the recovery room for 30 min. The post-operative period went uneventfully. The child was shifted to the post-operative ward.

DISCUSSION

FLMA is a safer alternative to the ETT in adenotonsillectomy procedure.[6] LMA has come into increasing use in anesthesia, particularly in outpatient surgeries. LMA can be inserted easily without requiring neuromuscular blockade and also allows spontaneous ventilation throughout the procedure. Introduction of LMA induces a less hemodynamic stress response. It is better tolerated in shallower depths of anesthesia.[7,8]

FLMA is a safer alternative to the ETT in adenotonsillectomy procedure.[6] LMA has come into increasing use in anesthesia, particularly in outpatient surgeries. LMA can be inserted easily without requiring neuromuscular blockade and also allows spontaneous ventilation throughout the procedure. Introduction of LMA induces a less hemodynamic stress response. It is better tolerated in shallower depths of anesthesia.[7] However, the presence of LMA in the mouth can obstruct the view of the surgical field. With the introduction of flexo metallic LMA's, this problem is solved and many studies have proved this.[4,5]

1. Sister rose to position leads to the collection of secretions in the oropharynx, easily suctioned out
2. As tonsillectomy is an elective procedure, these children have fasted overnight. Hence, the incidence of aspiration of gastric contents is less
3. LMA is better than the ETT in preventing aspiration of blood or secretions from above the vocal cords level, which is common in tonsillectomy
4. The position of tonsils allows for easy accessibility and complete visualization of the surgical area.

Hence, bleeding can be easily diagnosed and treated. The tonsillectomy procedure needs adequate surgical exposure, an adequate plane of anesthesia to prevent untoward movements, prevention of aspiration of blood from the oral cavity, an airway device that permits the circuit to be kept away from the surgical field, and also resists compression or kinking 9 FLMA has all the features necessary for the tonsillectomy procedure. Such as, the FLMA has a wire-reinforced, flexible airway tube that allows it to be positioned away from the surgical field.

Wire reinforced tube resists kinking and compression. Flexible LMA available in pediatric and adult sizes. Better protection of the airway from blood and secretions from above the trachea compared to an ETT [Figure 3].

There is a reduction in the incidence of post-operative nausea vomiting due to the prevention of blood from entering the esophagus. LMA better tolerated by the anesthetized spontaneously breathing patients than ETT. Good maintenance of LMA cuff stability even during head movement. All LMA benefits such as lesser drug requirement reduced coughing and bucking on emergence, minimal hemodynamic response, reduced intracranial, and intraocular pressures are present in the FLMA.

The disadvantages of using FLMA are, the wire reinforcement makes the FLMA more resistant to kinking and compression than the LMA Classic but does not prevent obstruction from biting. Airway obstruction and loss of seal have been reported when a Boyle Davis gag was used. This can usually be corrected by repositioning the gag. The FLMA is unsuitable for magnetic resonance imaging scanning if image quality in the region of the LMA is important.

The metallic rings will cause image distortion. The recommendations for optimal use of FLMA are,[9]

The Device Vice

a. FLMA pre-use tests should exclude any airway tubes with bite marks
b. The correct size of FLMA should be chosen

Figure 3: Prevention of aspiration of blood by laryngeal mask airway compared to endotracheal tube

c. Standard insertion technique with the mid-line placement of the airway tube and the pilot tube is advised.

Maintenance

a. Correct length of the blade
b. Lubrication of blade by a surgeon
c. Careful insertion of the blade by a surgeon [Figure 4]
d. Optimal head and neck positioning before opening of tonsillar gag [Figure 5].

Ventilation

a. Confirmation of ease of ventilation with open tonsillar gag

Figure 4: Insertion of the mouth gag

Figure 5: The optimal position of flexible laryngeal mask airway and mouth gag

b. Spontaneous or positive pressure ventilation
c. No part of the airway tube or cuff visible to the surgeon
d. Airway tube shielded if split blade during laser surgery.

Removal of Device

a. Careful tonsillar gag removal at the end of surgery by a surgeon
b. Laryngoscopy to check no further bleeding
c. Placement of bite block
d. Discontinuation of volatile agents to allow recovery.

If Problems Arise with Partial Obstruction Following the Opening of the Tonsillar Gag, Several Checks Can Be Made

a. Head and neck position
b. FLMA size. Tonsillar gag size
c. The slight tension on the airway tube to maintain a midline position as the blade is introduced by the surgeon, reducing the likelihood of any part of the tube becoming kinked or trapped between the blade and the teeth in particular
d. Try different blade size
e. Further adjustments to head and neck position
f. Change the FLMA size.

CONCLUSION

The use of the FLMA for adenotonsillectomy procedures is associated with a superior recovery profile; less airway soiling compared to uncuffed ETTs.

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How to cite this article: Balaji T, Manoharan TR, Priya ALS, Suresh J. A Case Report of Flexometallic Laryngeal Mask Airway Used in Tonsillectomy. Int J Sci Stud 2021;8(11):10-13.

Source of Support: Nil, **Conflicts of Interest:** None declared.

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Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Report

Stroke Volume Variation Guided Fluid Management Intraoperatively Using Cardiac Output Monitor in a Case of Craniofacial Resection

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Abstract

Early aggressive resuscitation of critically ill patients may limit or reverse tissue hypoxia, organ failure progression, and improve outcome. Similarly, a protocol to optimize preload and cardiac output in patients undergoing major surgery reduced post-operative complications and length of stay. However, overzealous fluid resuscitation has been associated with increased complications, increased length of intensive care unit and hospital stay, and increased mortality. Cardiac filling pressure, including central venous pressure and pulmonary artery occlusion pressure, have been traditionally used to guide fluid management. Studies conducted over the past decades demonstrate that cardiac filling pressures are unable to predict fluid responsiveness. At present, stroke volume variation that normally occurs during phases of the respiratory cycle is used to guide fluid responsiveness during major surgeries.

Key words: Cardiac output, Fluid responsiveness, Stroke volume variation

INTRODUCTION

Precise assessment of volume status is a prerequisite for adequate volume replacement which may achieve optimal organ perfusion and oxygen supply. Frequently used preload indexes such as central venous pressure (CVP), pulmonary artery occlusion pressure (PAOP), intra thoracic blood volume index (ITBI), and left ventricular end diastolic area index (LVEDAI), often fail to provide reliable information as an alternative to these static variables assessment of stroke volume variation has been used as an indicator for hemodynamic monitoring to predict fluid responsiveness in patients requiring major surgeries involving large fluid shifts.[1-4]

CASE SCENARIO

We report a 36-year-old male presenting with ulcers over the hard palate and bleeding from the ulcer site for 30 days and ear pain with discharge. No h/o epistaxis/giddiness. On examination, the patient is moderately built, weighing 60 kg. Another system examination was found to be normal. Echocardiography, spirometry, and other blood investigations are within normal limits. The patient had been diagnosed as recurrent carcinoma hard palate (well-differentiated squamous cell carcinoma) and subsequently underwent partial maxillectomy with supraomohyoid neck dissection in September 2011. Now, because of intracranial extension, middle craniofacial resection and reconstruction with temporalis flap and superficial temporal artery-based osteoplastic flap were planned [Figure 1].

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

ANESTHETIC MANAGEMENT

After getting high-risk informed consent, the patient was scheduled for surgery. The patient was pre-medicated with inj. glycopyrrolate 0.2 mg iv, inj. ranitidine 50 mg iv, inj. ondansetron 8 mg iv, and inj. morphine 4 mg iv. In the operating room, peripheral line was established with 16 gauge Venflon. Other monitors such as NIBP, pulse oximeter, and E.C.G. were used. A continuous spinal catheter was placed at the L2-L3 level with 19G epidural catheter to reduce the intracranial pressure. After local infiltration and anesthetizing lower airway, tracheostomy was performed and 8 sizes

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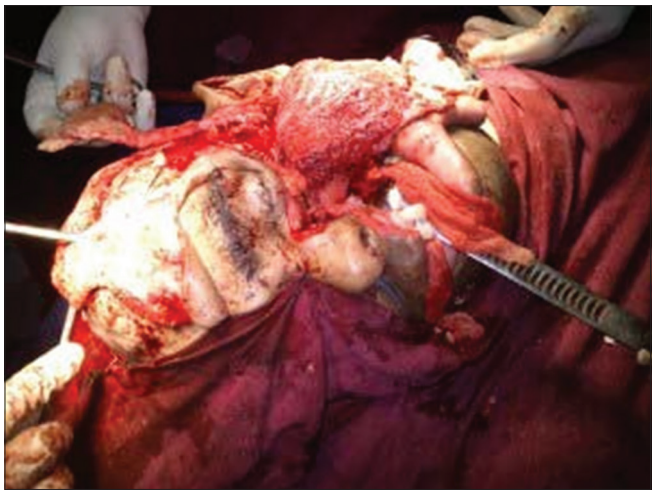

Figure 1: Craniofacial resection being done

Figure 2: Cardiac output monitor showing stroke volume variation and stroke volume index

flexometallic tube inserted. After checking tube position and air, entry patient was induced with inj. propofol 130 mg iv and inj. atracurium 35 mg. Anesthesia was maintained with isoflurane oxygen-nitrous oxide volume-controlled ventilation with a tidal volume of 8 ml/kg. The right subclavian vein was cannulated with 7 Fr 20 cm triple lumen catheter for central venous pressure (CVP) measurement and the left radial artery was cannulated with 18 gauge Venflon and connected to Vigileo cardiac output monitor. After induction, the following variables are measured: CVP, S.V., CO, and stroke volume variation (S.V.V.). Then, S.V.V. was measured at 15 min intervals whenever S.V.V. is more than 13% fluid was given with crystalloids and hetastarch in increments of 50–100 ml to maintain S.V.V. around 10 and CVP of 6–10 mmHg [Figure 2].

DISCUSSION

Several dynamic tests of volume responsiveness are reported. These tests dynamically monitor change in stroke volume after a maneuver that increases or decreases venous return. Tests such as pulse pressure variation (PPV) derived from analysis of arterial waveform, S.V.V. derived from pulse contour analysis, and variation of the amplitude of pulse oximeter plethysmographic waveform are highly predictive of fluid responsiveness.[5] Systolic arterial pressure variation (SPV) and PPV are also influenced by the vasomotor tone which is supposed to be less the case with S.V.V. We used S.V.V. for assessing fluid responsiveness in this patient. S.V.V. is the change in stroke volume during respiratory cycle. It occurs due to cyclic changes of intrathoracic pressure induced by mechanical ventilation and can be assessed continuously by any beat-to-beat cardiac output monitor.[6] The following equation assesses S.V.V. as a percentage of S.V. during the ventilator cycle: SVV=SV max-SV min/S.V. mean where maximum and minimum S.V. are mean values of four extreme values of S.V. during a period of 30 s and mean S.V. is the average value for this period.[7] The major determinant of this variable is the reduced venous return during mechanical inspiration. Both arrhythmias and spontaneous breathing will lead to misinterpretation of PPV and S.V.V. For any specific preload, PPV/SVV will vary according to tidal volume and airway pressure. Many studies show that a rise in S.V.V. predicts the subsequent appearance of hypotension and necessity for additional fluid, particularly when S.V.V. exceeds 15%. Intermittent positive pressure ventilation induces cyclic changes in loading conditions of the left and right ventricles. Mechanical ventilation decreases preload and increases afterload of the left ventricle. The right ventricle preload reduction is due to a decrease in venous return pressure gradient. The inspiratory reduction in the right ventricular ejection leads to decreased LV filling after a phase lag of 2–3 heartbeats. Thus, the left ventricular preload reduction may lead to a decrease in the left ventricular stroke volume.

In case of ARDS low tidal volume which is used reduces the amplitude of change in intra thoracic pressure that causes the SVV. If the tidal volume challenge results in increase in absolute value of SVV more than 2.5 % fluid responsiveness is likely.[8] A variation of >12–13% is highly predictive of volume responsiveness. S.V.V. was advocated to be more accurate than SPV and PPV. The patient during sepsis state and undergoing neurosurgery demonstrated the ability of S.V.V. to predict fluid responsiveness.

CONCLUSION

Thus, S.V.V. can serve as a useful indicator of fluid responsiveness in mechanically ventilated major surgical patients. However, further studies are required to demonstrate the usefulness of both automatically

calculated variables to guide volume optimization in critically ill patients to improve outcomes.

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How to cite this article: Suresh J, Manoharan TR, Priya ALS, Balaji T. Stroke Volume Variation Guided Fluid Management Intraoperatively Using Cardiac Output Monitor in a Case of Craniofacial Resection. Int J Sci Stud 2021;8(11):14-16.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Series

Reviewing Anti-histamines in Urticaria

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CASE 1 – DELAYED EPISODES OF PAINFUL URTICARIAL LESIONS

Case Presentation

An otherwise healthy 37-year-old female, who worked in a grocery store (mostly standing) presented with daily episodes of painful hand and feet swellings for the past 8 months. She also reported difficulty in wearing her shoes. Moreover, she experienced skin lesions on the right side of her body at night as she would sleep leaning on that side.

Medical History

- She reported occasional fever and fatigue along with her skin lesions.
- She also reported difficulty in sleeping and a substantial decrease in her daily work productivity and overall quality of life.
- There were no symptoms of fever, joint involvement, or hearing loss.
- The urticaria was not present during early childhood.
- There was no relevant medical family history.
- There was no history of food/drug allergies or insect bites.
- She was a non-smoker and occasionally consumed alcohol during weekends.

Diagnostic Interventions

General examination	
Height	165 cm
Weight	62 kg
BMI	22.77 kg/m^2 (normal)
Blood pressure	126/82 mmHg
Temperature	37.5°C (afebrile)

BMI: Body mass index

Physical and clinical examination	
Visual examination	All lesions appeared in areas where there was continuous pressure applied
Delayed pressure urticaria testing (2 kg weight and a blood pressure cuff)	Positive test – palpable and visible swelling on the right forearm at the site of pressure at the end of 30 min and at 6 h
Routine hematologic and biochemical screening tests (hemoglobin, white blood cell count and differential, erythrocyte sedimentation rate, liver function tests, and urinalysis)	No abnormal findings

Diagnosis

Based on the clinical history and results of provocative testing, the diagnosis was confirmed as "delayed pressure urticaria (DPU)."

Treatment and Management

- The patient was prescribed levocetirizine (5 mg) plus montelukast (10 mg) once daily along with oral prednisolone for a duration of 2 weeks.
- In addition, she was counseled appropriately about her condition, and was strictly instructed to avoid wearing tight clothing, sitting/sleeping on hard surfaces for prolonged periods, carrying heavy groceries, and other such situations.

Follow-up

- After 2 weeks, there was a notable clinical improvement in the symptoms of the patient.
- The patient strictly adhered to the treatment regimen and suggested instructions.
- The patient also reported a significant improvement in her work productivity and overall quality of life.

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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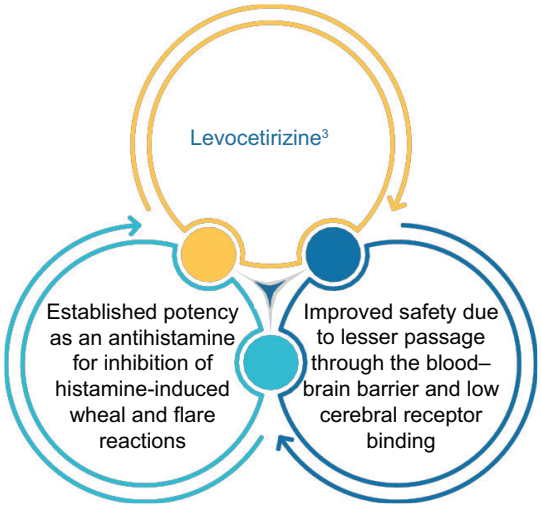
Figure 1: Wheals 6 h after suspension of 7 kg weight over the right shoulder of a patient. (Adapted from Quintero OP *et al.* J Allergy Clin Immunol Pract. 2017;5:179-80.)

DISCUSSION

DPU is a subtype of chronic inducible urticaria, that is characterized by recurring erythematous and often painful swelling after the skin is exposed to sustained pressure.[1] It might compose up to 37% of all physical urticarias, which also includes cholinergic urticaria, solar urticaria, and cold urticaria; but rarely as a primary inducible urticaria.[2] DPU lesions take 4–6 h to manifest and generally last for more than 24 h.[1] Evidence suggests that the quality of life impairment associated with DPU is significantly higher than that in people with chronic spontaneous urticaria, mostly affecting areas of work/study, leisure, etc.[2]A representative image of DPU is illustrated in Figure 1.

DPU is diagnosed based on patient history and the results of skin provocation tests like pressure challenge test.[1,2] Current treatments for this condition include antihistamines, montelukast, oral steroids, nonsteroidal anti-inflammatory drugs, cyclosporine, omalizumab, and intravenous immunoglobulin.[2]



A global assessment indicated that levocetirizine 5 mg once daily was an effective agent in patients with chronic idiopathic urticaria.[3] Its action provides a rapid and satisfactory control of the symptoms and subjective disease measures.[3]

CONCLUSION

Treatment with levocetirizine in combination with other therapies significantly improved the clinical symptoms and quality of life of the patient.

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CASE 2 – ROLE OF LEVOCETIRIZINE IN CHRONIC SPONTANEOUS URTICARIA

Case Presentation

A 38-year-old married Muslim male Mr. Abdul Ahmed, laborer by occupation and resident of Kota, presented with a complaint of recurrent multiple itchy red raised lesions distributed over the whole body for the past 1 year. Lesions persisted for about 4–6 h, and frequency of appearance of lesions had gradually increased from once weekly initially to 8–10 times weekly at present. Lesions were associated with severe itching that impaired his day-to-day activity and work.

Medical History

- No history of swelling over lips, eyelids, or face.
- No associated difficulty in breathing or abdominal pain.
- He had no significant medical history.
- He reported a history of tobacco chewing for 25 years.
- Personal and medical history was non-contributory.
- He consumed alcohol during weekends.

Diagnostic Interventions

Physical and clinical examination	
Physical examination	Patient appeared healthy He had multiple discrete urticarial wheals of varying size from few millimeters to several centimeters over whole body, predominantly over the back
Complete blood count	Normal
Liver and renal functions and urine analysis	Normal
Chest roentgenogram	Normal

Confirmed Diagnosis

Based on the patient history and diagnostic interventions, the diagnosis was confirmed as "chronic spontaneous urticaria."

Treatment

- The patient was initially started on Tab. Xyzal 5 mg (levocetirizine 5 mg) OD after breakfast for 1 week.
- Dose was gradually escalated to 10 mg BD for 1 week to get desired response and thereafter maintained at the same level with regular follow-up at 4 weeks.

Follow-up

- On follow-up, he gave no history of any new lesions or itching.
- The routine investigations (complete blood count, liver, renal functions, urine analysis and lipid profile) were repeated.
- The observed drug was tolerated well with no side effects or derangement of laboratory parameters.

CONCLUSION

This case report suggested that up dosing of XYZAL was quite effective in chronic spontaneous urticaria with good patient tolerability and compliance.

CASE 3 – COLD URTICARIA: MANAGEMENT WITH LEVOCETIRIZINE

Case Presentation

A 29-year-old healthy female presented with a complaint of intermittent itchy rash after being exposed to cold winds.

Patient History

- She noticed that the rash occurred suddenly after exposure to cold, and the rash resolved on its own within 1–2 h each time it appeared.
- She used to have these symptoms for several years since her adolescence, but they had gradually worsened during her recent vacation trip to a colder destination.
- Her worst symptoms occurred when she was exposed to a cold object, like holding a chilled cold drink in the flexure of her arm while she wore a T-shirt.
- She had experienced severe shortness of breath while exercising in the morning and would get facial swelling after using cold water.
- She was otherwise alright without any significant medical history or any medication use and had no known allergies.

Physical Examination

- Afebrile
- Erythematous pruritic wheals appeared after a cold tuning fork was applied for 2 min to the inner aspect of the forearm (cold stimulus test).

Based on her symptom-based clinical data, the patient was diagnosed with cold urticaria

Treatment and Follow-up

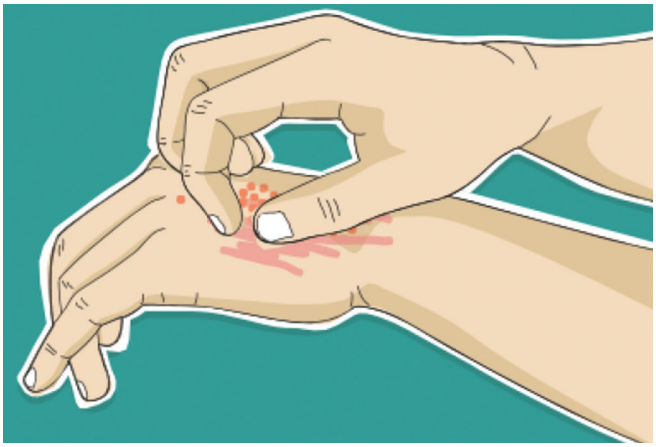
The patient was started on levocetirizine 5 mg once daily for 2 weeks.

At a follow-up visit 4 weeks after initiation of levocetirizine, the patient reported an improvement in her condition with no significant symptoms following a cold exposure.

Treatment Rationale

- The EAACI/GA²LEN/EDF/WAO guideline recommends 2nd generation H1-antihistamines (AHs) to be taken regularly by the patients with chronic urticaria.[1]
- The CSACI, therefore, recommends in agreement with other international bodies, that only less sedating newer generation AHs should be first-line treatment regimen, and should be preferred over older AHs and that the use of first-generation AHs should be significantly curtailed in chronic urticaria.[2]

EAACI/GA²LEN/EDF/WAO: European Academy of Allergology and Clinical Immunology, EU founded network of excellence, the Global Allergy and Asthma European Network, European Dermatology Forum and World allergy organization. CSACI: Canadian Society of Allergy and Clinical Immunology.



DISCUSSION

- Cold-induced urticaria is a form of chronic urticaria with a duration of symptoms of at least 6 weeks.[3]
- It is the second most common type of chronic inducible urticarial.[3]
- It is more common in younger individuals and more likely to affect females as opposed to males.[3]
- Non-sedating AHs, used up to 4 times the standard dose for non-responders to the standard dose, have found to be effective in controlling the frequency and severity of symptoms associated with cold-induced urticaria, regardless of the cause.[3]

Studies on Levocetirizine

- Levocetirizine reduces the discomfort caused by urticaria symptoms in approximately 75% of patients without affecting sleep or safety.[4]
- Levocetirizine in chronic urticaria doubled the effectiveness in the course of treatment at higher doses.[4]
- It improved the quality of life of the patient.[4]

CONCLUSION

Levocetirizine 5 mg once daily is recommended for patients with urticaria induced by cold.

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CASE 4 – A CASE REPORT OF PHYSICAL URTICARIA

Case Presentation

A 39-year-old female presented with a complaint of bilateral areas on her legs, which had been subjected to laser treatment for removal of unwanted hair. The pruritus worsened over time and she experienced a diffuse and substantial wheal and flare reaction.

Medical History

- The patient had a similar but less intensive reaction during her first laser treatment procedure 5 weeks earlier.
- The reaction included initial follicular papules worsening over hours into diffuse urticaria of the lower extremities.
- There was no relevant personal or family history of atopy.
- She denied oral/pharyngeal swelling and shortness of breath.
- She denied history of any pruritic eruptions following exposure to cold, heat, pressure, emotional stress, exercise, or spicy food.
- There was no history of any medication allergies as well.

- She reported being a social drinker and consuming alcohol occasionally.

Diagnostic Interventions

On physical examination	No abnormal findings detected
Dermographism	Negative
Blood pressure	130/84 mmHg
Temperature	37.5°C (afebrile)
Complete blood count	Normal

Diagnosis

Based on the patient history and diagnostics, the diagnosis was confirmed to be "**laser-induced urticaria**."

Treatment

- The patient was prescribed 5 mg levocetirizine once daily for alleviation of symptoms for a week.
- She was also prescribed desoximetasone cream to be applied twice a day to the treatment site.

Follow-up

- No urticarial lesions were noted after a week of continuous treatment.
- At the 1-month follow-up, the patient denied having any more symptoms.
- The patient decided to undergo a third laser hair removal treatment several weeks later.
- The patient did not develop urticaria after prophylactic levocetirizine 5 mg tablet was taken 2 h before the session.

DISCUSSION

Urticarial responses are commonly seen after laser hair reduction procedures.[1] After laser treatment, an urticarial papule develops around each treated follicle that contained a pigmented hair shaft.[1] This urticarial response is usually.

Figure 1: Development of urticaria after using long-pulse duration alexandrite laser

limited to the immediate area surrounding the hair shaft, with a more subtle urticarial response occurring at the entire treatment site.[1] A representative image of laser-induced urticaria is illustrated in Figure 1.[1]

In accordance to clinical evidence, levocetirizine 5 mg/day has been effective in reducing symptoms of chronic idiopathic urticaria and improving quality of life, with an acceptable tolerability profile.[2]

CONCLUSION

Levocetirizine provided symptomatic relief and enabled the patient to complete her laser treatments without trouble.

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CASE 5 – ROLE OF LEVOCETIRIZINE IN CHRONIC SPONTANEOUS URTICARIA

Case Presentation

A 24-year-old male presented to his general practitioner with a complaint of severe itching and relapsing rash.

Patient History

- His symptoms began in the last few months and then became severe in the past 4 weeks.
- The rash was present all over his body without an identifiable trigger with occasional swelling on lips and eyes.
- His symptoms worsened at night and also while wearing tight clothes.

- His symptoms lasted for 6–12 h and troubled him on majority of the days in a week.
- He did not have any previous allergic episodes.
- He looked anxious and depressed while he came to the clinic.
- He only took over-the-counter medications for his itch, which did not give him relief.
- Since he was having persistent symptoms affecting his daily schedule, he needed medical help.

Physical Examination

- Afebrile.
- Presence of wheals and angioedema.
- Review of symptoms was unremarkable.

Laboratory Tests

- Results of routine screening laboratory tests for complete blood count and erythrocyte sedimentation rate were normal

- Based on symptom- based clinical data, the patient was diagnosed with chronic spontaneous urticaria (CSU).

Treatment and Follow-up

- The patient was prescribed levocetirizine 5 mg once daily for 2 weeks.
- At a follow-up visit 4 weeks after initiation of levocetirizine, the patient reported reduction in the number and size of wheals along with a significant improvement in itching.

Treatment Rationale

- The EAACI/GA²LEN/EDF/WAO guideline suggests 2nd generation H1-antihistamines (AHs) to be taken regularly by the patients suffering from chronic urticarial.[1]
- The CSACI, therefore, recommends in agreement with other international bodies, that only less sedating newer generation AHs should be first-line the treatment regimen, and should be preferred over older AHs and that the use of first generation AHs should be significantly curtailed.[2]

DISCUSSION

- Chronic spontaneous urticaria (CSU), previously termed as chronic idiopathic urticaria (CIU),[3] is defined as spontaneous appearance of wheals, angioedema, or both for more than 6 weeks due to known or unknown causes.[1]
- Approximately 40% of patients with CSU report episodes of angioedema or deeper swelling of dermal or mucosal tissues, whereas only 10% show angioedema as their primary manifestation.[3]
- In majority of the cases, it is a self-limiting disorder, persisting for 2–5 years, although 20% of them suffer for more than 5 years.[3]
- New-generation antihistamines taken once daily are effective and well tolerated in the treatment of CSU symptoms and in improving the patient's quality of life (QoL).[4]

Study on Levocetirizine in CSU[4]

- In a study conducted by Nettis *et al.*, levocetirizine was found to be superior in reducing the mean total symptom score as well as individual symptoms, number of daily episodes and number of wheals, and QoL compared to placebo.
- Beneficial effects of levocetirizine appeared during the first 3 weeks and lasted throughout the duration of the active trial and were found to be effective in controlling CSU.
- It concluded that levocetirizine 5 mg once daily is an effective agent in patients with CSU/CIU compared to placebo.

EAACI/GA²LEN/EDF/WAO: European Academy of Allergology and Clinical Immunology, EU founded network of excellence, the Global Allergy and Asthma European Network, European Dermatology Forum and World allergy organization. CSACI: Canadian Society of Allergy and Clinical Immunology.

CONCLUSION

Thus, levocetirizine 5 mg once daily is a favorable treatment choice for patients with chronic spontaneous urticaria.

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CASE 6 – A CASE OF EFFECTIVE TREATMENT OF CHRONIC URTICARIA

Case Presentation

A 25-year-old male, college student by occupation, resident of Jodhpur (Rajasthan), presented with chronic spontaneous urticaria, with a complaint of recurrent multiple itchy, red, raised, wheal, and flare lesions distributed over whole body, predominantly over trunk for 6 months. Wheal and flare lesions appeared 3–4 times/week and persisted for about 12 h.

Medical History

- Wheals and flares were 5–10 cm in size and were associated with severe itching, which impaired his academic performance and led to social pressure.
- No history of swelling over lips, eyelids, or face.
- No associated difficulty in breathing or abdominal pain.
- There was no significant history.
- Personal and medical histories were non-contributory.

Diagnostic Interventions

Physical examination	Patient appeared healthy with multiple discrete urticarial wheals of size varying from 5–10 mm over whole body, predominantly over trunk region
Complete blood count	Normal
Liver and renal functions	Normal
Lipid profile and urine analysis	Normal

Diagnosis

Based on the patient history and diagnostic interventions, the diagnosis was confirmed as "Chronic Spontaneous Urticaria."

Treatment

- The patient was started on Tab. Xyzal 10 mg (levocetirizine 10 mg) B.D. after breakfast for 1 week.
- He was also asked to focus on increasing intake of fruits, vegetables, grains, and low-fat dairy products.

Follow-up

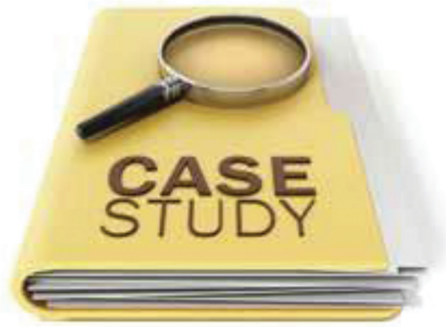
- On follow-up after 2 weeks, there was no complaint of appearance of new wheals and flares.
- There was no itching and urticaria was alleviated.
- He was maintained on the same regimen with regular follow-up at 4 weeks.
- On the next follow-up after 4 weeks, there was no history of any itching or lesions.
- He was advised to come for regular follow-ups in 4 weeks.
- It was observed that the drug was well tolerated, with no side effects.
- Due to twice a day dosing, compliance was good.

CONCLUSION

This case report suggested that updosing of XYZAL was quite effective in chronic spontaneous urticaria with good patient tolerability and compliance.

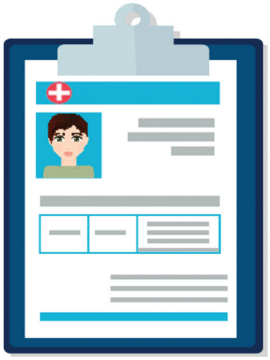
CASE 7 - ROLE OF LEVOCETIRIZINE IN AQUAGENIC URTICARIA

Case Presentation



A 42-year-old woman was referred to the dermatology department due to recurrent episodes of urticarial.

Patient History



- She presented with a 2-year history of pinpoint sized wheals affecting the shoulders, arms, trunk, abdomen, and back, when she took a bath or shower.
- These symptoms appeared within 10–20 min after contact with water and provoked intense pruritus. Each episode lasted for 20–40 min and spontaneously resolved.
- The patient did not complain of angioedema, wheezing, or dyspnea with these episodes.
- She had no personal history of allergies or drug allergy and no family history of urticaria.
- She had no treatment history before visiting clinic.

Investigations	
Clinical investigations	
Immunoglobulin E	1965 IU/mL (normal, 0–170)
Alkaline phosphatase	349 U/L (normal, 106–322)
Eosinophil count	Normal
Immunological study	Within normal ranges
Water provocation tests	
Room temperature wet compress to the upper body for 30 min	Pin head to match head sized wheal surrounded by erythema on the shoulder [Figure 1]
Cold water and hot water compress were also applied for 30 min	Induction of pinpoint wheals at the site of compresses application
Water challenge test with tap water, distilled water, and normal saline	Similar results
Pressure test	
A 6000 g weight was applied to the skin for a period of 20 min	After 8 h, no lesions had appeared
Exercise test	
Running	Lesions were not reproduced after running
Ice cube test	
An ice cube filled plastic bag was applied to the patient's forearm for 20 min	No lesions were noted on the forearm after removal of cold stimulation

Diagnosis

Based on the findings, the patient was diagnosed with aquagenic urticaria.

Treatment

Levocetirizine was prescribed initially at a dose of 5 mg daily for symptom relief.

Follow-up

- After 2 weeks, no lesions had developed on contact with water.
- Once the symptoms were relieved, the dose was reduced to 5 mg every other day.
- The patient was still symptom free at the 1-year follow-up.

DISCUSSION

Aquagenic urticaria (AU) is a type of physical urticaria produced by contact with water. Urticaria is produced irrespective of water temperature, pH, or psychogenic factors. Incidence of AU is slightly greater in women than in men.[1] There is lack of a clear pathogenesis for AU, which has contributed to difficulty in proposing evidence-based treatments for affected patients.[2]

Figure 1: Urticaria after wet compression (Representative image)

Patients with AU usually present with characteristic 1–3 mm folliculocentric wheals and surrounding 1–3 cm erythematous flares within 20–30 min following skin contact with water. They can also experience associated symptoms, including pruritus, burning, and uncomfortable prickling. Diagnosis of AU is largely based on a history of recurrent urticaria after exposure to water combined with a water challenge test.[2]

The urticarial symptoms, such as wheal formation and pruritus, are thought to be mediated, at least partially, by the effects of histamine on the H1 receptor. Therefore, the first-line therapy for AU generally consists of oral H1 antihistamines. The second-generation H1 antihistamines with lesser central nervous system depression, but greater duration of action are preferred in the treatment of urticaria.[2]

Levocetirizine has been shown in observational studies as an effective and satisfactory therapy for patients with allergic respiratory and skin disease. Levocetirizine markedly improves the symptoms of urticaria. In the study by Fang *et al.*, it was shown that 60–80% of urticaria patients, treated with levocetirizine, reported complete or marked improvements in individual symptoms.[3]

CONCLUSION

Second-generation H1-antihistamine such as levocetirizine is effective in resolving symptoms of aquagenic urticaria.

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CASE 8 – A CASE OF CHRONIC SPONTANEOUS URTICARIA

Case Presentation

A 33-year-old man presented to the dermatology clinic with multiple relapsing erythematous edematous wheals primarily on his limbs and trunk region for the past 7 months. The wheals were itchy with a stinging sensation. They appeared recurrently for varying duration (till a few hours) at one site along with new wheals appearing at other sites.

Medical History

- Initially, small, recurrent eruptions occurred on the trunk at the interval of several weeks.
- Gradually, the condition became much worse and involved all four limbs in addition to the trunk with a much higher recurrence, that is, multiple times in a day.
- The patient reported that the wheals aggravated mainly at night and got slightly relieved by the application of warm water provided a slight relief.
- There was no relevant family or personal history.
- The patient also reported residing in a damp environment and having an aversion to open air, even during summers.
- He had a history of complete vaccination with normal response to it.
- There was no relevant history of food or drug allergies.

Diagnostics

Physical and clinical examination	
Physical examination	• Multiple edematous, itchy wheals on trunk and limbs with concurrent burning and stinging sensations • The eruptions were widespread and variable in intensity
Laboratory investigation	• High level of IgE (480 IU/mL) • High level of absolute eosinophil count (1000/mm^3)
CU-QoL	• 78
VAS	• 9

IgE: Immunoglobulin E, CU-QoL: Chronic urticaria quality of life questionnaire, VAS: Visual analog scale

Confirmed Diagnosis

- Based on the symptoms, patient history, and clinical examination, the diagnosis was confirmed as **"chronic spontaneous urticaria (CSU)."**

Treatment and Follow-up

- The patient was initially started on **levocetirizine 5 mg once daily** for a duration of 2 weeks.
- After 2 weeks, there was a visible reduction in the number and size of wheals and substantial improvement in itching.
- However, to achieve complete resolution of the lesions, dose of levocetirizine was increased to 10 mg BD and he was maintained on the same for 4 weeks subsequently.
- At the next follow-up visit after 4 weeks, there was complete resolution of the symptoms and lesions.
- The patient reported significant and gradual improvement in his quality of life.

DISCUSSION

Representative image: Case of urticarial wheals

CSU is a mast cell-mediated condition characterized by spontaneous occurrence of wheals and/or angioedema for a total duration of 6 weeks or more.[1] The global prevalence of CSU is estimated to be between 0.23% and 1.8%.[1]

Women are affected twice as often as men.[1] Both children and adults are affected, although the prevalence is highest in the 40-60 years age group.

The management of CSU is aimed at avoiding exacerbating factors and controlling symptoms as long as CSU persists.[1] The second-generation H1-antihistamines taken regularly, are the first-line pharmacological treatment.[1] If symptoms persist at 2–4 week intervals, the dose can be uptitrated to 4 times the standard dose.[1]

In accordance to recent evidence, the second-generation H1-antihistamine, levocetirizine demonstrated superior therapeutic efficacy to placebo for the treatment of patients with CSU.[2]

Compared with placebo, levocetirizine had significantly reduced wheal scores with small to medium effect sizes.[2]

CONCLUSION

As established by the current case report, levocetirizine is an effective and well-tolerated pharmacotherapy for CSU.

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How to cite this article: Arora J, Jain S, Sharma J, Singh JK, Kapoor S, Singhi MK, Keshari M, Pudukadan D. Reviewing Anti-Histamines in Urticaria. Int J Sci Stud 2021;8(11):17-26.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Review Article

Niti: A Savior in Endodontics

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Abstract

A wide array of NiTi instruments has been introduced for shaping root canals. Many variables and physical properties influence the clinical performance of NiTi rotaries. It is the clinical experience, handling properties, safety, and case outcomes that decide the fate of a particular instrument design. This review article appraises the mechanical properties and advancement of NiTi instruments.

Key words: Advances in niti, Mechanical properties, Nickel–titanium, Rotary instruments

INTRODUCTION

One of the primary goals of endodontic therapy is the complete debridement of pulp tissue from the canal, coupled with shaping of the root canal system.[1]

The introduction of nickel–titanium (NiTi) alloys and the subsequent automation of mechanical preparation was the first steps toward a new era in endodontics.[2,3] Recent advances in manufacturing process of NiTi alloys have allowed for development of rotary endodontic files that are more flexible, less likely to fracture and more capable of maintaining the original canal position than their predecessors.[4,5]

HISTORY

In 1963, NiTi alloy was generally developed for the U.S. space program at the Naval Ordnance Laboratory and named as "Nitinol."[6] It was 1st used in 1971 by Andreasen and Hilleman in manufacture of orthodontic wires.[7] Later, in 1988 Walia, Brantley and Gerstein introduced 1st handheld NiTi made by matching orthodontic wire. A new concept in file design, that is, ProTaper system (Dentsply, Sirona) was introduced in 2001.[8]

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

In 2011, the Swiss dental specialist COLTENE developed method for modifying DNA of NiTi, in which files were given true shape memory and thus allowed exceptionally precise working.[9] Most recently in 2016 same manufacture introduced Hyflex electrical discharge machining (EDM) system, also made from NiTi CM 495 alloy.[3]

MECHANICAL PROPERTIES OF NITI

NiTi alloy used in endodontics contain approximately 56 wt.% nickel and 44 wt% titanium resulting in a nearly one to one atomic ratio.[10] The equiatomic NiTi alloy can exist in 2 different temperature-dependent crystal structures named austenite (parent phase with cubic B2 crystal structure) and martensite phase (low temperature phase with monoclinic B19 crystal structure)[11] and possesses typical characteristics which are super elasticity (SE) and shape memory effect (SME).[12,13] These properties occur as a result of the austenite-to-martensite transition (martensitic transformation), which can be introduced by stress or temperature.[14,15]

ADVANCES IN NITI ALLOY

More recently, a new generation of the Race system – the booster tip (BT)-RaCe instruments – was introduced.[3,16] These instruments have a special non-cutting "booster tip" (BT) up to 0.17 mm in length with six cutting edges and a reduced diameter, which, according to the manufacturer, facilitates progression of the instrument to the apical region of the root canal while maintaining its original curvature.[3]

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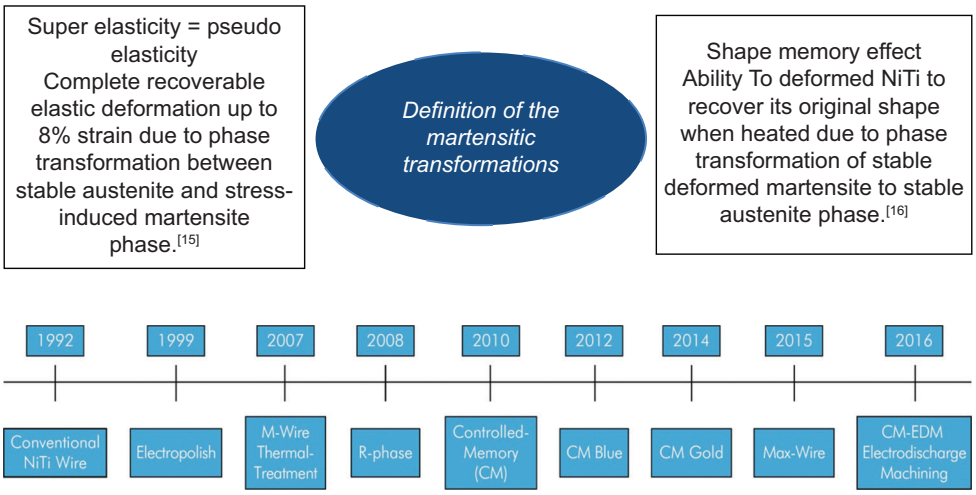

Similar to the Race system, the EndoSequence instruments (Brasseler, Savannah, GA, USA) also undergo electrochemical treatment after machining, which consists of immersion in an ionic solution through which an electric current pass to remove any irregularities generated during the manufacturing process.[3]

In 2007, Tulsa Dental developed a new NiTi alloy known as M-Wire, composed of Nitinol 508 (55.8% Ni by weight, Ti completing the balance), which undergoes unique thermal treatments at various temperatures, done before the instruments are machined.[3] This material contains both the martensite and R phases, while maintaining pseudoelasticity.[17] Compared to instruments fabricated from conventional NiTi alloys, instruments made from M-Wire alloy have higher cyclic fatigue resistance and improved mechanical properties.[18]

In 2008, Sybron Endo introduced a series of mechanical NiTi instruments subjected to a special heat treatment after completion of the machining process, which creates an additional phase change in the crystal structure of the alloy to improve flexibility and strength, besides accommodating some of the internal stress caused by machining.[3,19] As noted above, this phase of the NiTi alloy (the R phase) is an intermediate phase between martensite and austenite and occurs during martensitic transformation when cooling to the R phase, as well as from the R phase to marten site.[20]

In 2010, instruments manufactured with controlled memory (CM)-wire thermal treatment technology were introduced by DS Dental (Johnson City, TN, USA).[21] After machining of Nitinol SE508, a heating and cooling process gives the alloy control over the shape-memory effect, allowing the instruments to be pre-bent, which confers greater fatigue resistance and flexibility, contributing to a more centered canal preparation and lower rates of transportation.[3] These instruments also contain less nickel (52%) than conventional SE alloys (54–57%), which improves the mechanical properties of the alloy.[22]

In 2011, Coltene/Whaledent (Cuyahoga Falls, OH) introduced the Hyflex line with instruments made from (CM-Wire, Johnson City, TN, USA).[23] The system consists of instruments developed to work specific regions of the root canal, starting with removal of cervical interferences with an orifice shaper, followed by preparation of the middle and apical thirds, and ending with more tapered instruments for final shaping.[3,24]

In 2012, Dentsply Sirona introduced a new heat treatment process for NiTi CM alloys, whereby instruments are repeatedly heat-treated and then cooled, which results in a surface color corresponding to the thickness of the layer of titanium oxide.[3] The Vortex Blue (Dentsply Sirona), Sequence Rotary File and X1 Blue File (MK Life, Porto Alegre, RS, Brazil), Reciproc Blue (VDW), ProTaper Gold (Dentsply Sirona), and WaveOne Gold systems are manufactured using this technology.[3] In the NiTi Blue Wire alloy, the thickness of the titanium oxide layer is 60–80 nm, whereas in the NiTi Gold alloy, this thickness is 100–140 nm.[3,25]

More recently, in 2016, the same manufacturer introduced the Hyflex EDM system (Coltene/Whaledent, Cuyahoga Falls, OH), also made from NiTi CM 495 alloy, but manufactured using spark-erosion technology, widely used in engineering.[3] This EDM, or EDM, is a non-contact thermal erosion process employed in the manufacture of electrically conductive materials which use controlled electric discharges in the presence of a dielectric fluid.[26,27] This processes "melts" the surface of the metal (in this case, a NiTi alloy), partially evaporating small portions of the metal and leaving behind an eroded surface.[3]

Recently, a special NiTi alloy known as MaxWire (Martensite-Austenite Electropolishing-Flex, FKG) was developed for

the manufacture of instruments in the XP-endo family (FKG): XP-endo Finisher (XP-F), XP-endo Finisher Retreatment (XP-R), and XP-endo Shaper (XP-S).[3] As a result of the alloy treatment, at temperatures equal to or greater than 35°C, it shifts from the martensitic to the austenitic phase, giving the instrument a semi-circular shape that allows it to project against the walls of the root canal when rotating, performing eccentric rotary motion.[3,28] Thus, XP-endo instruments are able to adapt to the morphology of the root canal system, expanding, or contracting as they advance along the working length.[29] The XP-endo Finisher has an ISO 25 diameter and zero taper (25/0.00). Its main purpose is to provide supplementary cleaning of the canal at the end of chemical and mechanical preparation by touching hard-to-reach areas of the root canal walls, preserving dentin, and the internal anatomy of the canal.[3] It has been reported that the mechanical action of XP-F, when combined with agitation of the irrigant, promoted greater bacterial reduction and biofilm removal from the main canal and dentin tubules.[3,30]

CONCLUSION

Recent advancements in the manufacturing process of NiTi alloys will enhance the quality of endodontic treatment by the development of newer endodontic instruments with superior mechanical properties. Post-machining thermomechanical heat treatment will increase durability of the instrument by increasing the flexural/cyclic fatigue resistance. SE and SME of the NiTi instruments will result from phase transformation on heat treatment, which offered a promising result in enhancement of fatigue resistance during root canal preparation in complicated curved canals. In future, further research has to be needed for heat treatment of retreatment file systems and to improve the efficiency, safety, and quality of endodontic instruments.

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How to cite this article: Gandhi C, Gupta S, Gupta P. Niti: A Savior in Endodontics. Int J Sci Stud 2021;8(11):27-29.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Review Article

Teledentistry: The Lifeline for an Oral Diagnostician during Coronavirus Disease-19 Pandemic in Asia

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Abstract

Teledentistry is the remote facilitating of dental guidance, treatment, and education through the use of information technology instead of direct face-to-face contact with patients. Teleconsultation, telediagnosis, teletriaging, and telemonitoring are subunits of teledentistry that has important functions relevant to dental practice. There are many challenges for acceptance of this technology by the dentists as well as patients, which need to be addressed urgently. Teledentistry can offer an innovative solution to resume dental practice during this pandemic in our Asian population. This article reviews the origin, rationale, scope, basis, and requirements for teledentistry, along with the current evidence that exists in the literature and illustrates how the digital transformation will strongly aid oral medicine specialists and their patients

Key words: Oral Medicine, Teledentistry, Telediagnosis, Teleconsultation, Teletriaging

INTRODUCTION

Over the past decade, significant changes have occurred in information and telecommunication technology in health-care fields that have had a positive impact on practice style.[1] Like other health professionals, dentists have seen a lot of change over the years from regular procedures to digital technology that is taking dentistry to greater heights.[2,3] New terms like "telemedicine," "teledentistry" and "telepharmacy" have caught the public's attention. Although many disciplines exist within the health care field, they all share an important common denominator: The use of telecommunication technology as an important role in health-care practice. Teledentistry is an emerging field in our specialty that integrates electronic health records, telecommunications technology, digital imaging, and the internet to link dental providers and their patients. The foundations of teledentistry lies in telehealth and telemedicine technologies that have been in practice since the 1950s.[1,2] Our field has experienced extensive technologic innovations; recently and particularly, these advances have been made by the use of computers, digital diagnostic imaging services, and devices with respective software for analysis and follow-up.[3]

With scientific advancements happening rapidly, the mankind was taken up to a surprise challenge. Coronavirus disease 2019, also called (COVID-19), is a recent infectious disease that is rapidly spreading worldwide and has taken up many lives till date. COVID-19 has as its etiologic agent the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): The 2019 coronavirus is different from SARS-CoV, but it has the same host receptor: human angiotensin-converting enzyme 2 (ACE2). The epidemics of COVID19 started from Wuhan, China, last December and has become a major challenging public health problem for not only China but also countries around the world.[4-6] On January 30, 2020, the World Health Organization announced that this outbreak had constituted a public health emergency of international concern.[6-7]

Access this article online

www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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During such a pandemic, where every person is worried about their life and scared beyond any normal behavior, oral health has taken a back seat. Patients who suffer from dental issues are in a dilemma over available options to address their unbearable toothache, uncontrolled gum bleeding and other serious oral health issues. Furthermore, the ones who have just minor queries cannot contact the dental health specialist due to the prevailing lockdown situation. That's when the teledentistry comes into picture.

WHAT IS TELEDENTISTRY?

Teledentistry is a combination of telecommunications and dentistry, involving the castling of clinical information and images over remote distances for dental consultation and treatment planning.[8-10] It is a synergistic combination of telecommunications, technology, and the internet, which ultimately has taken up dentistry to a relatively new and an exciting field that has endless potential. The term "Teledentistry" was first used in 1997, when Cook defined it as "the practice of using videoconferencing technologies to diagnose and provide advice about treatment over a distance."[8,9]

The use of teledentistry as a means to improve access to oral health services in areas with inadequate availability of general and specialty dental care is emerging as a practical solution in emergency aid, initial consultation, and expert opinion.[8,11] Like other health-care professionals, dentists too can use every option at their disposal to provide quality dental care to those who are in need. With simple tools such as smartphones and laptop webcams, dentists can provide their services to all patients safely from their homes, thereby eliminating their risk of infection.[8,10-12] Teledentistry can occur in two forms, namely, "*real time consultation*" [Figure 1] and "*store and forward*" [Figure 2]. The real-time method transfers the information immediately, whereas the store-and-forward method allows data to be stored in a local database to be forwarded as and when needed.[9]

IDEAL REQUIREMENTS FOR TELEDENTISTRY

Internet is the basis of modern systems of teledentistry, being up-to-date, fast, and able to transport large amounts of data. There are numerous reasons why internet-based teledentistry has taken precedence over other ways of communication: The reasons being speed, low cost, efficacy, documented consultation, minimized occupancy, simultaneous communication of multiple participants, and asynchronism.[13] To enable live video conferencing, one might employ a widely available standalone Internet Protocol/Integrated Services Digital Network video conferencing solution, or install a Peripheral Component Interconnect codec board into the system. If a live group session is desired, a multipoint control unit that bridges three or more parties is required. The codec must be able to accommodate audio and visual functions.[1,13-15]

However, for most dental applications, store-and-forward technology provides excellent results without excessive costs for equipment or connectivity. A typical store-and-forward teledentistry system consists of a computer with substantial hard drive memory, adequate random access memory, and a speedy processor; an intraoral video camera and a digital camera for the capture of pictures; a modem and an internet connection.[3,13,16] This data packet may include the patient's history, relevant clinical photographs, digital X-rays, and other higher investigative details.[2]

UNDERSTANDING THE CONCEPTS AND CHALLENGES

In South East Asia, India is a developing country and most of the population belongs to a rural background where some of the basic amenities of daily routine life are missing, especially primary health education and services.[2] Primary and community health centers can be equipped with modern telehealth and teledentistry to facilitate education and better services to the society. Students, teachers from educational institutions at various levels, and social workers from gram panchayat can be educated and trained toward the importance and functioning of telehealth. Instructors of teledentistry educational courses need to have both teaching experience and computer knowledge. The team must be guided by instructors who are experienced in leading online communication, able to promote discussion, and familiar with the use of updated computer technology.

GUIDELINES TO BE FOLLOWED

During this pandemic, our goal as dental care providers is to use telecommunication technology to triage patients, conduct problem-focused evaluations and to limit office visits to urgent or emergency care.

Protocols[17]

- Take control of appointments in your own hands.
- Talk to all patients over the phone before their visit to the clinic. Depending on the symptoms, ask for some basic investigations before you see them in person for an early diagnosis.
- Preferably use over the counter drugs.
- Make all attempts to screen these patients for symptoms/signs of COVID infection and refer appropriately, if suspected.

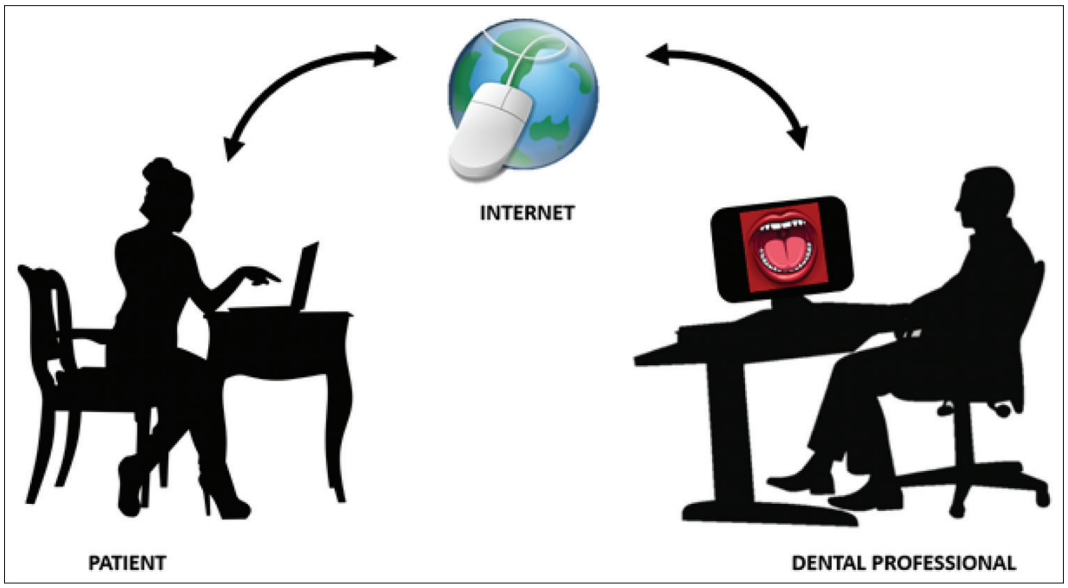

Figure 1: Real-time consultation involves a video conference between dental professionals and their patients, at different locations, through which they can see, hear and communicate with each other

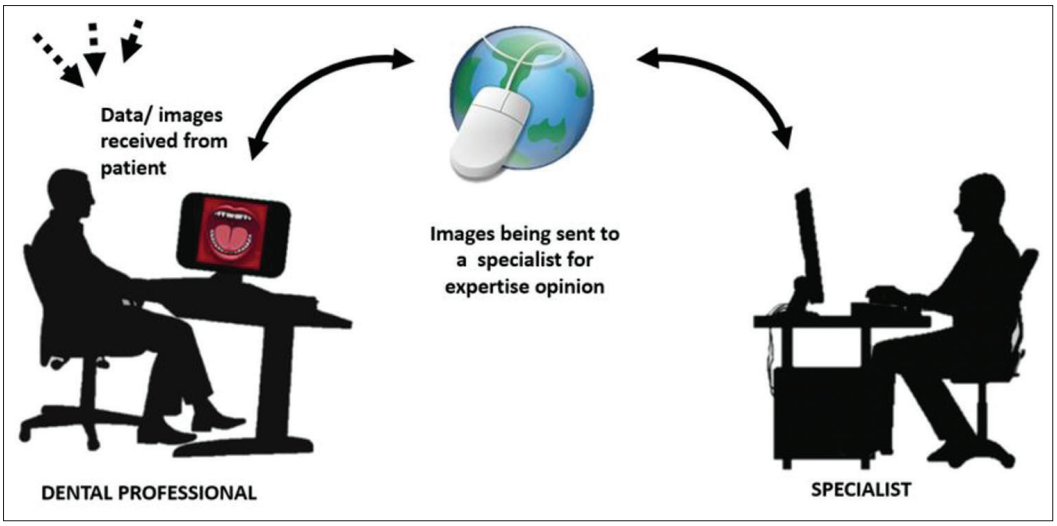

Figure 2: Store-and-forward method involves the exchange of clinical information and static images collected and stored by the dental practitioner, which is sent for an expertise opinion for a more appropriate treatment planning in the patient's absence[8]

- Audio record the conversation with prior consent of the patient.
- Record all personal details of the patients as spoken by the patient
- If audio not recorded, make an entry in your diary, stating time of conversation, personal information and clinical details. The concluding part will contain your diagnosis and expertise as you would do if patient was seen by you physically.

American Dental Association Guidelines for a Virtual Appointment through Telecommunication

- Technology utilizing method of communication platforms open to the public is prohibited (e.g.: Social media encounters).
- Technology utilizing closed method of communication is acceptable (e.g.: video conference through mobile device, telephone conversation, computer-based software, smartphone communication through text message, email, and photos).
- Patients must be made aware of privacy implications when using these communication methods and encryption must be used whenever possible.
- Encounters through telecommunication must be properly documented in a patient's record. Proper documentation of services provided must include details of encounter such as date of service, time, and duration, along with supportive documentation describing encounter.[18]

MERITS AND DEMERITS

Merits	Demerits
1. Distance diagnosis of oral diseases is possible.	1. Treatment will require a visit to the clinic.
2. Can provide preventive services.	2. Additional diagnostic aids such as percussion and palpation cannot be performed.
3. Less patient exposure due to digitalization of techniques and equipment.	3. The accuracy of intraoral photographs may vary.
4. Better discussion of patient's problems with other peer dentists of concerned specialty within minutes, therefore, better treatment planning.	4. Initial investment is high.
5. Provide oral health-care services to patients who are medically compromised, children and geriatric populations.	5. Time consuming during signal issues and technique sensitive.
6. Decreased time and labor required to store the data.	6. Technical problems occurring during data transmission may cause a misdiagnosis or medical error
7. No wastage of papers and files for patient records.	7. Legal issues regarding the confidentiality of the patient information may raise concern[19]
8. Effective chairside time management[1,3,13,19]	

APPLICATIONS OF TELEDENTISTRY IN ORAL MEDICINE

An experienced oral physician can confidently and independently analyze the obtained clinical information and images. His scope will not only include common teeth and gum problems, but a wide range of orofacial disorders such as oral cancer, temporomandibular joint disorders, oral mucosal diseases, salivary gland disorders, orofacial pain disorders, and infective orofacial lesions. Success was tasted in studies conducted by Torres-Pereira *et al.* (2013) and Castro *et al.* (2014) in a population of 60 and 102 patients, respectively, to understand the efficacy of teledentistry in the field of oral medicine and radiology which concluded that it is a reliable alternative to the traditional oral examination for dental caries assessment and increased accuracy of consultations was seen when two observers participated.[13] Belfast in N. Ireland has successfully proved that distant diagnosis is an effective alternative in the diagnosis of oral lesions using transmission of digital images by E-mail in a community dental service.[19] Summerfelt reported a teledentistry-assisted, affiliated practice dental hygiene model developed by the Northern Arizona University Dental Hygiene Department that allowed dental hygienists to provide oral health care to underserved populations by digitally linking up with a distant oral health team.[3] A study by Jacobs *et al.* (2002) reported accurate results during comparison of radiographs viewed through the telemedicine versus while viewing in person.[20,21] Birur *et al.* (2015) conducted a cohort study in 2000 individuals and concluded that, in the targeted cohort, out of 61% interpretable images, 45% of the lesions confirmed by him were in 100% concordance with the specialists.[22] The role of oral diagnostician in offering specialist services to the deprived population in remote areas can be clearly demonstrated with these studies.

NEED OF THE HOUR

Dentistry today needs a complete structural and cultural change to prevent doctors as well as patients from getting infected. Dental specialists should adopt telementoring and establish a digital hybrid learning platform to create awareness and regulate important information through social media or by conducting webinars to influence more people positively. Furthermore, there is a need for telementoring in dentistry to curb panic and fear and communicate facts. The coming together of dentistry, pharma, and IT in the country will make a huge positive impact in providing essential, acute emergency dental services to the general public. Practitioners should start practicing teledentistry globally which can be incredibly useful for triaging and will also reduce direct contact with patients. However, this needs to be regulated and also remunerated. This model, if adopted in India, can help save time, effort, and money significantly, thereby providing emergency dental access to the masses.

FUTURE PROSPECTS

The advances in telecommunication have rightly enabled the dental care to promise many exciting changes in the coming years. There are certain issues which if resolved might benefit the success of teledentistry.[20, 23,24] These issues include the following:

1. Today's dental students are facing many new challenges on graduation. Introduction of teledentistry technology and education into their curriculum, can serve as an eye-opener toward exciting opportunities and advanced approaches in their growing career.
2. Since most of the teledentistry-based education programs are in English, the Information Technology professionals should come up with an advanced software incorporating regional languages so that teledentistry will reach a larger section of the society in our country's diverse population.
3. Light-field-based 3D telemedicine could be the next generation cutting edge technology in teledentistry. This enables recording light rays in a single shot and provides 3D glass-free display with a wide zone of viewing as well as an immersive 3D display and highly

detailed convertible algorithm with patient details incorporated in it.[19]

CONCLUSION

COVID-19 is having a devastating impact in the field of dentistry, and with the pandemic still on the growth curve, it is difficult to ascertain the extent and severity of its long-term impact at this point of time. The professional future of dental practitioners and the sustenance of their practices is a serious concern. Utilizing current teledentistry technologies, oral health-care providers can digitally acquire and transmit diagnostic data to a distant dentist for triage, diagnosis and patient referral. Day-by-day, the use of this new field is attracting dentists across the globe and bringing the fraternity closer as well as improving the quality of the services rendered. Studies involving greater number of participants will be required in future to validate the various aspects of teledentistry applications.

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How to cite this article: Anitha R, Ganesh MR, Vardhan BG, Gopal KS. Teledentistry: The Lifeline for an Oral Diagnostician during Coronavirus Disease-19 Pandemic in Asia. Int J Sci Stud 2021;8(11):30-34.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Study of Jaundice Profile in Pregnancy with Emphasis on Maternal and Fetal Outcome

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Abstract

Introduction: Jaundice in pregnancy leads to adverse maternal and fetal outcome. Viral Hepatitis B and hemolysis, elevated liver enzymes, and low platelets syndrome are the common causes of Jaundice. Various complications such as hepatic encephalopathy, hepatorenal failure, disseminated intravascular coagulation, post-partum hemorrhage, and abruptio placentae occur leading to increased maternal and perinatal mortality.

Aims and Objectives: The aim of this present study in to analyze the causes and various complications so that early diagnosis and management can be done to reduce the fetomaternal morbidity and mortality.

Material and Methods: Pregnant woman with jaundice of all trimesters were selected for study.

Results and Conclusion: The incidence was found to be 0.81%. Majority of the patients were in the age group of 20–30 years, both primi and multigravidae. Maternal mortality was 8% and perinatal mortality was 38%.

Key words: Jaundice, Pregnancy, Fetomaternal outcome

INTRODUCTION

Jaundice is yellowish discoloration of skin and mucous membrane resulting from increased serum levels of bilirubin, either direct or indirect. Only a smail percentage of pregnant women are affected by jaundice, but it has adverse outcomes for both the mother and the fetus, especially in developing countries like India.

Jaundice in pregnancy occurs 1 in 1500 cases and is an important medical disorder seen more often in developing countries than in developed ones. It is responsible for 14% of maternal and 60% perinatal deaths.

Jaundice in pregnancy can he caused by diseases unique to pregnancy such as toxemia of pregnancy, hyper emesis gravidarum, intra hepatic cholestasis of pregnancy, hemolysis, elevated liver enzymes and low platelets (HELLP) syndrome, and acute fatty liver of pregnancy (AFLP). There are a number of diseases causing jaundice, which occur coincidental with pregnancy such as viral hepatitis A, B, C, E, gall stone disease, hemolytic anemia, or due to drug administered during pregnancy. Pre-existing liver disease can also cause jaundice in pregnancy such as cirrhosis of liver, chronic viral hepatitis B and C, autoimmune hepatitis, and Wilson's disease.

As jaundice in pregnancy carries grave prognosis for both the mother and the fetus, the present study was undertaken to identity various causes of jaundice and to analyze the altered liver functions. This study will help us in better management of the cases of jaundice in pregnancy and in improving the maternal and fetal outcome.

Access this article online

www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

MATERIALS AND METHODS

This study was done at Nalanda Medical College Hospital, Patna, from January 15, 2018 to 14th December 14, 2019.

Ninety pregnant woman with jaundice of all trimesters admitted in indoor of the hospital were selected for prospective study.

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Detailed history was taken and meticulous general, systemic, and obstetrical examinations of the patient were conducted. The routine blood investigations such as complete blood count, reticulocyte count, and rapid test for MP were carried out, along with liver function tests, serum bilirubin (total, direct, and indirect) serum glutamic-pyruvic transaminase (SGPT), serum glutamic-oxaloacetic transaminase (SGOT), alkaline phosphatase (ALP), total protein, albumin and globulin, coagulation profile, and viral markers study including HBsAg, anti-HAV IgM, anti-HCV Ab, and anti-HEV IgM. Ultrasonography of hepatobiliary system was also advised. An analysis of maternal and fetal outcome was done.

RESULTS

During the study period, total number of antenatal admissions was 11020, out of which there were 90 case of jaundice. Hence, the incidence of jaundice was 0.81% . In this study, patients were from 19 to 35 year of age, majority being in the age group of 20–30 years, that is, 82% [Table 1]. About 60% were primi and 40% were multigravidae [Table 2]. About 90% of cases of jaundice in pregnancy presented in third trimester followed by second trimester 8% and first trimester, 2% [Table 3]. Out of 90 cases only 5 were booked [Table 4].

On analyzing the symptoms, 70% cases presented with yellow coloration of sclera and urine, 50% with nausea and vomiting, 44% with loss of appetite, and 40% with fever. A few presented with upper abdominal pain, itching, and passage of clay stool. As regards signs, icterus was present in all cases, edema in 28%, hepatomegaly in 22%, and epigastric tenderness in 20%. Ascites, splemomegaly, and scratch marks were found in certain percentage of cases [Table 5]. Bile salts and bile pigments were positive in 40% cases. The level of serum bilirubin varied between 2 and 18 mg % the highest being in the range of 2–5 mg %, i.e., 44%. The level of SGPT was 100–500 IU/L in 53% cases, <100 IU /L in 40 % cases, and more than 500 IU/L only in 7% cases. In maximum number of cases, level of ALP was <500 IU/L, that is, 76%, 500–1000 IU/L in 20%, and more than 1000 IU/ L only in 4% cases [Table 6].

The most common case of jaundice in pregnancy was viral hepatitis constituting 60% cause. Hepatitis E was detected in 2 and Hepatitis B in 10 cases. Out of 90 cases of jaundice in pregnancy, there were eight cases each of HELLP syndrome and chronic liver disease (CLD), seven cases each of intraheptic cholestasis and hyperemesis gravidarum, and five cases each of AFLP and transfusion reaction [Table 7].

On analyzing the pregnancy outcome, 45 had preterm and 36 term deliveries out of 90 cases. Seven had abortion and two died during the antenatal period [Table 8]. Ten cases delivered by LSCS. There were seven cases of hepatic encephalopathy and three of hepato renal failure. Five cases developed disseminated intravascular coagulation (DIC). Atonic post-partum hemorrhage (PPH) was seen in nine patients and four had abruptio placentae [Table 9]. Maternal mortality was 8% [Table 10].

As regards fetal outcome, there were 25 preterm and 31 term live births. There were 19 cases of preterm intra uterine deaths or still births and four cases of term IUD [Table 11]. Perinatal mortality was 38% and neonatal 10%.

DISCUSSION

In the present study, the incidence of jaundice in pregnancy was 0.81%. It is higher as compared to the study done by Acharya *et al.*[1] (0.4%) and Krishnamurthy *et al.* (0.29%).[2]

Most of the cases were from low socioeconomic class. Majority of cases were in the age group of 20–30 year (82%) and were primigravidas (60%).

The result was similar to the study done by Apraita *et al.* with 52.9% incidence of jaundice in pregnancy in younger

Table 1: Age-wise distribution

Age group	Number of cases	%
20 years	10	11
20–30 years	74	82
>30 years	6	7

Table 2: Distribution of cases according to gravidity

Gravidity	Number	%
Primi	54	60
Multi	36	40

Table 3: Distribution of cases according to period of gestation

Trimester	Number	%
First	2	2
Second	7	8
Third	81	90

Table 4: Distribution of cases according to booking

Booking status	Number	%
Unbooked	85	94
Booked	5	6

Table 5: Clinical features

	Number of cases	%
Symptoms		
Yellowish coloration of sclera and urine	63	70
Fever	36	40
Loss of appetite	40	44
Nausea and vomiting	45	50
Pain upper adwomen	4	5
Itching	9	10
Clay stool	2	2
Signs		
Icterus	90	100
Hepatomegaly	20	22
Splenomegaly	5	6
Epigastric tenderness	18	20
Ascites	10	11
Edema	25	28
Scratch marks	8	9

Table 6: Liver function tests

Test	Number of case	%
Serum bilirubin (mg %)		
2–5	40	44
6–10	22	24
11–15	20	22
>15	8	9
SGPT (IU/L)		
<100	36	40
100–500	48	53
>500	6	7
ALP (IU/L)		
<500	68	76
500–1000	18	20
>1000	4	4

Table 7: Etiology of jaundice

Diagnosis	Number	%
Viral hepatitis	54	60
HELLP syndrome	7	8
Intra hepatic cholestasis	6	7
AFLP	5	5
Transfusion reaction	5	5
Hyper emesis gravidarum	6	7
Chronic liver disease	7	8

Table 8: Pregnancy outcome

Outcome	Number	%
Abortion	7	8
Preterm delivery	45	50
Term delivery	36	40
Died in antenatal Period	2	2

age group and 51% cases were primigravidas. Majority of cases, that is, 90% presented in third trimester with higher complications during this period. The result was similar to that found by Harshad *et al.*[3] and Shukla *et al.*[4]

Table 9: Maternal outcome

Outcome	Number	%
DIC	5	6
Abruption	4	5
Atonic PPH	9	10
Hepatic encephalopathy	7	8
Hepato renal failure	3	4
Morality	7	8

Table 10: Maternal mortality

Diagnosis	Number of cases	Maternal mortality	%
HELLP syndrome	7	1	1.11
AFLP	5	1	1.11
Hepatitis	54	4	4.44
Hepatorenal failure	2	1	1.11

Table 11: Fetal outcome

Outcome	Number	%
Term live babies	31	35
Preterm live babies	25	28
Term IUD	4	5
Preterm IUD/ still birth	19	22
Neonatal mortality	9	10
Perinatal mortality	34	38

Viral hepatitis was the most common cause of jaundice in the present study, that is, 60%. Shukla *et al.* reported 57. 10 and Harshad *et al.* reported 47% cases of viral hepatitis. According to the study done by Karegoudar *et al.*, the most common cause of jaundice in pregnancy was HELLP syndrome (64%), followed by viral hepatitis.

In the present study, the incidence of HELLP syndrome was 7%. Cases of AFLP, CLD, hyperemesis gravidarum, intrahepatic cholestasis, and transfusion reaction were few in number, varied between 5% and 7%. Level of serum bilirubin, SGPT, and SGOT was found to be high in viral hepatitis, more than 500 IU/ml. Harshad *et al.* also reported marked elevation of bilirubin and transaminases about 10 fold in viral hepatitis. Pregnancy-associated liver diseases such as HELLP syndrome, intrahepatic cholestasis of pregnancy, and hyper emesis gravidarum had only 2–3 fold elevation.

In the present study, maternal mortality was 8%, 31 patients developed complications. Out of 54 case of hepatitis, seven developed hepatic encephalopathy and three hepatorenal failure. Four died of hepatic encephalopathy and one of heptaorenal failure. Hepatitis E was culprit in I case and Hepatitis B in two cases of hepatic encephalopathy. Atonic PPH developed in 10%, DIC in 6%, and abruption in 5% cases. Three cases of DIC were caused by HELLP syndrome and 2 by AFLP.

Maternal mortality was 24.4% according to Tripti *et al.*[5] and 7.8% according to Jayati *et al.*[6] Jain *et al.*[7] reported 3.92% cases of abruption.

As regards fetal outcome, there were 50% preterm deliveries and 28% preterm live births. There were 22% preterm IUDs or still births. Kumar *et al.*[8] reported 66.6% and Harshad *et al.* reported 32% preterm deliveries.

Perinatal mortality in this study was 38%. It was comparable to that reported by Rathi *et al.*,[9] 35.4% and Kumar *et al.* 26.5%. Tripti *et al.* and Karegouder *et al.*[10] reported higher prenatal mortality 61.76% and 46.16%, respectively. Neonatal mortality was 10% caused by HELLP syndrome, Hepatitis E, Hepatitis B, and intrahepatic cholestasis of pregnancy.

CONCLUSION

Although incidence of jaundice in pregnancy is low, it is associated with poor maternal and fetal outcome. Regular antenatal check-ups and relevant investigations are required for early diagnosis and proper management of cases of jaundice in pregnancy so as to reduce the maternal and fetal morbidity and mortality. As viral hepatitis is the most common cause, improving sanitary conditions and habits, imparting health education and knowledge of preventive measures will go a long way in reducing the burden of jaundice in pregnancy.

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How to cite this article: Sharan M, Kumar M. Study of Jaundice Profile in Pregnancy with Emphasis on Maternal and Fetal Outcome. Int J Sci Stud 2021;8(11):35-38.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Lenticular Status of Fellow Eye of Patient with Unilateral Mature Cataract: A Prospective Study

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Abstract

Introduction: Cataract is a leading cause of blindness in the world, it is an avoidable cause of blindness. Government and NGOs throughout the world are striving to treat cataract and to restore vision in people in this world. Mature cataract causes severe degree of visual impairment unlike immature cataract. Mature cataract prevalence is more because of negligence to get treated at an early stage of cataract.

Aim: This aim of the study was as follows: **(**1) To determine the rate of immature cataract, pseudophakia, and other forms of lens status in fellow eye of patients presenting with unilateral mature cataract, (2) to determine the demography of patient presenting with unilateral mature cataract, and (3) to determine the percentage of mature cataract in hospital and camp patient group.

Materials and Methods: It is a prospective study, all patients within the study period with unilateral mature cataract reported to our outpatient department are grouped as hospital patient group and patients with unilateral mature cataract reported to our camp are grouped as camp group. Demographic details and status of contra lateral lenticular status of all patients were recorded.

Results: Ninety-six of 696 patients had mature cataract which accounts for 13.8%. Mature cataract was found more in females (55.2%) than male (44.8%) that too in female reported in camp had 58.5% mature cataract. About 32% of patients had contralateral pseudophakia, female patients (54.8%) were found to be more than males with contralateral pseudophakia. Most common age group with mature cataract was 60–69 years of age.

Conclusion: Studies have revealed intraocular lens (IOL) implantation significantly improved vision-related quality of living. Although economic conditions play a significant role, availability of adequate and appropriate surgical resources and patient's perception of benefits can increase utility of cataract surgery, Information, education, and counseling about cataract surgery especially among females are the need of the hourssw. Patients should be counseled to be in regular follow-up after first eye cataract surgery, so as to prevent development of mature cataract in fellow eye.

Key words: Blindness, Camp, Cataract surgery, Cataract surgery rate, Immature cataract, Mature cataract, Outpatient, Pseudophakia, Vision, Visual impairment

INTRODUCTION

Cataract is clouding of the lens of the eye which prevents clear vision. Although most cases of cataract are related to the ageing process, occasionally children can be born with this condition, or a cataract may develop after eye injury, inflammation, and other eye diseases.[1] Cataract is responsible for 51% of world blindness, which represents about 39 million people (2010) [Graph 1].[1] Although cataracts can be surgically removed, in many countries, barriers exist that prevent patients to access surgery.[1] Cataract is a leading cause of blindness in the world [Table 1], it is an avoidable cause of blindness. Government and NGOs throughout the world are striving to treat cataract and to restore vision in people in this world. Mature cataract causes severe degree of visual impairment unlike immature cataract. Mature cataract prevalence is more because of negligence to get treated at an early stage of cataract. This study mainly conducted to evaluate the prevalence of mature cataract and that to in patients who had undergone cataract surgery in fellow eye, and neglected to undergo cataract surgery early and resulted in mature

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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cataract as they were satisfied with one eye vision. We also want to evaluate the percentage of people who seek medical treatment voluntarily for mature cataract by dividing them as hospital group and camp group. Cataract surgery rate (CSR) [3] indicates the number of cataract surgery done in patients diagnosed with cataract. Tamil Nadu is a state with higher CSR compared to our national average [Table 2]. We through this study wanted to evaluate effective utilization of service provided by government by the people to avoid blindness.

Aim of the Study

The aim of the study was as follows:

1. To determine the rate of immature cataract, pseudophakia, and other forms of lens status in fellow eye of patients presenting with unilateral mature cataract
2. To determine the demographic details of patient presenting with unilateral mature cataract
3. To determine the percentage of mature cataract in hospital and camp patient group.

Study Period and Type

This is a prospective randomized, observational, and non-interventional hospital-based study.

Study period

The study period was from October 1, 2019, to March 31, 2020.

MATERIALS AND METHODS

The Institutional Ethical Committee approval for conducting the study was obtained. Patients with unilateral mature cataract reported to our hospital outpatient department (OPD) and patients reported to our eye camps were enrolled in our study. Consent from patient to get enrolled in the study was obtained. A thorough ocular examination was carried out to grade that the cataract was done in both eyes of the patients. All patients with unilateral mature cataract reported in our hospitals OPD were grouped together as hospital group and patients with unilateral mature cataract reported to our eye camps are grouped together as camp group. Fellow eye lenticular status of patients with mature cataract was noted. The demographic details such as age and gender were recorded for all patients.

Inclusion Criteria

The following criteria were included in the study:

1. All patients with unilateral mature cataract
2. All age groups
3. Both genders.

Exclusion Criteria

1. One eyed patient was excluded from the study.

Statistical Methods

Mean (SD) and frequency (percentage) were used for continuous and categorical variable, respectively. Fisher's exact test or Chi-square test was used to assess the difference between the categorical variables. Student's *t*-test or Mann–Whitney U-test was used to test mean difference between the two continuous variables. $P < 0.05$ considered as statistically significant. All statistical analyses were done by statistical software STATA 11.0.

RESULTS

During the study period, a total of 696 patients with cataract reported to us. Ninety-six patients out of 696 which account for 13.8% had unilateral mature cataract.

Occurrence of Cataract

A total of 696 patients with cataract reported during the study period, out of which 389 patients were female and 307 were male [Graph 2].

Table 1: Blindness prevalence in world and India

Region	Total population (million) (%)	Blindness (million) (%)	Visual impairment (million) (%)
World[1]	6737.5 (100)	39.365 (100)	285.389 (100)
India[1]	1181.4 (17.5)	8.075 (20.5)	75.512 (26.5)

Table 2: CSR 2 of India and Tamil Nadu

Region	Total population (%)	Cataract surgery done (%)	CSR
India	1,236,344,631 (100)	6,331,982 (100)	5122
Tamil Nadu	72,138,958 (5.8)	578,183 (9.1)	8015

CSR: Cataract surgery rate

Table 3: Illustration of patents with unilateral mature cataract

Gender	Camp (%)	Hospital (%)	Total (%)
Male	23 (53.5)	20 (46.5)	43 (44.8)
Female	31 (58.5)	22 (41.5)	53 (55.2)
Total mature cataract	54 (56.25)	42 (43.75)	96

Table 4: Mature cataract with pseudophakia in fellow eye

Group	Male (%)	Female (%)	Total (%)
Camp	9 (42.85)	12 (57.14)	21 (67.7)
OP	5 (35.7)	5 (29.4)	10 (32.3)
Total	14 (45.16)	17 (54.8)	31

OP: Outpatient

Occurrence of Mature Cataract in Hospital and Camp Group

A total of 96 patients had unilateral mature cataract [Graph 3], 54 patients were from camp and remaining 42 patients are from hospital [Table 3].

Gender Difference in Mature Cataract and in Hospital and Camp Group

Forty-three male and 53 female patients had unilateral mature cataract. Twenty-three males from camp group and 20 patients from hospital group had unilateral mature cataract with accounts for 53.5% and 46.5%, respectively.

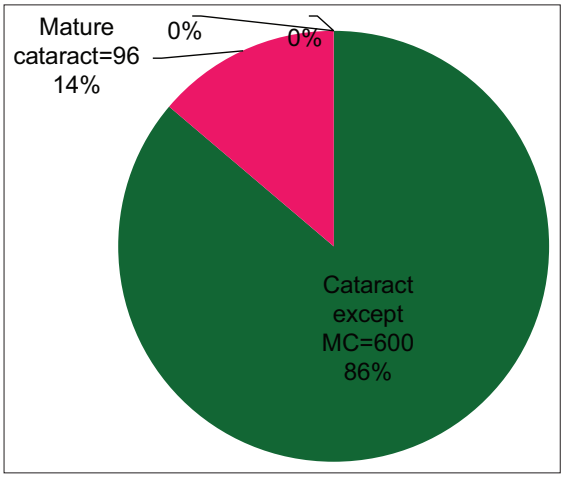
Likewise, 31 females had unilateral mature cataract in camp group and 22 females in hospital group which accounts for 58.5% and 41.5%, respectively [Table 4].

Age Group Distribution of Patients with Unilateral Mature Cataract

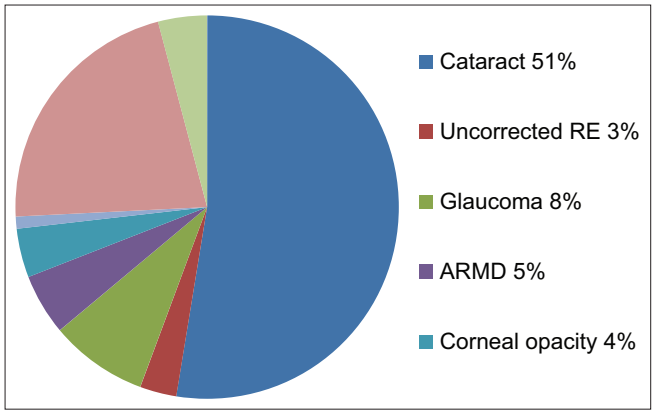
Maximum age group reported with cataract was 60–69 years in both hospital and camp groups followed by 70–79 years age group reported with mature cataract [Graph 4].

Lenticular Status of Fellow Eye in Patients with Unilateral Mature Cataract

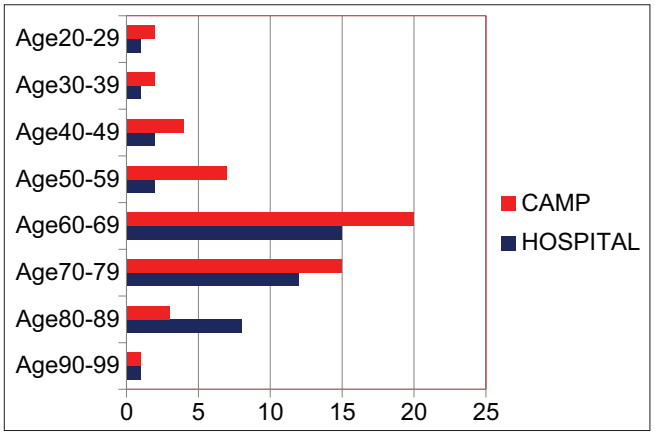
About 40.5% of patients had fellow eye immature cataract, 32% of patients had fellow eye pseudophakia, and 27.5% of patients had finding such as clear lens, aphakia, and complicated cataract [Graph 5].



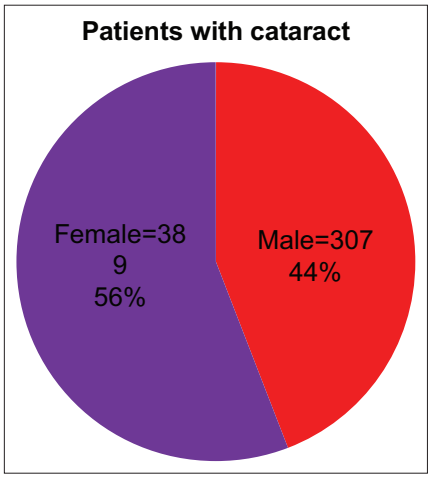
Graph 3: Percentage of mature cataract



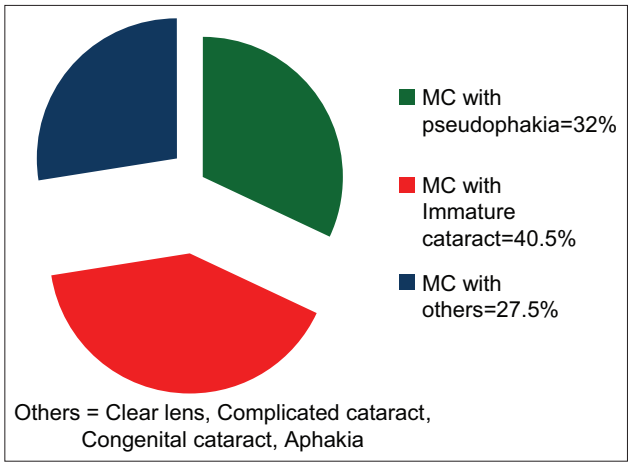
Graph 1: Various causes of blindness



Graph 4: Age distribution of cataract patients



Graph 2: Total number of cataract patients with gender distribution



Graph 5: Percentage of patients with unilateral mature cataract with various lenticular status of fellow eye

Gender Difference in Unilateral Mature Cataract with Fellow Eye Pseudophakia in Hospital and Camp Group

Out of 31 patients with unilateral mature cataract with fellow eye pseudophakia, 17 patients were females and 14 were males. Twelve females were from camp group which accounts for 38.7%. Twenty-one patients (67.74%) out of 31 were from camp group.

DISCUSSION

The above data show that the occurrence of cataract was more which are less equal in both males and females, but occurrence of mature cataract found to be more in females (55.2%) than in males, this signifies females present late for cataract surgery.

About 13.6% of patients had unilateral mature cataract, which signifies patients tend to ignore to get operated early as they are satisfied with uniocular vision.

All most equal percentage of patients presented with mature cataract in both hospital and camp patients which indicated barriers exist other than economic factor for the patients.

Fifty-four (56.25%) patients out of 96 with unilateral mature cataract are from camp group, only 42 patients reported to our OPD for surgery voluntarily. These data signify the reluctance among people to undergo cataract surgery in the fellow eye at the earliest.

Out of 51 females with unilateral mature cataract, 31 patients (58.5%) are from camp group, this signifies that females have less access to cataract surgery at the earliest compared to males.

Most common age group reported for cataract in both the groups was 60–69 years, it signifies that senile cataract is the most common form.

The rate of mature cataract with pseudophakia in fellow eye was found to be 32% indicating that patient is satisfied with vision in one eye and presents very late for fellow eye cataract surgery.

67.7% of camp group patients presented with mature cataract with fellow eye as pseudophakia, likewise 32.3% of hospital group patients presented with mature cataract with fellow eye pseudophakia. This indicates that camp patients are not getting operated for fellow eye early as compared to hospital reported patients. The percentage of mature cataract with fellow eye pseudophakia was higher in females 54.8%, among which 67.7% are from camp group.

CONCLUSION

Studies have revealed intraocular lens implantation significantly improved vision-related quality of living.[4] Although economic conditions play a significant role, availability of adequate and appropriate surgical resources and patient's perception of benefits can increase utility of cataract surgery.[5,6] Information, education, and counseling about cataract surgery especially among females are the need of the hour.

Patients should be counseled to be in regular follow-up after first eye cataract surgery, so as to prevent development of mature cataract in fellow eye.

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How to cite this article: Damodaran K, Chopra V. Lenticular Status of Fellow Eye of Patient with Unilateral Mature Cataract: A Prospective Study. Int J Sci Stud 2021;8(11):39-42.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Comprehensive Study on Relative Afferent Pupillary Defect

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Abstract

Introduction: Relative afferent pupillary defect (RAPD) or Marcus-Gunn pupil is an important clinical finding in examination of the visual system.

Aim: The aim of this study was to (1) analyze various etiological factors of RAPD and (2) to assess the significance of grade of RAPD and visual prognosis.

Method of Study: All patients with RAPD examined of the cause, grading of RAPD done by swinging torch light test and best-corrected visual acuity measures during each visit till the study period.

Results: Fifty patients with RAPD studied, 33 patients had optic nerve pathology, 14 patients had retinal pathology two patient with macular cause, and 1 had vitreous hemorrhage. Out of 33 patients with optic nerve pathology, 11 had Grade 4 RAPD, two out of 11 patients had good visual outcome. Fourteen retinal cause patient had severe grade relative afferent pupillary and poor visual outcome. Two macular and one vitreous patient had lesser grade of relative afferent pupillary and had good visual outcome.

Conclusion: RAPD has multifactorial etiology, severe grade (Grades 3 and 4) relative afferent pupillary have poor visual outcome compared to lesser grade (Grades 1 and 2). Patients who presented early with relative afferent pupillary subjected to appropriate management attained better visual outcomes. This study necessitates detection of relative afferent pupillary at the earliest and to institute prompt treatment for better visual recovery.

Key words: Anterior ischemic optic neuritis, Central retinal artery occlusion, Central retinal vein occlusion, Grading of relative afferent pupillary defect, Optic neuritis, Relative afferent pupillary defect, Optic nerve, Retinal detachment, Swinging flash light test, Traumatic optic neuritis

INRODUCTION

The relative afferent pupillary defect (RAPD) or Marcus-Gunn pupil is an extremely sensitive and significant objective clinical finding in the examination of the visual system.[1] Various techniques used to quantify or measure afferent pupillary defects are use of neutral density filters,[1] cross-polarized filters, and subjective grading based on the amount of initial contraction and subsequent re-dilation of each pupil using swinging flash light.[2] Even in an unconscious patient, the determination of an RAPD can be made by swinging flash light test.

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

Grading OF RAPD

Severity of RAPD is graded by swinging flash light test (Dejong Textbook of Neurology).

GRADE 1 – Weak initial pupillary constriction followed by greater dilatation.
GRADE 2 – Initial pupillary stall followed by greater dilatation.
GRADE 3 – Immediate pupillary dilatation.
GRADE 4 – No reaction to light.

Aim of the Study

The aims of this study were as follows:

1. Analyze various etiological factors of RAPD.
2. Asses the significance of grade of RAPD and visual prognosis.

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Study Type

This is a prospective randomized, observational, and non-interventional hospital-based study.

Study Period

September 1, 2020 to December 31, 2020.

METERIALS AND METHODS

The Institutional Ethical Committee approval for conducting the study was obtained. Fifty patients presenting with clinical diagnosis of RAPD to the Ophthalmology Department of Government Vellore Medical College were included in the study. After obtaining informed consent from, the patient following evaluation was done in patients with RAPD.

1. Complete ocular history.
2. Best-corrected visual acuity measured during each visit and at the end of the study.
3. Swinging flash light test.
4. Detailed slit-lamp examination.
5. Intraocular pressure and color vision.
6. Field charting.
7. Posterior segment evaluation by direct ophthalmoscope, IDO, and 90 D.

Inclusion Criteria

The following criteria were included in the study:

1. All patients with RAPD.
2. All age group.
3. Both gender.

Exclusion Criteria

The following criteria were excluded from the study:

1. Anatomically abnormal pupil.

Statistical Methods

Mean (SD) and frequency (percentage) was used for continuous and categorical variable respectively. Fisher's extract test or Chi-square test was used to assess the difference between the categorical variable. Student *t*-test or Mann–Whitney U-test was used to test mean difference between the two continuous variables. $P < 0.05$ considered as statistically significant. All statistical analysis was done by statistical software STATA 11.0.

RESULTS

Out of 50 patients with RAPD, 33 patients had optic nerve pathology, 14 patients had retinal pathology, two patients had macular pathology, and one patient had vitreous hemorrhage as the etiology for RAPD.

Optic Nerve Causes for RAPD

In our study, 33 patients accounted for optic nerve causes for RAPD of which 13 patients had optic atrophy (three patients had primary optic atrophy, three of them had secondary optic atrophy, and seven patients had consecutive optic atrophy). Nine patients with optic neuritis (ON) and eight patients with traumatic optic neuropathy (TON) presented with RAPD. Of the eight patients with TON, three patients had fracture of the optic canal with displacement in one patient with RAPD. One patient had pituitary macroadeoma and hence was diagnosed as compressive optic neuropathy [Figure 1].

Grading of RAPD in Optic Nerve Causes

Out of 33 patients with optic nerve pathology having RAPD, 11 of them had Grade 4 RAPD (nine patients had optic atrophy and two patients had TON). Both of the patients with TON came to our hospital with history of defective vision only after 1 week following trauma and they had bony fracture of the optic canal with displacement. Six patients had Grade 3 RAPD (four patients had optic atrophy and two patients with anterior ischemic optic neuropathy). In our study, large number of patients (14 patients) presented with Grade 2 RAPD, of which six patients diagnosed as TON, seven had ON, and one patient diagnosed as compressive optic neuropathy. Two patients with ON presented with Grade 1 RAPD [Table 1].

Visual Outcome in Optic Nerve Diseases

In our study, optic atrophy patients presented with Grade 3 and Grade 4 RAPD had poor vision at the time of presentation and they did not show improvement in vision even after 3 month of follow-up. On patients presented with Grade 1 and Grade 2 RAPD, though they had poor vision at presentation that they had good visual improvement at end of 3 months. Two patients with TON had Grade 4 that RAPD had poor visual outcome since they presented late to our hospital. Two patients of TON who had poor vision initially with Grade 2 RAPD had fracture of the optic canal with bony displacement and on surgical, correction had good visual improvement. One patient diagnosed had pituitary macroadenoma had Grade 2 RAPD that had poor vision and after surgical removal had vision improvement to BCVA 6/60 [Table 2].

Retinal Causes of RAPD

In our study, six patients with ischemic central retinal vein occlusion (CRVO), four patients with central retinal artery occlusion (CRAO), and three patients with retinal detachment had RAPD at presentation [Figure 2].

Grading of RAPD in Retinal Diseases

All patients with retinal pathology had Grade 3 and Grade 4 RAPD. All the four patients with retinal detachment had Grade 4 RAPD. Two patients each with CRVO and CRAO had Grade 3 RAPD and four patients with CRVO and two patients with CRAO had Grade 4 RAPD [Figure 3].

Visual Outcome in Retinal Disease

All four patients with retinal detachment who presented with Grade 4 RAPD had poor vision since they came very late after their visual detoriation; hence, there was no visual improvement. Even patients with CRAO and ischemic central retinal vein patients had no improvement on treatment [Table 3].

Macular and Vitreous Causes of RAPD

Two patients had chronic central serous chorioretinopathy with Grade 1 RAPD and they had good visual improvement on treatment with topical anti-inflammatory drugs. One patient had dense vitreous hemorrhage with Grade 1 RAPD and when the patient was treated by vitrectomy patient had good visual recovery.

DISCUSSION

Marcus-Gunn pupil or RAPD occurs when there is a unilateral disturbance in the anterior afferent visual pathway, including retina, optic nerve, optic chiasma, and optic tract RAPD, which has multifactorial etiology involving the visual pathway. The standard technique for detecting RAPDs is the alternating light test.[3]

Normal Responses

When a light is shone alternately in each eye, the normal pupillary response is an initial pupillary constriction followed by redilatation; this response occurs each time the light moves from one eye to the other. The initial constriction does not occur due to the brief time in darkness when the light crosses the nose. The initial constriction occurs because each retina is in the dark when the other eye is being stimulated; when the light moves, the retina signals an increase in light intensity and the pupils constrict.

Clinical Testing

The alternating light test should be done in a dark room with the patient looking at a distant fixation target. A bright light should be used, the light should be shown in each eye symmetrically – the amount of time on each eye should be the same and the angular displacement of the stimulus from the line of sight should be the same for each eye.

Criterion for RAPD

When diagnosing an RAPD, the most reliable component of the pupillary response to look for is asymmetry of the initial constriction. An eye with an RAPD will show a smaller initial constriction and will redilate to a larger size, but the asymmetry of redilatation will be less reproducible than the difference in initial constriction. The best indicator that an eye has an RAPD is aconsensual response of its pupil that is less than the direct response. Since there is possibility of a unilateral efferent defect or asymmetric contraction anisocoria, we should not rely too much on a comparison of the direct responses of the two pupils. If we look at only one pupil and see a direct response of that pupil that is greater than its consensual response, we might merely be seeing contraction anisocoria, not an RAPD in the other eye.

Conditions Leading to an RAPD[4]

1. Optic nerve disorders: Mild ON with no or minimal loss of vision can lead to a very severe RAPD, unilateral or asymmetric optic neuropathies are common causes of an RAPD, arteritic, and non-arteritic anterior ischemic optic neuropathy, TON (due to direct ocular trauma, orbital trauma, or during head trauma damage can occur to optic nerve as it passes through the optic canal into the cranial vault).
2. Glaucoma: Glaucoma is usually a bilateral disease and RAPD occurs if one optic nerve is more damaged.
3. Optic nerve tumor: Primary tumors of the optic nerve (such as glioma, or meningioma) or tumors that compress the optic nerve (such as sphenoid wing meningioma and pituitary lesions).
4. Orbital disease: This could include compressive damage to the optic nerve from thyroid related orbitopathy (i.e., compression from enlarged extraocular muscles in the orbit), orbital tumors, or vascular malformations.
5. Optic nerve infections or inflammation: Cryptococcal infection can cause a severe optic nerve infection in the immunocompromised individuals.
6. Surgical damage to the optic nerve: Damage following an orbital hemorrhage related to eye, orbital, sinus, or plastic surgery; damage following neurosurgical procedures such as a pituitary tumor resection; and damage related to the migration of an orbital plate after surgical correction of a blow-out fracture.
7. Retinal causes: Unilateral retinal detachment, vein occlusion, and arterial occlusion.

In our study, out of 50 patients studied 33 patients had optic nerve pathology, 14 patients had retinal pathology, two patients had macular pathology, and one patient had dense vitreous hemorrhage.

In our study, two patients had ethambutol-induced retrobulbar neuritis with Grade 1 RAPD and on stopping ethambutol and treatment with steroids patient had good visual recovery. Among eight patients with TON, six

Table 1: Grading of relative afferent pupillary defect in optic nerve causes

Disease	Grade 1	Grade 2	Grade 3	Grade 4
Optic atrophy	-	-	4	9
Traumatic optic neuritis	-	6	-	2
Optic neuritis	2	7	-	-
Anterior ischemic optic neuritis	-	-	2	-
Compressive optic neuritis	-	1	-	-

Table 2: Visual outcome in optic nerve diseases

Disease	Grade	Vision at present	Vision at 1 week	Vision 3 months
Optic neuritis	Grade 1	PL and 1/60	6/6	6/6
	Grade 2	1/60–4/60	6/36–6/24	6/12–6/9
Traumatic optic neuritis	Grade 2	HM–2/60	6/60–6/36	6/12–6/9
	Grade 4	PL	HM	HM
Anterior ischemic optic neuritis	Grade 2	1/60	5/60	6/60
Compressive optic neuritis	Grade 2	CFCF	6/60	6/60
OA	Grade 3	1/60–2/60	NI	NI
	Grade 4			

Table 3: Visual outcome in retinal disease

Disease	Grade	Vision day 1	Vision 3 months	Vision 6 months
Ischemic central retinal vein occlusion	Grade 3 Grade 4	HM–1/60	NI	NI
Central retinal artery occlusion	Grade 3 Grade 4	CFCF–2/60	NI	NI
Total retinal detachment	Grade 4	PL-ve	PL-ve	PL-ve

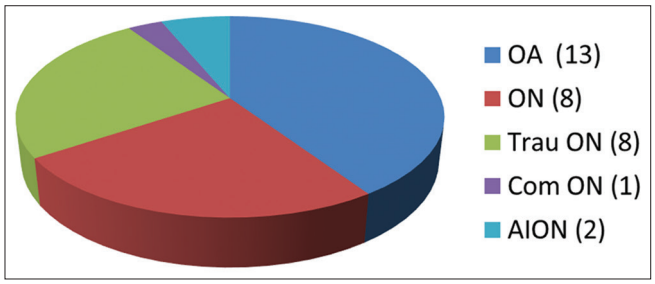

Figure 1: Causes of relative afferent pupillary defect

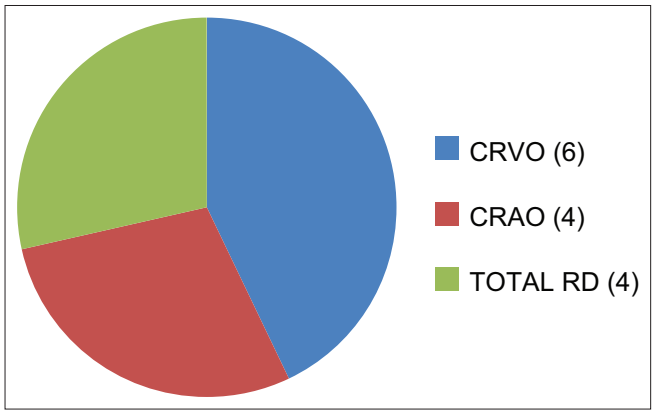

Figure 2: Retinal causes of relative afferent pupillary defect

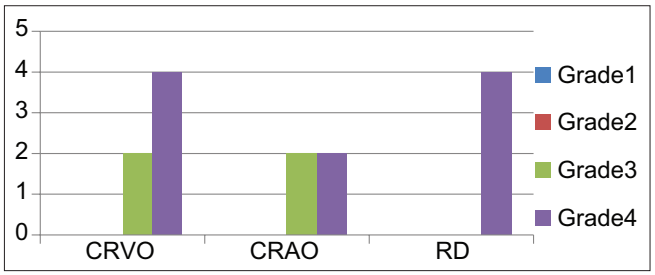

Figure 3: Grading of relative afferent pupillary defect in retinal diseases

patients had Grade 2 RAPD who presented on day of trauma and had good visual recovery with treatment. Two patients had Grade 4 RAPD and they presented 1 week after trauma and their visual recovery was poor.

One patient with Grade 2 RAPD diagnosed to have pituitary macroadenoma and after surgery, she had visual improvement. Hence, RAPD has diagnostic significance in intracranial abnormalities. Two patients with Grade 3 RAPD diagnosed as anterior ischemic ON and was treated with IV steroids and continued with oral steroids. Though there was only partial visual recovery, it helps in preventing blindness in fellow eye.

Patients with optic atrophy and retinal disease had Grade 3 and Grade 4 RAPD and they had no visual recovery. Two patients with chronic CSCR had Grade 1 RAPD and they had good visual recovery. The above finding and

observation indicate that the early detection of disease process and its prompt treatment gives better visual outcome to the patient.

CONCLUSION

1. From this study, we conclude that RAPD has multifactorial etiology involving the visual pathway and prompt recognition and investigation helps in diagnosing the underlying etiology.
2. Patients with Grade 1 and Grade 2 have better visual outcome than patients with Grade 3 and Grade 4.
3. Patient who presented early with RAPD subjected to appropriate management attained better visual outcome.
4. Hence, RAPD has diagnostic and prognostic significance.
5. This study, therefore, necessitates the importance of detecting such cases at primary level and its earliest referral to tertiary center for prompt treatment and good visual recovery.

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How to cite this article: Chopra V, Damodaran K. Comprehensive Study on Relative Afferent Pupillary Defect. Int J Sci Stud 2021;8(11):43-47.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

A Study on Risk Assessment and Behavioral Change during COVID-19 Pandemic among Residents of Delhi-NCR

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Abstract

Background: COVID-19 pandemic represents a major global health crisis. It has affected large number of populations all over the world. It is not only causing physical derangement of health but also affecting mental health. The study was conducted to access the change of behavior and risk assessment among people due to COVID-19-induced lockdown.

Materials and Methods: A cross-sectional survey using Google forms was conducted among 300 people of age group 18–60 years and above in India. The link of the questionnaire was sent through E-mails, WhatsApp, and other social media for the collection of the data. Fear of COVID-19 scale (FCV-19S) was applied to assess the fear regarding COVID-19.

Results: The study was conducted among 300 participants. It was observed that 49.3% of people who worried about the current situation, 51.7% experienced depressive symptoms, 60.7% did not leave the house due to fear of acquisition of infection, 68.3% often listened to news, and engaged with apps for finding information regarding COVID-19 had higher mean COVID-19 fear score than their counterparts.

Conclusion: Our study concluded that FCV-19 is engraved among Indian population with respect to risk of acquiring the disease and behaviors associated with it.

Key words: Behavioral change, COVID-19, Risk assessment

INTRODUCTION

The new public health crisis threatening the globe with the emergence and spread of 2019 novel coronavirus (nCoV) or the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus originated in bats and transmitted to humans through yet unknown intermediary animals in Wuhan, Hubei province, China in December 2019.[1] On February 11, 2020, the world health organisation (WHO) Director-General, Dr. Tedros Adhanom Ghebreyesus, announced that the disease caused by this new CoV was a "COVID-19."[2] Due to the rapid spread in the disease across the globe, on March 11, 2020, the WHO declared it as a pandemic.[3] Globally, as of 9:20 am CEST, July 15, 2020, there were 13,119,239 confirmed cases of COVID-19, including 573,752 deaths, as reported. It is known that there are three types of human CoV (HCoV) existing presently which are HCoV-229E, SARS-associated CoV, and HCoV-OC43.[4] In late December 2019, many patients were admitted to the hospital suffering from virus presenting pneumonia like symptoms and were diagnosed as pneumonia of unknown etiology. The people affected by the virus were linked epidemiologically to wholesale market of wet animals and sea food in Wuhan, Hubei Province, China.[5]

Access this article online

www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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The first known case of nCoV was identified in Wuhan, China in December, 2019. The very first reported laboratory-confirmed case of COVID-19 in India was from Kerala on January 30, 2020. On March 31, 2020, a total of 2245 cases and 56 deaths were confirmed in India.[6] The incubation period of CoV is 5–7 days, that is, the syptoms starts to appear after 5–7 days after coming in contact if the infected person. The period of CoV infection ranges from 7 to 41 days with the average of 14 days and number of days usually depends on the age of the patient, any pre-existing disease and also on the immune system of the body. The most common presenting complaints by the patient are fever, cough, fatigue, pharyngitis, and in late stages followed by cough with expectoration, breathlessness, decrease in oxygen saturation point below 95, respiratory distress, diarrhea, acute cardiac injury, and kidney failure. Nationwide lockdown was announced by the government on March 24, 2020 as a containment strategy. After this, three cycles of lockdown for the prevention of the transmission of disease were opted in the country. India is facing multiple major challenges on the COVID-19 front. It is densely populated: 464 people/km^2 compared with Italy's 206, Spain's 91, Iran's 52, and the USA's 36. It has a huge population: 1380 million (USA 330 million, Iran 83 million, Italy 60 million, and Spain 46 million). Social distancing without total shutdowns is unthinkable, especially within the big cities with crowded streets, trains, buses, and offices.[7]

This lockdown cycle might have caused significant distress in the form of fear, anxiety, and confusion among the public. Apart from reducing the transmission rate, considering an individual's risk and change in behavior is a vital aspect for their psychological wellbeing. This may also largely influence the manner, in which an individual may adhere to preventive measures toward COVID-19. Hence, the aim of our study is to examine the reaction of population toward Covid-19 outbreak and to access the psychological response in terms of fear, depressive symptoms, and change in behavior during the nationwide lockdown.

MATERIALS AND METHODS

The cross-sectional online study was carried out in India. An online semi-structured questionnaire was developed using google forms. An informed consent was attached to it. The link of the questionnaire was sent through E-mails, WhatsApp, and other social media for the collection of the data.

Participants

The participants of this study consisted of 300 individuals, including 195 (65.05%) females and 105 (35.0%) males. The age of the participants ranged between 18 and 29 years. Participants with access to the internet could participate in the study.

Data Collection Tools

The data collection was initiated on May 20, 2020. The online self-reported questionnaire contained the five sections related to change of behavior and risk assessment during COVID-19 induced lockdown. The seven-item fear of COVID-19 scale (FCV-19S) was used to assess fear regarding COVID-19. The FCV-19S was developed by Ahorsu *et al.* (2020).[10] It is a unidimensional scale with seven items. It has a 5-point Likert-type rating system (ranging from 1: Strongly disagree to 5: Strongly agree). The responses were recorded on a five-point Likert scale ranging from strongly disagree to strongly agree. The higher the score, the greater the FCV-19. The sociodemographic variables included age, gender, occupation, education, marital status, and native state were also collected. Informed consent was taken from the study participants and institutional ethical approval has been taken.

Data Collection and Analysis

Preliminary data of the participants were indexed in Microsoft Excel. Later, interpretation of the indexed data were done in Microsoft word. Data were analyzed using SPSS Version (SPSS., Chicago, IL,USA) software. Descriptive statistics have been used in the study to analyze the findings. A significant relationship between variable $P < 0.05$ was consider statistically significant.

RESULTS

The study was conducted among 300 participants among which maximum belong to the age group 18–29 years (67.1%), in which majority were female (65.0%) with 56.3% were educated up to higher secondary level. Majority of the participants were working (51.3%) with 28.0% which were medical/paramedical professional. About 55.0% of the participants were unmarried and majority of them resided in urban area (94.3%), along with family (93.0%). Proportion of people suffering from illness such as asthma, cancer, diabetes, heart ailment, and hypertension was 10.7% [Table 1]. We found that majority of people in sample population were worried about the current situation (49.3%). In general, 57.7% thought that they were susceptible for getting CoV infection if they do not take appropriate measures. In response to the fear due to current situation, 51.7% were already experiencing depressive symptoms such as anxiety, depression, panic, and stress. In response to change in behavior during COVID-19 phase, 62.0% spent most of their time thinking about COVID-19 with a severity of 52.3%. Majority reported change in daily routine including usage of hand sanitizer

Table 1: Distribution of participants according to the socio-demographic variables

S. No.	Characteristics	Number of participants	Percentage of participants (%)
1	Age (Years)		
	18-29	185	61.7
	30-44	67	22.3
	45-59	36	12.0
	60 and above	12	4.0
2	Gender		
	Female	195	65.0
	Male	105	35.0
3	Education		
	Upto 12 grade	169	56.3
	Undergraduate	121	40.3
	Postgraduate and above	10	3.3
4	Occupation		
	Students	104	34.7
	Working*	154	51.3
	Housewife	42	14.0
5	Marital status		
	Unmarried	165	55.0
	Married	135	45.0
6	Locality		
	Urban	283	94.3
	Rural	17	5.7
7	Currently residing with		
	Family	279	93.0
	Friends	2	0.7
	Hostel	4	1.3
	Alone	15	5.0
8	Associated with any essential service/work		
	Yes	64	21.3
	No	236	78.7
9	Into medical/paramedical professional		
	Yes	84	28.0
	No	216	78.0
10	Suffering from any illness		
	Illness	32	10.7
	Not at all	268	89.3

(97.3%), wearing mask (97.3%), and staying in house for most of the time (60.7%). Most of the participants denied to visit any Chinese restaurants after the lockdown (72.0%), along with travelling abroad during the year 2020 (94.0%). Majority of the participants were users of Arogya Setu app (76.3%) [Table 2]. On applying independent *t*-test and one-way ANOVA [Table 3] to assess the distribution of mean COVID-19 fear score among different variables, it was seen that being worried about the current COVID-19 situation ($P = 0.001$), the thought of COVID-19 affecting the body's way of response to infection ($P = 0.001$), experiencing any depressive symptoms in response to FCV-19 ($P = 0.001$), fear of leaving the house ($P = 0.001$), listening to news related to COVID-19 ($P = 0.001$), and being engaged in mobile apps for retrieving information related to COVID-19 ($P = 0.02$) were significant with mean COVID-19 fear score. Also among the significant factors, those who were very worried about the current situation (20.52 ± 5.73), experiencing depressive symptoms (20.28 ± 5.68), not leaving the house due to fear of acquisition of infection (20.14 ± 5.35), often listening to news, and engaged with apps (20.38 ± 5.36) for finding information regarding COVID-19 had higher mean COVID-19 fear score than their counterparts.

DISCUSSION

COVID-19 is an emerging, expeditiously transmuting global health challenge affecting all sectors.[8,9] The present study explored predictors of fear and behavior change in response to the COVID-19 pandemic. The FCV-19S has been utilized in this study as it has proven to have robust psychometric properties, with comparability among both genders and across all age groups to assess and allay fears in individuals.[10,21] COVID-19 is associated with decreased physical and environmental well-being. In our study, females participants were predominant as seen in congruence with other studies.[11-14] Majority of the participants were from urban areas which were similar to a study conducted on COVID-19 in India.[11] Our results coincide with the findings from previous studies. Particularly as depicted in the 2009–2010 Swine flu pandemic, the 2015–2016 Zika virus outbreak and recent 2020 COVID-19 study, consciousness regarding health was significant factor regarding increased fear due to the current CoV pandemic.[15-17] Furthermore, our study reported that exposure to media for information was significantly associated with fear which was found similar in others studies.[18,19] Furthermore, a positive association was seen between fear due to COVID-19 and depressive symptoms (anxiety, depression, panic, and stress) which coincide with the findings of other studies.[20-23] People have started using hand sanitizers more than usual and wearing mask every time they step out of their house with maximum cancelling the plan of visiting abroad this year due to fear of CoV infection. A study conducted in Tamil Nadu reported changing their daily routines in response to the pandemic, including reducing social gatherings, increasing social distancing, and informing others about COVID.[24] They also reported an increase in cell phone/internet use and increasing housework (e.g., cooking and cleaning). Furthermore, a study in Iran shows scores on the FCV-19S were significantly and positively correlated with instruments assessing depression and anxiety.[25] However, it is not clear if scale scores would be correlated with individuals carrying out preventive COVID-19 behaviors (e.g., handwashing, social distancing, and respiratory hygiene). However, the association between fear and health-related behaviors is complex. Since the data were collected through an online application on a voluntary basis using convenience sampling strategy, it restricts the generalized recruitment. As the data are based on the participant's personal statements, it may show some bias regarding social acceptance of fear. Studies

Table 2: Risk and behaviour assessment table

	Risk and behaviour variable	No. of participants	Percentage of participants (%)
1	How often do you think about Covid-19?		
	Rarely	114	38.0
	Often	186	62.0
2	How severe do you think Covid-19 is?		
	Very Severe	125	41.7
	Severe	157	52.3
	Not Severe	18	6.0
3	Are you worried about the current situation?		
	Very worried	92	30.7
	Worried	148	49.3
	Not worried	60	20.0
4	Do you think that, in general, you are susceptible, to getting coronavirus infection, if you take no preventive measures?		
	Very Susceptible	102	34.0
	Susceptible	173	57.7
	Not at all susceptible	25	8.3
5	Do you think if it affects you how would your body respond to the infection?		
	No effect	68	22.7
	Moderate effect	131	43.7
	Severe effect	101	33.7
6	Have you experienced any of the following in response to a fear of covid19?		
	Depressive symptoms	155	51.7
	No symptoms	145	48.3
7	Have you experienced any trouble in sleep due to COVID 19?		
	Yes	43	14.3
	No	257	85.7
8	How often are you listening to news related to covid19?		
	Rarely	159	53.0
	Often	141	47.0
9	How often you use sanitizer on a daily basis?		
	Rarely	94	31.3
	Often	206	68.7
10	Do you use any hand sanitizer as a precautionary measure?		
	Yes	292	97.3
	No	8	2.7
11	Have you started wearing the mask because of COVID -19?		
	Yes	292	97.3
	No	8	2.7
12	Will you every time wear a face mask, when you step out of your house?		
	Yes	282	94.0
	No	18	6.0
13	Do you stock up your grocery because of fear of running them out?		
	Yes	138	54.7
	No	136	45.3
14	Do you fear to leave your house?		
	Yes	182	60.7
	No	118	39.3
15	Do you know about the immunity boosters advised by the AYUSH ministry?		
	Yes	190	63.3
	No	110	36.7
16	Will you be calling domestic help during the lockdown?		
	Yes	75	25.0
	No	225	75.0
17	Will you be calling domestic help after lockdown gets over?		
	Yes	135	45.0
	No	165	55.0
18	Will you visit any Chinese restaurant after lockdown gets over?		
	Yes	84	28.0
	No	216	72.0
19	Will you travel abroad this year?		
	Yes	18	6.0
	No	282	94.0

(*Contd...*)

Table 2: *Continued*

	Risk and behaviour variable	No. of participants	Percentage of participants (%)
20	Do you have the Aarogya Setu Mobile app?		
	Yes	229	76.3
	No	71	23.7
21	How often are you engaged with mobile apps for the information regarding COVID-19?		
	Rarely	205	68.3
	Often	95	31.7

Table 3. Testing Mean COVID Fear Scale with Respect to Sociodemographic Profile

S. No	Characteristics	No. of participants		Mean±Standard Deviation	
		Frequency	(%)	COVID-19 fear score	*P*- value
1.	Age (Years)				0.82##
	18-29 years	185	61.7	19.23±5.67	
	30-44 years	67	22.3	19.25±5.54	
	45-59 years	36	12.0	20.00±5.20	
	More than 60 years	12	4.0	18.42±4.83	
2.	Gender				0.18#
	Male	105	35.0	18.70±5.36	
	Female	195	65.0	19.61±5.62	
3.	Education				0.59##
	Upto 12 grade	10	3.3	19.03±6.95	
	Undergraduate	121	40.3	18.89±5.42	
	Postgraduate and above	169	56.3	19.57±5.55	
4.	Occupation				0.36##
	Housewife	42	14.0	20.40±4.63	
	Student	104	34.7	19.23±5.76	
	Working	154	51.3	19.03±5.60	
5.	Marital Status				0.71#
	Married	135	45.0	19.42±5.60	
	Others (Divorcee/separated, widow, unmarried)	165	55.0	19.19±5.50	
6.	Locality				0.06#
	Rural	17	5.7	21.76±5.03	
	Urban	283	94.3	19.14±5.54	
7.	Currently residing with				0.59#
	Family	279	93.0	19.34±5.55	
	Others (Alone, friends, hostel)	21	7.0	18.67±5.48	
8	Associated with any essential service work				0.71#
	Yes	64	21.3	19.06±5.58	
	No	236	78.7	19.36±5.53	
9	Into Medical/Paramedical professional				0.68#
	Yes	84	28.0	19.08±5.86	
	No	216	72.0	19.38±5.42	
10.	Suffering from any illness				0.91#
	Illness (Asthma, Cancer, Diabetes, Heart ailment, Hypertension)	32	10.7	19.19±5.08	
	Not at all	268	89.3	19.31±5.60	

#Indicates the Independent T-Test; ##Indicates the One-way ANOVA

conducted on different samples utilizing different sapling methods are highly recommended. Furthermore, this study used a cross-sectional design which did not depicts the exact cause-effect relationship between the variables.

CONCLUSION

Our study concluded that FCV-19 is engraved among Indian population with respect to risk of acquiring the disease and behaviors associated with it. This study depicts a dire need to conduct an epidemiological study across the nation to determine the level of fear as well as other associated issues concerning behavioral changes in response to COVID-19. The findings of this study may help in structuring of effective intervention strategies to maintain optimal health of peoples in this global crisis situation.

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How to cite this article: Nidhi K, Chawla B, Taneja N, Nandi D, Awasthi AA, Janardhanan R. A Study on Risk Assessment and Behavioral Change during COVID-19 Pandemic among Residents of Delhi-NCR. Int J Sci Stud 2021;8(11):48-53.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Impact of Residual Prostate Weight Ratio on Clinical Outcome after Turp in Benign Prostatic Hypertrophy Patients

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Abstract

Introduction: Burden of symptomatic benign prostate hyperplasia increases with increasing age and transurethral resection of prostate (TURP) is the gold standard, safe, and effective treatment for it. However, after TURP symptomatic improvements are not achieved completely in some patients. Prostate size which usually not correlated with lower urinary tract symptoms in benign prostate hyperplasia patients has strong relation with treatment methods and outcome after treatment.

Purpose: The present study aims to determine the correlation between one of the parameters that are residual prostate weight ratio (RPWR), on clinical outcomes which are measured by the International Prostate Symptom Score (IPSS) and Peak Flow Rate (Q_{max}) after TURP in BPH.

Materials and Methods: This is a prospective study to determine the impact of the tissue resection extent on outcome after TURP in men with symptomatic benign prostatic enlargement by determining correlation of a variable the residual prostatic weight ratio (RPWR) with outcome parameters such as International Prostate Symptom Score (IPSS) and Peak Flow Rate (Q_{max}). This study was conducted in the Department of Urology and Renal Transplantation, SCB Medical College and Hospital, Cuttack between 2017 and 2019.

Results: A total of 52 patients were evaluated. RPWR is the ratio of prostate weight after TURP and initial weight of prostate. In the present study, RPWR ranges from 0.38–0.67 with a mean of 0.5015 and median of 0.505. The correlation coefficient (r) of RPWR was found to be inversely related to the volume of prostate tissue resected and the outcome variables such as ΔIPSS (r = 0.19, P <0.187) and ΔQmax (r = 0.167, P <0.238).

Conclusion: RPWR was found to have a significant correlation with the clinical outcome. Amount of tissue resection has strong impact on symptomatic improvement after TURP and the lesser the value of RPWR after TURP, the better the clinical outcome in terms of IPSS and peak flow rates.

Key words: Lower urinary tract symptoms, Peak flow rate, Symptomatic improvement, Symptom score, Tissue resection

INTRODUCTION

The prostate, which occupied from bladder base to membranous urethra, is a pyramidal fibromuscular gland and it surrounds the prostatic urethra. The small size prostate without any evidence of BPH is described as a croissant shape (short anterior commissure, prominent apical notch, and posterior lip of prostatic tissue), and the bigger gland is more doughnut shaped.[1] BPH initiates as small micronodules in the transitional zone and gradually grow and coalesce to form macronodules. Benign prostatic hyperplasia (BPH) which is the most common disorder of the prostate gland in aging male is a pathologic disease process which has significant contributions to lower urinary tract symptoms (LUTS). LUTS can be either obstructive/voiding related (hesitancy, intermittency, post-voidal dribbling, straining, and weak

Access this article online

www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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stream) or irritative/storage related (frequency, urgency, and nocturia).[2] International Prostate Symptom Score (IPSS) is a self-administered tool for clinical research of LUTS in BPH which graded severity of symptoms.[3] Infravesical obstruction can be measured by invasive pressure-flow studies, in which peak flow rate or Qmax provides an indirect measure probability of bladder outlet obstruction.[4]

There are various surgical and minimally invasive techniques such as intraprostatic stents (temporary/permanent), Transurethral Needle Ablation of the Prostate (TUNA), Transurethral Microwave Therapy (TUMT), Transurethral vaporization of prostate (TUVP), Transurethral Incision of the Prostate (TUIP), and Lasers (Nd: YAG, Ho: YAG, KTP, Diode, Thulium laser), but transurethral resection of the prostate (TURP) is a "gold standard" surgical treatment yet. After TURP, outcome is assessed by improvement of symptoms urinary flow rate measured by uroflowmetry.

Prostate size is determined by various methods which include digital rectal examination, cystourethroscopy, and ultrasonography.[5-8] Watanabe *et al.* used transrectal ultrasound to evaluate prostate size and reported accurate results.[9] Residual prostatic weight ratio (RPWR) was evaluated to know the correlation between prostate size and outcome. RPWR value after TURP gives a good estimate of the clinical outcome regardless of prostate size or patient's age. In the present study, RPWR measured before and after TURP and correlated with outcome parameters IPSS and Q_{max}.

MATERIALS AND METHODS

The present study which was prospective observation conducted in 52 patients in the department of urology and renal transplantation between 2017 and 2019. All patients with symptomatic BPH who have indication of surgery and were planned for TURP included in the study. All other BPH Patients who either managed conservatively or have features of prostatic malignancy were excluded from the present observation. All patients evaluated by detail clinical history and physical examination. All baseline investigations related to patients, serum prostatic specific antigen, transrectal ultrasonography (TRUS), uroflowmetry (Q_{max}), and histopathological examination of the resected tissue of prostate were done. Standard monopolar transurethral resection of prostate was done in all included symptomatic BPH patients. IPSS was recorded in pre-operative and post-operative (after 4 months) time. The patient is followed on outdoor patient department basis for a minimum of at least 4 months.

The clinical outcomes were measured by the difference (Δ) in IPSS score and difference in peak flow rate Q_{max} before and 4 months after TURP.

Estimated total prostate wt. = 0.52 × length × width × height × specific gravity of the prostate (1.010)

RPWR = Prostate weight after TURP/Initial weight of prostate before TURP.

Prostatic weight after TURP was derived by substracting the TURP specimen weight from initial weight of prostate.

The data were collected and stored in Microsoft Excel 2013© Microsoft Office. These collected data were statistically analyzed using descriptive statistics by SPSS version 16. Continuous variables were expressed as either the mean ± standard deviation or median. All statistical outcomes were presented at 95% confidence intervals based on a two-sided test. Correlation analysis and the paired *t*-test were used for statistical assessment and were considered significant at $P < 0.05$.

Informed consent was taken from all patients before including in the present observation.

RESULTS AND OBSERVATIONS

All patients of symptomatic BPH who fulfills the indication of surgical treatment were admitted for definitive treatment in the form of transurethral resection of prostate in this present study. A total of 52 patients were included for observation prospectively. Most of the patients were of more than 55 years with mean age is 62.1 years. Mean prostate volume before TURP was 62.6 g and after TURP its mean value was 31.9. RPWR is the ratio of prostate weight after TURP and initial weight of prostate. In the present study, RPWR ranges from 0.38 to 0.67 with a mean of 0.5015 and median of 0.505. Mean value of pre-operative IPSS score was 21.42, whereas 12.04 was post-operative IPSS value. Peak flow rate was measured by uroflowmetry in pre-operative and 4 month after TURP. Mean peak flow rate (Q_{max}) was 9.21 in pre-operative time and 16.15 in post-operative time after 4 month of TURP. When calculated, the correlation coefficient (r) of RPWR was found to be inversely related to the volume of prostate tissue resected and the outcome variables such as ΔIPSS ($r = 0.19$, $P < 0.187$) and ΔQmax ($r = 0.167$, $P < 0.238$) [Figures 1 and 2].

Figure 3 shows percentage of patients showing with different value of RPWR.

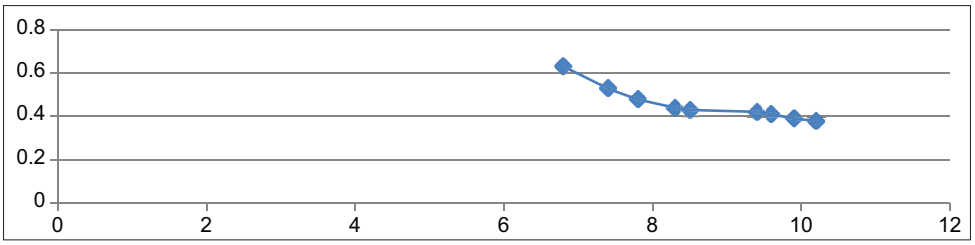

Figure 1: Correlation of RPWR with change in IPSS

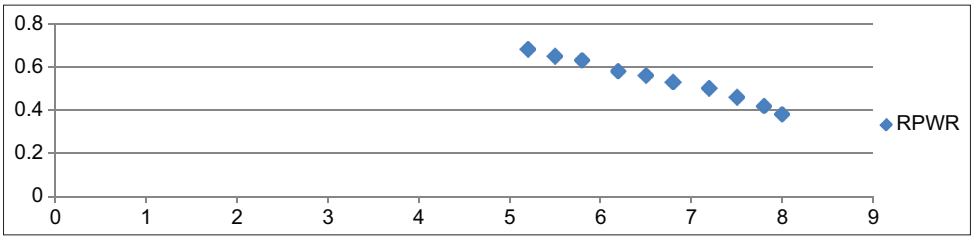

Figure 2: Correlation of RPWR with change in Q_{max}

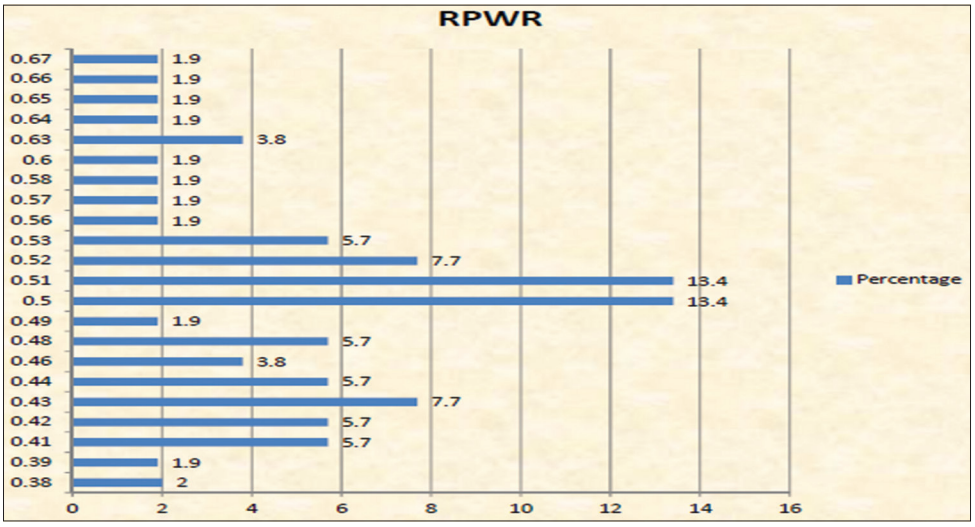

Figure 3: Patients percentage with different value of RPWR

DISCUSSION

Benign prostatic hyperplasia (BPH) is a highly prevalent disorder affecting elderly male. Besides LUTS, it can also cause more serious complications such as urinary retention, urinary tract infections, renal insufficiency, and hematuria.[10] All patients with moderate-to-severe symptoms score or its complications undergo transurethral prostatic resection which is the widely accepted as "gold standard" surgical treatment.[11]

Park *et al.* studied to determine prostate size using ellipse volume calculation (height × length × width × π/6).[12] Prostate volume measured by TRUS correlated closely with real specimen volume.

RPWR was measured by dividing the weight of prostate after TURP by the prostatic initial weight. Milonas *et al.* studied to establish the operative parameters influences on TURP outcomes.[13] In their study, residual prostatic weight ratio (RPWR) has strong impact on outcomes after 6 months of TURP. In the present study, impact was analyzed after 4 month of surgry.

Chen *et al.* studied prospectively 40 men from April 1996 to June 1997 at Division of Urology, Taipei Municipal Jen-Ai Hospital, School of Medicine, Taiwan and assessed residual prostatic weight ratio (RPWR) in clinical outcome after TURP) and found that mean age 70.4 years.[14] In the present study, mean age was 62.1 years. They evaluated outcome parameters before TURP and then 16 weeks after TURP. The estimated total prostate weight was measured by formula 0.52 × length × width × height × the specific gravity of the prostate (1.010). In the present study, same derivative formula was used. The RPWR was calculated

as the residual prostate weight after TURP divided by the initial weight of prostate. Prostatic weight after TURP was derived by substracting the TURP specimen weight from initial weight of prostate. They founded a close correlation between the estimated prostate weight and the actual weight of the TURP specimen ($r = 0.82$ and 0.80 for the adenoma and total prostate, respectively). They found negative correlation between the RPWR and the change in symptom score, and change in peak flow rate. In the present study, also there is a negative correlation between RPWR and delta IPSS and delta Q_{max}.

Songra *et al.* did a prospective study to know the effect of the extent of tissue resection on symptom improvement after TURP in men with symptomatic BPH.[15] RPWR was derived by dividing the weight of prostate after TURP by the initial weight of prostate. Difference in AUA score, Q_{max}, and Q_{avg} measured before operation and 2 months after surgery was used as clinical outcome parameters. There was a significant improvement in AUA score, Q_{max}, and Q_{avg} post-operatively. Maximum numbers of patients undergoing TURP had RPWR in the range of 51–60% (mean RPWR 49.9%). In the present study, about 40% have RPWR in between 0.49 and 0.57. Mean overall change in AUA Score (Δ AUA), Δ Qmax and ΔQavg was 12.04, 8.27 ml/sec and 6.64 ml/sec respectively, which is almost comparable to findings of the present study. Smaller the value of RPWR, larger is the Δ AUA, Δ Qmax and Δ Qavg and vice versa. There was negative correlation between the RPWR and the ΔgativeQ$_{max,}$ and ΔQavg ($r = -0.42$, -0.067, and -0.09, respectively). Similar trends of observations also found in the present study. Residual prostatic weight ratio (RPWR) and residual prostatic weight emerged as significant influencer on benign prostatic hyperplasia surgery outcome.

CONCLUSION

Symptomatic improvement after TURP will depend on the amount of tissue removed RPWR that is one of the significant parameter which has impact on clinical outcomes. RPWR inversely correlated with clinical outcome parameters. Treatment was considered effective when post-operative results were excellent and good.

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How to cite this article: Hasan A, Swain S, Mohanty NK, Singh GP, Hota D. Impact of Residual Prostate Weight Ratio on Clinical Outcome after Turp in Benign Prostatic Hypertrophy Patients. Int J Sci Stud 2021;8(11):54-57.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Knowledge, Awareness, and Practice about Dental Floss among Students in a Dental College in Nepal

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Abstract

Background: Dental floss is an oral hygiene aid which is recently being used and promoted among the dentists. Dentist should have adequate knowledge and training to prescribe and demonstrate use of dental floss. They also should be able to educate patients regarding the same.

Materials and Methods: A descriptive cross-sectional study done in the dental college in Terai region of Nepal. This questionnaire-based survey was conducted among the undergraduate BDS students of the dental college. The questionnaire consisted of three sections of section 1 containing 3 demographic questions, section 2 consisted of 10 questions, and section 3 consisted of 7 questions. The students were given 15 min to tick mark the answers. Data collected were tabulated and statistically analysis was done.

Results: Among 160 students, 137 (85.6%) participated in the study. All of them had heard of dental floss. Most of them, that is, 100 (72.99%) knew that it is a thread to clean teeth. Seventy-three (53.28%) said that dental floss removes plaques, 64 (46.72%) said that they do not know if it removes calculus, 73 (53.29%) said that they do not know if it's used to polish teeth. Fifty-six (40.15%) said that it should be used daily, 68 (49.64%) said that that it should be used regularly by everyone, 101 (73.73%) said that they do not know if it can be used to detect caries/calculus and 109 (79.57%) said that they do not know if it can injure interdental gingiva. Most of them, that is, 121 (88.32%) did not used dental floss, those using it said that they, that is, 13 (9.48%) used it irregularly/sometimes, those who did not used it, most of them, that is, 92 (67.15%) said that they do not know how to use it. Most of them, that is, 102 (74.45%) were not seeing patients so not yet prescribing it. Those prescribing it were mostly, that is, 9 (6.56%) prescribing it for patients with crown and bridge/proximal restorations and periodontal diseases, and 12 (8.75%) said that they gave demo to use it but sometimes only. Those who did not prescribed 116 were mostly, that is, 102 (74.45 %) students not seeing patients yet and all of them would prescribe if taught to do so.

Conclusion: We concluded that there is severe lack of knowledge regarding dental floss among the undergraduate students and they require proper education and training to use dental floss.

Key words: Dental devices, Dentists, Home care, Oral hygiene, Students

INTRODUCTION

Oral hygiene is must to maintain proper oral health. Oral hygiene methods have developed since the origin of oral hygiene aids such as toothpaste and toothbrushes. Moreover, oral hygiene aids are supplemented by dental floss and mouthwashes, adding an advantage in protecting oral tissues.[1] Dental floss is used to remove plaque from the interproximal areas of teeth. They are also indicated for use after fixed denture placement.[2] Using floss decreases plaque accumulation and thus prevents inflammation of gingiva, thus preventing periodontitis as well as caries in interproximal areas. Thus, proper use of dental floss along with other oral hygiene aids is going to keep overall healthy oral cavity. This will decrease the total burden and expenses on treatment of oral diseases.[3]

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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For a dental floss to be effective, it has to be properly used by individuals, for which adequate knowledge about dental floss is required. This can be done by dentist, educational videos, pamphlets, advertisements, etc.[4,5] The majority of patients visits dentist for their oral health care and maintenance. Thus, dentist plays an important role in helping and guiding patients regarding proper oral hygiene methods including the importance and use of floss. To be an effective educator about the dental floss, the dental students should have adequate knowledge about dental floss.[5] There was no such study found in our literature search so we planned to conduct a study to find out the awareness, knowledge, and practice about dental floss among the dental students in a dental hospital in Nepal.

MATERIALS AND METHODS

This cross-sectional survey was conducted in M. B Kedia Dental College, Birgunj, Nepal, among the undergraduate students of BDS in October 2018. Out of a total of 160 students, 137 was selected as the final sample. Undergraduate BDS students among the 40 of 1st year, 31 of 2nd year, 31 of 3rd year, 35 of 4th year students. The students were given a questionnaire form consisting of 15 questions. Time given was 15 min to complete the questionnaire. The questionnaire was divided into three sections. Section 1 of the questionnaire consisted of demographic data (age, gender, and year of BDS) and consent for the participation in the study. Section 2 consisted of 10 questions regarding knowledge and awareness about dental floss. Section 3 consisted of 8 questions about their practice of dental floss. All the questions had multiples options with only one best answer to be selected by students depending on their knowledge, awareness, and practices of dental floss. In section 2, eight questions were of true and false types and 1 with multiple choice and yes/no types each. In section 3, four questions were of multiple-choice answers and four of yes/no types. There was no marking for right or wrong answers. Collected data were tabulated in Microsoft Excel and statistical analysis was done.

RESULTS

There were total of 137 students out of the 160 total BDS undergraduate students who participated in the study after their consent. Hence, there was around 85.6% of participation. In section 1, demographic details were asked, age, gender, and year of BDS. Students were in the age range of 18 years–25 years with a mean age of 22.33. There were 102 female students and 35 male students. The total sample size of 137 undergraduate BDS students among the total of 160 students (40 in each year) participated in the study included 38 of 1st year, 33 of 2nd year, 31 of 3rd year, and 35 of 4th year students. For section 2 [Table 1], 10 questions were there. For asking have they heard of dental floss, all (100%) of them said yes. For, what is dental floss? 9 (6.56%) said that it's a wire to clean teeth, 12 (8.75%) said a wire to polish teeth, 100 (72.99%) said a thread to clean teeth, and 16 (11.67%) said a thread to polish teeth. For, dental floss removes plaques, 73 (53.28%) said true, 15 (10.94%) said false, and 26 (18.97%) said that they do not know. For dental floss removes calculus, 34 (24.82%) said true, 39 (28.47%) said false, and 64 (46.72%) said do not know. For, dental floss is used for polishing of teeth, 45 (32.85%) said true, 19 (13.87%) said false, and 73 (53.29%). For, dental floss massages the gingiva, 44 (32.12%) said true, 37 (27.01%) said false, and 56 (40.88%) said do not know. For, dental floss should be used daily, 47 (34.31%) said true and 31 (22.63%) said false and 55 (40.15%) said do not know. For, dental floss should be used by everyone regularly, 44 (32.12%) said true, 28 (20.44%) said false, and 68 (49.64%) said do not know. For, dental floss helps in detecting proximal caries/calculus, 19 (13.87%) said true, 17 (12.41%) said false, and 101 (73.73%) said do not know. For, dental floss can injure the interdental gingiva, 17 (12.41%) said true, 11(8.03%) said false, and 109(79.57%) said do not know [Table 1].

In section 3, 7 questions were asked. For, do you use dental floss, 18 (13.13%) said yes and 121 (88.32%) said no. Those who said yes, were asked how many times a week, for which 13 (9.48%) said irregularly/sometimes, 2 (1.45%) said more than twice a week, but not everyday and none of them said everyday. Those who said No were asked why, for which 92 (67.15 %) said don't know how to use, 17 (12.40%) said time consuming, 20 (14.59%) said expensive. For, do you prescribe dental floss, 21 (15.32%) said yes, 14 (10.21%) said no and 102 (74.45%) said not applicable as they don't yet see patients. For those who said yes, they were asked for which conditions, for which 4 (2.91 %) said in all patients, 3 (3.73%) said in patients with crown and bridge or proximal restorations, 5 (3.73%) said patients with periodontal diseases and 9 (6.56 %) said in both the above conditions. Those saying yes were also asked if they give demo for using dental floss for which 3 (2.18%) replied 'yes, always', 12 (8.75%) replied 'yes, sometimes' and 6 (4.37%) replied No. For those who said no, they were asked why, for which 14 (10.21%) replied don't know when to prescribe and 102 (74.45%) replied others or don't see patients yet. Those who said no because they don't know when to prescribe were asked if they would be taught to prescribe then would they prescribe, for which all of them i.e 116 said, yes [Table 2].

DISCUSSION

Dental floss is defined as a thread used to remove plaque from the interdental areas of teeth.[1] It should be used once

Table 1: Questions and responses for section 2 (knowledge and awareness) of the questionnaire

Section 2: Questions and options	BDS 1st year		BDS 2nd year		BDS 3rd year		BDS 4th year		Total	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Have you heard of dental floss										
Yes	38	100	33	100	31	100	35	100	137	100
No	0		0		0		0		0	0
If yes, What is dental floss?										
A wire to clean teeth	3	7.89	4	12.12	2	6.45	0	0	9	6.56
A wire to polish teeth	6	15.78	5	15.15	1	3.22	0	0	12	8.75
A thread to clean teeth	25	65.78	16	48.48	24	77.41	35	100	100	72.99
A thread to polish teeth	4	10.52	8	24.24	4	12.90	0	0	16	11.67
None	0	0	0	0	0	0	0	0	0	0
Dental floss removes plaques										
True	7	18.42	9	27.27	24	77.41	33	94.28	73	53.28
False	5	13.15	3	9.09	5	16.12	2	5.71	15	10.94
Do not know	26	68.42	21	63.63	2	6.45	0	0	26	18.97
Dental floss removes calculus										
True	8	21.05	10	30.30	9	29.03	7	0.20	34	24.82
False	3	7.89	3	9.09	8	25.80	25	71.42	39	28.47
Do not know	27	71.05	20	60.60	14	45.16	3	8.57	64	46.72
Dental floss is used for polishing of teeth										
True	9	23.68	10	30.30	7	22.58	19	54.28	45	32.85
False	6	15.78	3	9.09	5	16.12	5	14.28	19	13.87
Do not know	23	60.52	20	60.60	19	29.03	11	31.42	73	53.29
Dental floss massages the gingiva?										
True	10	26.31	9	27.27	8	25.80	17	48.57	44	32.12
False	12	31.57	5	15.15	5	16.12	15	42.85	37	27.01
Do not know	16	42.10	19	57.57	18	58.06	3	8.57	56	40.88
Dental floss should be used daily?										
True	8	21.05	5	15.15	12	38.70	22	62.85	47	34.31
False	6	15.78	7	21.21	11	35.48	7	0.20	31	22.63
Do not know	24	63.15	21	63.63	8	25.80	2	5.71	55	40.15
Dental floss should be used by everyone regularly?										
True	7	18.42	5	15.15	11	35.48	21	0.60	44	32.12
False	6	15.78	7	21.21	9	29.03	6	17.14	28	20.44
Do not know	25	65.78	24	72.72	11	35.48	8	22.85	68	49.64
Dental floss helps in detecting proximal caries/calculus?										
True	3	7.89	3	9.09	5	16.12	8	22.85	19	13.87
False	4	10.52	3	9.09	5	16.12	5	14.28	17	12.41
Do not know	31	81.57	27	81.81	21	67.74	22	62.85	101	73.73
Dental floss can injure the interdental gingiva?										
True	2	5.26	1	3.03	4	12.90	10	28.57	17	12.41
False	4	10.52	2	6.06	2	6.45	3	8.57	11	8.03
Do not know	32	84.21	30	90.90	25	80.64	22	62.85	109	79.57

daily after brushing early in the morning or before retiring to bed. It has different types, waxed, non-waxed, with or without holder, medicated, or non-medicated. Apart from the traditional use of cleaning teeth, it can be also used to tie up the endodontic files to prevent aspiration. It is also used to detect proximal caries as well as to removal food lodged between the teeth. If not used properly, it can cause trauma to the gingiva. Use of dental floss is slowly gaining popularity among the Asian population, but it is not yet widely being used by everyone. Most of the disadvantage being the time consuming and relatively expensive as well. The dentist and dental health workers are responsible for educating to the patients about it and teaching the method and steps to use it. Before teaching and educating others, they themselves should be aware an adequately trained to give demonstration to the patients. Our study was conducted to assess the level of knowledge among the dental students regarding the use of dental floss.

Our study revealed that all of the students had heard of dental floss and around 72.99% knew what is dental floss, whereas only 56% of students knew about dental floss in study conducted by Bennadi *et al.* in 2013.[6] Only 18% of our students used dental floss but none of them were using it regularly, similarly, 2% used dental floss regularly in study conducted by Bennadi *et al.* in 2013,[6] but in contrast to the significantly high percentage, that is, 64.3% of dental interns used dental floss in a study done by Pandey[7] in 2020 in Nepal, also 19% used dental floss in a study done by Ahmad *et al.* in 2017[8] in Pakistan and 36.7% of dental

Table 2: Questions and responses for section 3 (practice) of the questionnaire

Section 3: Questions and options	BDS 1st year		BDS 2nd Year		BDS 3rd year		BDS 4th year		Total	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Do you use dental floss?										
Yes	2	5.26	3	9.67	5	16.12	8	22.85	18	13.13
No	36	94.73	30	90.90	28	90.32	27	77.14	121	88.32
If yes, how many times a week										
7 days/everyday	0	0	0		0		0		0	
Twice a week	0	0	1	3.03	1	3.22	1	2.85	3	2.18
More than twice a week , but not everyday	0	0	0		1	3.22	1	2.85	2	1.45
Irregularly/sometimes	2	5.26	2	6.06	3	9.67	6	17.14	13	9.48
If no, why?										
Do not know how to use	30	78.94	26	78.78	24	77.41	12	34.28	92	67.15
Time consuming	2	5.26	2	6.06	1	3.22	12	34.28	17	12.40
Expensive	4	10.52	2	6.06	3	9.67	11	31.42	20	14.59
Do you prescribe dental floss?										
Yes	0	0	0		0		21	60	21	15.32
No	0	0	0		0		14	40	14	10.21
Not applicable/do not see patients	38	100	33	100	31	100	0	0	102	74.45
If yes, in what conditions?										
All patients	N/A		N/A		N/A		4	11.42	4	2.91
Patients with crown and bridge/proximal restorations	N/A		N/A		N/A		3	8.57	3	3.73
Patients with periodontal diseases	N/A		N/A		N/A		5	14.28	5	3.73
Option B and C both	N/A		N/A		N/A		9	25.71	9	6.56
If yes, do you teach/demo for using dental floss?										
Yes, always	N/A		N/A		N/A		3	14.28	3	2.18
Yes, sometimes	N/A		N/A		N/A		12	57.14	12	8.75
No	N/A		N/A		N/A		6	28.57	6	4.37
If no, why?										
Do not know when to prescribe	0	0	0		0		14	40	14	10.21
Others/do not see patients	38	100	33	100	31	100	0	0	102	74.45
If no, would you prescribe if taught about it?										
Yes	38	100	33	100	31	100	14	40	116	84.67
No	0	0	0		0		0		0	

students used dental floss in a study done by Ramananda in 2019[9] in India.

Most of our students in the 1st and 2nd year BDS did not had adequate knowledge about dental floss, their knowledge slightly increased during their 3rd year and mostly during the 4th year when they started prescribing the dental floss in the indicated patients. Our curriculum seems to teach them somewhat about dental floss but it did not appeared adequate to be enough to train them to be eligible and confident to demonstrated same to the patients. There is severe lack of knowledge among the students regarding the use and function of dental floss. One of the major barriers for the use of dental floss by students was inadequate knowledge to use it followed by lack of time and expensive.

Our study had a limitation that it included the questions that were not included in any other previous studies or the studies till date so we could not compare our results with others. Furthermore, our study only included the BDS students, excluding the interns that too of only a single dental college in Terai region of Nepal. We would suggest for a nationwide survey study of similar study to get a true representation of the country's dental students.

CONCLUSION

We would conclude that there is severe lack of knowledge, awareness, and practice among the dental students regarding use of dental floss, so we need to improvise our curriculum to train our dental graduates better to prepare them to guide patients regarding the use of dental floss.

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How to cite this article: Mahanta SK, Gupta A, Deepak D, Jha KS, Rohit, Singh A. Knowledge, Awareness, and Practice about Dental Floss among Students in a Dental College in Nepal. Int J Sci Stud 2021;8(11):58-62.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

A Prospective Study of Outcome of Prophylactic use of Mesh in Patients Undergoing Elective Laparotomy in the Department of General Surgery at M.Y Hospital, Indore

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Abstract

Background: A hernia is a defect in the fascia of the abdominal wall and thus resulting into the formation of a hernial sac of peritoneum that contains visceral organ or abdominal contents. The objective of this study is to study the outcome of prophylactic use of mesh in patients undergoing elective exploratory laparotomy and to study the efficacy of PMP in reducing the incidence of incisional hernia in such patients.

Materials and Methods: Our study is based on study of 50 patients attending the surgical OPD of M.G.M Medical College and M.Y Hospital, Indore. The study includes all elective cases operated in routine OT in the Department of Surgery, M.G.M Medical College and M.Y Hospital, Indore. The study will include prospective cases for 1 year from date of approval from ethics committee. Patient will be discharged and advised to follow up at 1 month, 3 months, 6 months, and 1 year. All the cases are filled in pro forma.

Results: We had 8 (16.0%) patients in the age group of 18–20 years, 27 (54.0%) patients in the age group of 21–40 years, 12 (24.0%) patients were in the age group of 41–60 years, and 3 (6.0%) patients were in the age group of >60 years. Majority of the patients were in the age group of 21–40 years followed by 41–60 years. Patient in 21–40 years age group, 2 in 40–60 years, and 1 in >60 years group developed incisional hernia.

Conclusion: The mesh placement in an elective laparotomy during abdominal closure is associated with low occurrence of incisional hernia.

Key words: Hematoma, Onlay, Seroma, Sublay, Wound dehiscence

INTRODUCTION

A hernia is a defect in the fascia of the abdominal wall and thus resulting into the formation of a hernial sac of peritoneum that contains visceral organ or abdominal contents or other bulges that may appear similar, but are not true hernias. Other abnormalities that present as hernia but are not true hernias are diastasis recti and eventration.

Access this article online

www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

Exploratory laparotomy is opening of abdominal cavity for surgical purposes, for the pathologies of abdomen that cannot be dealt with minimally invasive techniques. Abdominal wall comprises musculoaponeurotic that gives the strength to abdominal wall along with skin and fascia. This also functions to keep the abdominal viscera within the cavity. Any incision over the abdominal wall for exploration may result into the weakening of this protective barrier and predisposes for the protrusion of the abdominal wall viscera through the musculoaponeurotic layers and it presents as a swelling over the wall just beneath the incision scar. This swelling is known as incisional hernia that contributes to significant proportion of post-operative complication in patients who underwent laparotomy.

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The incidence of incisional hernia develops after abdominal wall closure range widely from 10 to 23%[1,2] and up to 69% in long-term high-risk patients.

Various methods of suture closure (material and technique) and mesh reinforcement (position and shape) have been used to restore abdominal wall integrity and prophylactic treatment of incisional hernia. Primary repair of incisional hernia can be done when the defect is small. Despite advances in early repair, recurrence rates remain unacceptable (12–54%). Larger defect (>2–3 CMS) shows higher recurrence rate around 10–15% if closed by primary repair. Recurrence is susceptible to a vicious cycle of morbidity, because early subsequent repair presents greater technical challenges and an increased risk for recurrence and morbidity.[3,4]

Failure of effective and sufficient closure of the abdominal wall after operations leaves the patient at risk for developing hernia.

The introduction of prosthesis has become game changer in repair of ventral hernia. To date, few studies have focused on prophylactic management of incisional hernias in index patients which in short decreases the iatrogenic complications secondary to surgical incisional hernia repair.

Ideal mesh positioning is also a topic of study. Till date, wound dehiscence and incisional hernia are potentially serious complications following abdominal surgery, especially if it is performed through a midline incision. Although prophylactic reinforcement with mesh has been shown to reduce the risk of wound dehiscense and incisional hernia. Reinforcement of the suture line with a mesh may be an effective way of preventing wound dehiscence. By placing a polypropylene mesh under the aponeurosis along with drain after closure of the midline, the risk for incisional hernia has been shown to be reduced by at least two-thirds.

Enough evidence is now available to advise prophylactic mesh placement (PMP) for routine midline laparotomy in these high-risk cases. However, literature for the use of PMP in emergency midline laparotomy is rather scarce. We conducted this prospective study to examine the safety and efficacy of PMP in elective midline laparotomy.

Aims and Objectives

Primary objective

- The primary objective of the study was to study the outcome of prophylactic use of mesh in patients undergoing elective exploratory laparotomy.

Secondary objective

- The secondary objective of the study was to study the efficacy of PMP in reducing the incidence of incisional hernia in such patients.

MATERIALS AND METHODS

Title

- "A Prospective Study of Outcome of Prophylactic use of Mesh in Patients Undergoing Elective Laparotomy in the Department of General Surgery at M.Y. Hospital, Indore."

Study Design

- This was a prospective observational study.

Sample Size

- Fifty.

Inclusion Criteria

The following criteria were included in the study:

1. Patients >18 years and <70 years.
2. Patients who give written informed consent and to follow up.
3. Patient with comorbidities (obesity [BMI < 35], COPD smoking [ceased 1 month before procedure], and diabetes [HbA1C < 7]).

Exclusion Criteria

The following criteria were excluded from the study:

1. Patients not willing to give written consent.
2. Patients with irregular follow up.
3. Age <18 years.
4. Recurrent hernia (ventral) cases.
5. Morbidly obese (BMI > 35).
6. Unable for smoking cessation.
7. Diabetes (HbA1C > 7).
8. Immunocompromised cases.
9. Pregnancy.

Source of Data

- All elective cases operated routine OT in the Department of Surgery, M.G.M Medical College and M.Y Hospital, Indore. The study will include prospective cases for 1 year from date of approval from ethics committee.

Study Period

- One year from date of approval.

Place of Study

- The study was conducted at the Department of Surgery, M.G.M Medical College and M.Y Hospital, Indore.

Sample Size

- Fifty cases.

Procedure Planned

1. Our study is based on the patients attending the surgical OPD of M.Y. Hospital, Indore.

2. All patients are to be examined and planned for exploratory laparotomy. An informed consent will be taken from each patient after which the patient will be taken for an elective surgery (prophylactic mesh replacement).
3. The patients who developed complications after surgery will be examined clinically and managed as required
4. This study will be conducted after approval from thesis and ethical committee.
5. Data will be collected and appropriate statistical analysis will be done.
6. Present study includes 50 cases of laparotomy.

Follow-Up

Patient will be discharged and advised to follow up at:

- 1 month
- 3 months
- 6 months
- 1 year.

Routine Investigations

1. Hemogram
2. Renal function tests
3. Liver function tests
4. Serum electrolytes
5. Coagulation study
6. Ultrasonography whole abdomen
7. X-ray chest + ECG
8. Serology.

OBSERVATION AND RESULTS

Table 1 shows the distribution of patients according to post-operative complications.

Table 2 shows the distribution of patients according to the duration of hospital stay.

Table 3 shows the association between age and final outcome.

Table 4 shows the association between location of mesh and final outcome.

Table 1: Distribution of patients according to post-operative complications

Post-operative complications	Number	Percentage
Post-operative pain	15	30.0
Hematoma	1	2.0
Seroma	12	24.0
Surgical site infection	13	26.0
Wound dehiscence	6	12.0

Table 2: Distribution of patients according to the duration of hospital stay

Duration of hospital stay	Number	Percentage
1–7 days	6	12.0
7–14 days	23	46.0
14–21 days	13	26.0
>21 days	8	16.0
Total	50	100.0

Table 3: Association between age and final outcome

Age	Final outcome			Total (%)
	Hernia (%)	No hernia (%)	Unknown (%)	
18–20 years	0 (0.0)	7 (87.5)	1 (12.5)	8 (100.0)
21–40 years	1 (3.7)	24 (88.9)	2 (7.4)	27 (100.0)
41–60 years	2 (16.7)	9 (75.0)	1 (8.3)	12 (100.0)
>60 years	1 (33.3)	2 (66.7)	0 (0.0)	3 (100.0)
Total	4 (8.0)	42 (84.0)	8 (8.0)	50 (100.0)

Table 4: Association between location of mesh and final outcome

Location of mesh	Final outcome			Total (%)
	Hernia (%)	No hernia (%)	Unknown (%)	
Onlay	3 (60.0)	2 (40.0)	0 (0.0)	5 (100.0)
Sublay	1 (2.2)	40 (88.9)	4 (8.9)	45 (100.0)
Total	4 (8.0)	42 (84.0)	8 (8.0)	50 (100.0)

DISCUSSION

We conducted an observational study to see the prophylactic effect of prosthetic mesh in the development of incisional hernia after elective laparotomy. The study was conducted in the Department of General Surgery, MGM Medical College, Indore, from a period of July 2018 to October 2020.

The study is a type of comparative study in which the outcomes after mesh placements were used for comparison with patients developing incisional hernia acting as cases and those not developing act as controls. Furthermore, it compares the variation in the outcomes with the location of mesh, namely, sublay and onlay.

The study comprised 50 elective laparotomy cases done irrespective of the actual pathology involved. The age and gender were not taken as selection criteria. There were no other specific inclusion criteria. Patients who did not give consent were excluded from the study. All emergency laparotomy cases were also excluded.

We had 8 (16.0%) patients in the age group of 18–20 years, 27 (54.0%) patients in the age group of 21–40 years, 12 (24.0%) patients were in the age group of 41–60 years, and 3 (6.0%) patients were in the age group of >60 years. Majority of the patients were in the age group of 21–40 years followed by 41–60 years.

Patient in 21–40 years age group, 2 in 40–60 years, and 1 in >60 years group developed incisional hernia. The association of age with the development of incisional hernia post-laparotomy was found not to be statically significant. We, in our study, were able to establish that age did not have a role as a risk factor in the development of incisional hernia in contrast to as described by various surgical literatures based on the fact that human tissue tends to weaken off with aging.

Two out of 26 females (7.7%) and 2 out of 24 males (8.3%) in our study developed incisional hernia. This gender-wise incidence was not statistically significant and gender as a risk factor for the development of incisional hernia cannot be established in our study.

All four patients who developed hernia belonged to obese category as per the WHO criteria for BMI classification. Four out of 24 (16.7%) patients who were obese were associated with this complication. This was, however, not found to be clinically significant but we could not clearly rule out obesity as a risk factor for the development of incisional hernia. To clearly establish the relation, we need to conduct study for greater sample size or in a same cohort.

We placed mesh in all patients in our study. However, the location of mesh placement in different patients was not randomized and was fully on surgeon's discretion. We did sublay mesh placement by retro-rectus dissection in 45 patients and onlay placement in 5 patients. About 60% (3 out of 5) of patients who had onlay mesh placement developed incisional hernia. Furthermore, the rate of local wound complications in this group was higher. All five patients developed surgical site infection (SSI) and three progressed to develop seroma and for developing wound dehiscence and burst abdomen.

The hospital stay in patients with sublay mesh placement was highly variable with six patients getting discharged before 7 days and 24 staying till 14 days. Eleven patients had stayed for more than 15 days up to 21 days and four patients stayed for more than 21 days. One patient who developed hernia in sublay group had prolonged hospital stay due to the development of complications (wound dehiscence). This proves that the sublay mesh placement as such is not associated with increased risk but the wound infection associated with the mesh leads to the hernia formation. Overall sublay mesh placement had lower rate of wound complications with 18% of patients developing SSI, 20% developing seroma, and 5% developing wound dehiscence. This, in turn, correlates with lower rate of incisional hernia with sublay mesh placement as compared to that in onlay mesh placement.

In onlay mesh placed cases, all five patients had either of the wound complications, that is, SSI, seroma, or wound dehiscence. These complications were related to the prolonged hospital stay in all patients with onlay mesh. One out of five patients had stayed in ward up to 21 days and other four patients had stayed for more than 21 days. Three out of four patients who developed incisional hernia belonged to the onlay mesh placed group. The high rate of hernia in this group hence can be attributed to higher rate of wound complication in these patients.

As compared to the previous studies, our study showed similar results. In a study by Zachary Borab *et al.*[5] comparing the suture closure and onlay mesh placement, they found lower rate of incisional hernia with mesh but seroma formation and other wound complications were present. This was consistent with our study. We additionally tried to compare the rate of hernia with onlay and sublay mesh placement but due to lower number in onlay group, we could not establish the clear-cut relationship even though the cases were more after onlay mesh placement.

Furthermore, the post-operative pain and development of hematoma are more with the sublay mesh placement than compared with the onlay. This was done in no other previous study of PMP.

In our study, we did not have any patient with intraperitoneal placement as was compared in other studies like that done by Andres Kohler *et al.* and Burns *et al.*[4] Furthermore, the study is limited by the fact that many of the factors directly involved in wound healing such as diabetic status, hemoglobin status of patient, protein status, and technical aspect of closure. Furthermore, our study did not comment on the deviations with normal suture closure of the abdominal cavity and the type of mesh used.

CONCLUSION

From this prospective study, the following conclusions can be drawn:

1. Incisional hernia is an important delayed post-operative complication of abdominal wall surgery.
2. Several factors are implicated in occurrence of hernia after abdominal wall closure that includes patient factor and technical factors.

3. Wound infections (SSI) leading to wound dehiscence are a major cause of the development of incisional hernia.
4. Technique of abdominal wall closure, namely, suture closure and mesh placement, respectively, has variable impacts on the prevention of outcome that is incisional hernia.
5. Length of hospital stay depends on the development of wound infection and hence increases the chances of incisional hernia.
6. The mesh placement after elective laparotomy while abdominal closure is associated with low occurrence of incisional hernia as compared with the primary suture closure.
7. Onlay mesh placement technique has more chances of complications such as seroma and flap infections than sublay due to the fact of more dissection in fatty plane for mesh placement. Furthermore, more superficial location of mesh is easily accessible for bacterial invasion.
8. The concept of mesh placement can be successfully applied to selected patients to halt the development a morbid condition of incisional hernia.

ACKNOWLEDGMENTS

Authors would like to thank our patients who participated in our study. Furthermore, authors thankful to our colleagues, seniors, and paramedical staff who helped and supported us throughout the study.

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How to cite this article: Maheshwari A, Baghel H, Dubey R. A Prospective Study of Outcome of Prophylactic use of Mesh in Patients Undergoing Elective Laparotomy in the Department of General Surgery at M.Y Hospital, Indore. Int J Sci Stud 2021;8(11):63-67.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Assessment of the Lumbosacral Lordosis Angle for Sexual and Age-related Deviations in Cadaveric Lumbar Spines in Sikkim

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Abstract

Introduction: The role of optimal lumbar lordosis is unparalleled in the balancing the upright posture and management of spinal ailments. However, incongruities concerning the actual lordosis angle as well as the optimal range remain unresolved. The lumbosacral lordosis (LSL) angle formed between the central axis of third through fifth lumbar vertebrae and that of first sacral vertebra is contemplated as the true lumbosacral angle (LSA) by several authors. Data defining the standard parameters of this angle for regional and gender variances and their association among each other and age is unavailable in our population. Therefore, we estimated the LSL angle, the sacral disk angle (SDA), and the LSA in midsagittal cadaveric spines for regional variability and sexual dimorphism and the correlation among them and with age. Our results will not only compute the normal reference range in our population but will provide unsurmountable data in accomplishing the goal of the optimal lordosis angle in lumbar instrumentation and rehabilitative therapy.

Purpose: Analysis of the LSL, lumbosacral, and SDAs in cadaveric lumbar spines and their correlation with age and gender.

Materials and Methods: Forty midsagittal lumbar spines, consisting of equal number of males and female aged between 18 and 65 years were included in the study. Measurements were made using stainless steel goniometers.

Results: The mean age, LSL angle, SDA, and LSA is 47.85 (11.97), 143.9 (4.2), 20.0 (4.03), and 42.35 (3.4) in males and 42.95 (12.36), 139.85 (6.78), 17.35 (4.24), and 40.1 (3.37) in females.

Conclusion: The LSL angle (P = 0.015), SDA (P = 0.029) and the LSA (P = 0.047) are significantly higher in males. The lumbosacral scoliotic list LSL and SDA were positively correlated with each other and age in both males (r = 0.75) and females (r = 0.72).

Key words: Lordosis, Lumbosacral lordosis angle, Sacral disk angle, Lumbosacral angle

INTRODUCTION

The cognizance of evaluation of the lumbar lordotic curvature is unparalleled in the diagnosis and treatment of spinal ailments. The sagittal alignment of the spine stabilities the erect posture and determines the mechanical forces acting on the vertebral bodies.[1] Its alteration is the biggest offender for lumbosacral disintegration and pain.[2] Achieving the precise lumbar lordosis angle is the ultimate goal in deterrence of spinal degeneration and recreation of appropriate lumbar lordosis defines the success of reconstructive spinal surgery and rehabilitative therapy. However, the mystification of the true lumbosacral angle (LSA) and methods of assessment remain unsolved as the lordosis angle as well as the optimal range is still unspecified.[3,4] Lumbar lordosis is an evolutionary adaptation of human spine on attaining the erect posture where the lumbar spine arches forward to compensate for sacral inclination thus balancing the upper torso and preventing kyphosis.[5] Some authors consider the lumbosacral lordosis (LSL) angle formed at the center of L5 vertebrae by an axis joining the lower three lumbar vertebrae and that of first sacral vertebra as the true LSA.[6-9] Lordosis of the spine occurs at the cervical and

Access this article online

www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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lumbar region where the itinerant segments meet the almost immobile masses.[10,11] To the best of our knowledge, the evaluation of this angle for sexual dimorphism or regional variance and its correlation with age and other sagittal angles remains unexplored in our region. Most investigators have assessed either the Cobb's angle or the Ferguson's angle as the angle of lumbar lordosis.[4,5,12-17] The major inadequacy of the Cob's method is its sheer disregard for small segmental malformations as it includes the whole lumbar spine and the wide range of normal lordosis angle (30°–80°) that it defines. Furthermore, a single Cob's angle gives two varying lordotic curvatures.[4,17] All these limitations are overcome by the evaluation of the lumbosacral scoliotic list (LSL) which is static as the angle between two fixed vertical centroid axes is measured. Our study provides the unmatched morphometric analysis of the lumbar spine as it deliberates the lowest lumbar segment, most prone to ordeal of instability and contributing to 40% of lumbar lordosis and the lumbosacral junction most susceptible to trauma of flexibility.[4,10,11,18-20] With long fusions involving the lower lumbar segments and sacropelvic fixation gaining recognition for caudal strengthening in spinal surgeries the evaluation of LSL will deliver the most accurate reference ranges for deterrence of degeneration of the spine and circumvent iatrogenic or age associated flatback syndrome.[5,21] The sagittal spinal angles are influenced by several factors such as ethnicity, age, gender, and diseases.[5,22-41] Inconsistent observations prevail where most researchers reported higher values of lumbar lordosis in females.[21-26,34] While others found no variance.[7,15,17,30] Numerous researchers also validate that the aging spine exhibits loss of lordosis which manifests as flat back syndrome and gait anomalies.[10,22,31-33] While many observed no association between age and loss of lordosis.[11,14,29,34] Contradictory statistics exists regarding ethnicity, where some studies demonstrated bigger lordosis angles in Caucasians than Native Americans and Europeans.[35] While others reporting higher lordosis angles in African-Americans than Caucasians while some reported otherwise.[36-38] Moreover, yet others demonstrated similar angles between African-Americans and Caucasians and Europeans and Chinese.[39,40] Differences are observed even among two groups of same ethnicity.[41] Restoration of the perfect lumbar lordosis is the goal of lumbar fusion surgeries that averts adjacent segment degeneration and revised surgeries.[1,41-46] Although Cob's method is most preferred for assessment of lordosis, it increases the misperception about the precise angle of lumbar lordosis. All the deterrents of the Cob's method such as obtaining two varying angles from a single angle of lordosis, its neglect of segmental deformities and the large variation of the normal range of lordosis (30–80°) are overcome when evaluating the LSL angle which is fixed at the center of L3 vertebrae. Besides the above benefits our study also defines the standard reference range of lumbar lordosis for our population for the management of spinal ailments.

MATERIALS AND METHODS

Forty cadaveric mid sagittal lumbar spines sections were studied ranging from 18 years to 65 years in the department of anatomy, Sikkim Manipal Institute of Medical Sciences. Midsagittal sections were made taking care not to displace or damage the disks and vertebral bodies. Measurement of the LSL angle (LSL) sacral disk angle (SDA) and LSA was undertaken as mentioned by Yachom and Rowe. Spines with irregularities of the vertebra or disks, deformities like scoliosis, kyphosis and prolapsed disk, and those above 65 years likely to have extensive degenerative changes were excluded from the study. Small modifications were made to measure the angles directly. Transparency sheets were placed over the spinal sections and all important land marks and lines were drawn on these sheets and measurements were taken. The SDA was measured using the 360º stainless steel goniometer at the lumbosacral junction where the angle between a line passing through lower endplate of L5 vertebra and another line passing through the upper endplate of the first sacral vertebra were measured. The LSL angle (LSL) and the LSA were measured using the 180° goniometer. The LSL angle is open posteriorly and formed at the center of fifth lumbar vertebrae by an axis joining the lower three lumbar vertebrae and the axis of the first sacral vertebrae. The first line connects the centers of the L3 through L5 vertebral bodies and second line extends from the center of body of S1 vertebra to the center of L5 body. The center of the vertebral bodies is constructed by joining the anteroinferior with the posterosuperior angles and the anterosuperior with posteroinferior angle of vertebral bodies.

The LSA or the Ferguson's angle was measured between the upper end of sacrum and the horizontal plane. Data were analyzed using Windows SPSS version 20 (IBM Corp, USA). The data were tested for normality using the Kolmogorov–Smirnov test and were found to be normally distributed. The mean angles were tested using Student's t test for means. The association between various angles with each other and age was assessed using Pearson's correlation coefficient. The test results were within a confidence interval of 95%. A $P < 0.05$ was considered statistically significant.

RESULTS

The study was conducted on 40 mid-sagittal lumbar spinal sections without anatomical malformations. Equal number of male and female spines (20 each) was included in the

study. The LSL angle LSL formed at the center of fifth lumbar vertebrae was measured [Figure 1].

The overall mean age (SD) was 45.5 (12.26). The mean age was 42.9 (12.3) for females and 47.8 (11.9) in males with no significant difference ($t = 1.28$, $P = 0.20$).

The total mean LSL angle observed was 141.9° (±5.9) with a range of 125°–150°. The LSL was significantly greater in males 143.9 (4.17) as compared to females 139.85 (6.78), ($P = 0.015$) demonstrating that females have higher lordotic spines [Table 1]. This is in agreement to similar findings of most referred literature in our study. The overall mean LSL was lower than that perceived by Yachum and Rowe (145°, range 124–162°) and Saraste but comparable to Naidoo's inferences in asymptomatic Indian females.[6-8] The lower mean LSL observed in our samples is congruous with other studies on cadaveric samples who also established significant differences compared to spines of living participants.[34] The variances demonstrated in our study could be credibly influenced by ethnicity and environmental factors as this includes samples from the sub Himalayan belt. We established that there is a loss of lumbar lordosis with advancing age as the LSL angle was is higher in older spines. The highest angles were reported in the sixth decade of life while the lowest in the second decade. It is further evident in our study that the SDA and LSL showed positive correlation with each other. A weak positive correlation between LSL and LSA was observed but was not significant. However, no correlation was established between LSA and SDA [Table 2].

Figure 1: Measurement of lumbosacral lordosis angle using goniometer

A significant positive correlation between LSL as well as SDA and age are observed in both females and males ($r = 0.85$, $P = 0.0026$) and ($r = 0.830$, $P = 0.0029$) and ($r = 0.68$, $P < 0.05$), ($r = 0.81$, $P \leq 0.05$) respectively. However, sexual dimorphism is observed in Pearson's correlation between age and LSA where a weak positive correlation between LSA and age ($r = 0.26$, $P = 0.01$) is observed in females whereas a negative correlation between LSA ($r = -0.40$, $P = 0.52$) and age is observed in males [Table 3].

DISCUSSION

The orientation of sagittal spinal alignment determines the shear and compressive forces acting on the anterior, vertebral body, and iv disk and posterior elements of vertebral column.[1] Studies have perceived that altered lumbosacral sagittal alignment leads to spinal disintegration and pain. Conservation of the optimal lumbar lordosis is the primary goal of rehabilitative therapy and lumbar fusion surgery.[2,4-7] However, considerable ambiguity exists regarding the definite angle of lordosis itself and the average normal standards. The posteriorly open LSL angle formed at the center of L5 vertebral body between the axis joining the centers of L3 through L5 and the axis of first sacral vertebral bodies is contemplated as the true LSA by some authors but there is scant available data regarding its morphometry.[5,6] We assessed the LSL angle (LSL), the SDA and the LSA in 40 midsagittal lumbar sections for regional and gender variances and their correlation with age. Some major shortfalls of Cob's method of assessment of lordosis angle is its sheer disregard of smaller segmental malformations as it includes the whole of the lumbar spine from upper surface L1 to upper surface of S1 and that a single Cob's angle provides two varied lordotic curvatures.[3,4,16] This can be overcome by the assessment of the LSL, which is more specific as its land marks are fixed on the central axis of the lumbar and sacral vertebrae. It also limits the extent of patients' exposure to hazardous irradiations where images of the pelvis itself will offer adequate information. The LSL being confined to the lumbosacral junction, region subjected to extreme insult of compressive forces provides important the most reliable statistics for the investigations of spinal ailments.[20] Mangione demonstrated that with the loss of lordosis in old age the center of gravity shifts anteriorly and this leads to progressive imbalance of sagittal spinal configuration and verticalization of sacrum.

Table 1: Mean sagittal angles by gender

Variable	Total	Male		Female		*t*-test
	Mean (SD)	Mean (SD)	Range	Mean (SD)	Range	P value
Age	45.4° (±12.2)	47.85 (±11.9)	25–64	42.95 (±12.36)	20–64	0.21
LSL	141.9° (±5.9)	143.9° (±4.2)	135–151°	139.9° (±6.8)	125–148°	0.015
SDA	18.73° (±4.3)	20.02° (±4.03)	10–25°	17.45° (±4.34)	13–26°	0.029
LSA	41.5° (±3.16)	42.2° (±3.9)	35–48°	40.1° (±3.7)	34–46°	0.047

Table 2: Comparison of combined mean lumbosacral lordosis angle of present study with other studies

STUDY	Mean LSL(SD)	Range	*P*-value
Yachum and Rowe 2005	146°	124–162°	<0.05
Naidoo 2008 (females)	143.2° (±5)	135–155°	0.22
Present study 2021 combined	141.9° (±5.9)	125–151°	<0.05
Present study females with Naidoo (Females)	139.85 (±6.78) Females	125–149	0.04

Table 3: Age wise mean lumbosacral lordosis angle observed in the present study

Group	Age	Male *n*	Mean (SD) LSL	Female *n*	Mean (SD) LSL	*t*-stats	*P*
1	21–30	3	136.7°±1.52	4	130.0°±4.54	2.7	0.01
2	31–40	3	143.0°±3.00	4	137.25°±5.12	1.86	0.06
3	41–50	5	144.2°±3.34	6	142.83°±3.18	0.69	0.97
4	51–60	6	145.5°±2.25	4	144.5°±3.41	0.51	0.60
5	61–70	3	148.6±1.52	2	146.5±2.12	1.2	0.4

This causes excessive stress upon the osteoporotic hips and knees which trigger the gait abnormalities in the aged.[32] Hasday *et al.* (1983) predicted that iatrogenic flat back and gait abnormalities are common complications of Harrington's instrumentation.[43] The recreation of optimal lumbar lordosis angle in the lower lumbar segment and prevention of iatrogenic flat back is the desired objective in lumbar fusion surgeries. This reduces the complications of Harrington's instrumentation such as adjacent segment degeneration and gait anomalies and averts revision surgery.[3,42-46] Our inclusion of sections without any anatomical deformities assumes immense importance as the inferences will not only compute the standard normal reference parameters for our population and provide the pre-operative blueprint to formulate the above goal of restoration of the appropriate lumbar lordotic angle for reconstructive spinal surgery and therapy [Figure 2].

We observed an overall mean LSL angle of 141.9° (±5.9) with a range of 125°–151°, which is significantly lower than the mean angle of 146° ($P < 0.001$) range 124°–162°, demonstrated by Yachum and Rowe.[7] Saraste observed a mean LSL of 135° in patients of spondylosis and 145° in the control group. The mean LSL observed in our study is significantly lower than that observed by Saraste ($P < 0.05$) in the controls without spondylosis.[8] Interestingly the combined mean LSL in our sample corresponds to the mean LSL 143.3° ± 5, ($P = 0.22$) established by Naidoo in her sample of young to middle aged females. Nevertheless, we observed lower mean LSL in our female samples 139.9° (±6.78) ranging between 125 and 148° as compared to Naidoo.[9] The lower mean LSL observed in our sample could be ascribed to this being a cadaveric study. As our study is carried out in a population in the sub Himalayan belt the lower values obtained in our study could also be on account of ethnicity. However, to endorse this, further assessment with bigger samples in the forthcoming years is essential. Similarly, variations from the usual findings were reported by Farni and Truman (1965) in cadaveric samples.[36]

Gender Discrepancies

Data regarding the normal morphometry of the LSL or gender dimorphism and its association with age in our region is unavailable. We observed significantly greater LSL in males 143.9 (4.17) as compared to females 139.85 (6.78), $P = 0.015$. This substantiates the studies by Vialle, Ferdinand and Fox, Bryan, Amonoo-Koufi, Damasceno, and Youdas who observed greater lordosis in females.[22-28,34] Similar findings were reported by Hay *et al.* who observed that female spines demonstrated greater lordotic curvatures caudally with the peak between the L4 and L5 vertebrae.[27] These changes are ascribed to the adaptation of female spines to the forward thrust of the center of gravity during pregnancy as perceived by Whitcome *et al.* in their study.[28] While others Skaf and Okpala (2014), Onyemaechi (2018), and Kalichman (2011) observed no discrepancy between genders.[5,14,15,29,30]

Interestingly, the mean LSL angle of 139.85 (±6.78) obtained in our female samples is significantly (SEM = 1.52, t = 2.2032, P = 0.04) lower than that demonstrated by Naidoo in her sample of asymptomatic females.[9] Our sample included spines without anatomical malformations of the disk or the vertebrae or the canal. The mean values obtained will provide the most accurate reference range for normal LSL this region.

Age and Lumbosacral Lordois Angle

So far, there is no available record in literature regarding the correlation of the LSL with age. Most of the literature cited have either measured the lordosis by the Cob's method and have given inconsistent reports. Skaf *et al.* measured the lumbar lordosis by Cob's method reported a significant decrease of lumbar lordosis with age.[5] Similarly, Aaro, Murata, Potter, Magione, and Oyakhire established that lumbar curvature decreased with age as the lordotic angle increased.[5,9,21,30,31] Whereas, Hellems, Okpala, Kalchiman, and Youdas showed no difference with age.[12,15,29,34] Our study is in agreement with many of the above-mentioned studies showing loss of lumbar lordosis with age. The lowest mean LSL angle of 130° (±4.54) in females and 136.7° (±1.52) in males was observed in Group 1 (21–30) years. While the highest mean LSL of 146.5° (±2.12) in females and 148.6° (±1.52) in male was observed in Group 5 (61–70 years) [Table 3] A strong positive correlation (r = 0.83) between age and LSL is observed in our study [Table 4]. The results are in agreement with Skaff and Mangione, Von Lockum who demonstrated that loss of lordosis favored disk degeneration and shifts the center of gravity anteriorly leading to kyphotic spines and gait anomalies of old age.[5,32,38] Similarly, Ergun *et al.* (2010) also observed that a more vertical lumbosacral spine favored disk degeneration and herniation even in young adult women.[2] The higher LSL in old age observed in our study confirms that older spines portrayed loss of lordosis which further leads to degenerative changes of the disk and vice versa [Figure 3].

Indigenous Variablity

Innumerable authors have reported variability in the lumbar lordotic curvatures among various populations. Atta-Alla *et al.* (2014) in their study of Lebanese females observed that Lebanese women had straighter backs compared to Egyptians.[35] Fahrni and Trueman (1965) in their study of cadavers observed smaller lordotic angles in Native Americans compared to Caucasians.[36] Hanson (1998) observed that African-Americans had greater lordosis angles than Caucasians.[37] While Maduforo (2012), Oyakhire *et al.* (2013) observed lower angles in Africans than Caucasians as observed by Von Lockum and Splithoff.[16,30,38,39] Goldberg (2001) observed similar lumbar lordosis angles in Caucasians and African-Americans.[40] Chen (1999) also did not report any difference in between Chinese and European population.[41] However, most of the above cited studies assessed either LSA, Ferguson's or Cob's angle.[16,30,36-41] The combined mean LSL angle of 141.9° (±5.9), (P < 0.05) is significantly lower than the mean angle of 146° demonstrated by Yachum and Rowe and Saraste who observed a mean LSL of 145° (P < 0.001) in his study in the control group as compared to those with spondylosis (135°).[7,8] The mean LSL angle observed our male samples is analogous to the mean LSL angle of 143.2° (±5°) in young to middle aged asymptomatic Indian females demonstrated by Naidoo *et al.* in the radiographic study of lumbar spines of. However, the observed mean LSL of 139.85 (±6.8) in female spines in our study is significantly (SEM = 1.52, t = 2.2032, P = 0.04) lower than that demonstrated by Naidoo in young Indian females without back ache.[9] The significantly lower mean LSL angle observed across all our samples has established that influence of ethnicity and regional factors are considerably

Table 4: Gender wise Pearson's correlation between age and angles

Gender	LSL	SDA	LSA
Male	r=0.83	r=0.81	r=-0.40
P-value	P<0.05	P<0.05	P=0.08
Female	r=0.85	r=0.68	r=0.26
P-value	P<0.05	P<0.05	P=0.13

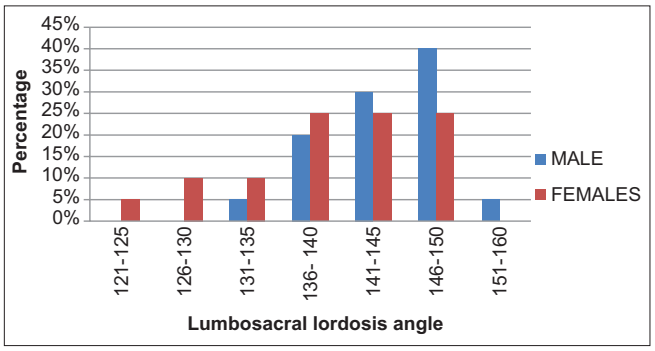

Figure 2: Frequency chart showing the lumbosacral lordosis angle between males and females

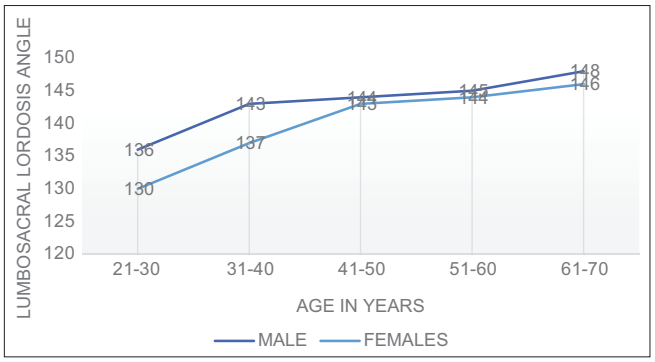

Figure 3: The correlation between age and lumbosacral lordosis

responsible for variances of the sagittal orientation of the lumbar lordosis of the spine. The present study corroborates that Indians, especiallly in the northeastern regions, have significantly lower sagittal spinal angles compared to other populations.

CONCLUSION

We observed LSL and lumbosacral disk angle and LSA were significantly higher in male samples. The smaller LSL in female leads to greater lordotic curvature of the spine which is an adaptation to balance the lumbar spines during pregnancy when the center of gravity shifts anteriorly. The LSL was positively correlated with age where the highest angle was observed in older spines. LSL was positively correlated with SDA in both males and females. Therefore, we concluded that spines showed significant loss of lordosis with age which conceivably induced the degenerative changes leading to flat back syndrome of aged spines. The measurement of the LSL angle presents the actual measurement between the itinerant lumbar spine and the immobile sacrum provides the most accurate reference data to evaluate spinal ailments and quantify the normal ranges. It also overcomes the shortfalls of the Cob's method by stipulating a single fixed angle over a short segment of spine with well-defined land marks. Our inclusion of spinal segments without anatomical incongruities will offer the ideal sagittal lumbar lordosis angle in reconstructive spinal surgeries and in devising lumbar support devices.

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How to cite this article: Chhetri K. Assessment of the Lumbosacral Lordosis Angle for Sexual and Age-related Deviations in Cadaveric Lumbar Spines in Sikkim. Int J Sci Stud 2021;8(11):68-74.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Clinical and Etiological Study of Ocular Motor Nerve Palsies in a Tertiary Care Hospital

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Abstract

Purpose: The purpose of the study was to provide clinically relevant information regarding the diagnosis, etiology, and work-up of ocular motor nerve palsies (OMNPs).

Materials and Methods: Thirty consecutive patients with OMNPs were investigated. All the patients were evaluated through a multidisciplinary approach comprising collaboration between the departments of ophthalmology, neurology, otorhinolaryngology, and internal medicine. Computerized tomography (CT) scan imaging of the brain and complementary laboratory tests were done for all the patients.

Results: Isolated OMNPs were seen in the majority of the patients with the third and the sixth cranial nerve being affected in 53.3% (19) and 32.3% (10), respectively. One case of combined OMNP (third+sixth+fourth cranial nerves) was reported. The majority of eyes (62.5%) with third cranial nerve palsy had pupil sparing presentation. Complete ptosis and full mydriasis were mostly seen in isolated cases of the third cranial nerve palsy. Overall, an etiological diagnosis was made in 93.3% of cases. The common causes were vascular conditions (46.7%), otorhinolaryngologic diseases (6.7%), and trauma (20%). CT scan failed to reveal any abnormality in 53.4% of cases.

Conclusion: Our study stresses the importance of a multidisciplinary collaborative approach in the evaluation of patients with ocular motor nerve palsy, especially where sophisticated, complementary investigations are impossible.

Key words: Computerized tomography, Etiology, Ocular motor nerve palsy, Ptosis, Pupil

BACKGROUND

Ocular motor nerve palsies (OMNPs) are commonly encountered in clinical practice and usually give us an insight into the underlying local, regional, or general diseases. They may be unilateral or bilateral, isolated, or combined type of involvement, and may be obvious or subclinical. To find out the etiology, it is important to carry out a careful clinical examination with supportive complementary investigations. This approach is known as "anamnesis."[1] To increase the chance of identifying the causes of OMNPs, a close collaboration between different specialties, that is, a multidisciplinary approach has been recommended. This short paper presents the result of the clinical and etiological aspects of OMNPs after using such a collaborative approach.

Access this article online

www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

MATERIALS AND METHODS

Thirty consecutive patients with OMNP were enrolled and examined at the Department of Ophthalmology, K.R. Hospital, MMCRI, Mysuru, from August 2017 to May 2018.

An arrangement about the protocol was made with the department of otorhinolaryngology, internal medicine, and neurology for their collaboration. They were especially asked to perform the investigation needed free of charge. In case of difference of opinion, a meeting was held among the ophthalmologists and other investigators to arrive at a consensus.

Each patient underwent a complete ophthalmologic evaluation as a part of the detailed anamnesis. The anamnesis

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also focused on risk factors in past and/or current ocular and general medical history and current or past medications. The thorough ocular examination included the following. Visual acuity was measured using conventional methods. Tests for ocular motility and ocular deviation were done in all nine directions of gaze and evidence of strabismus was assessed with cover-uncover test. The upper lids were evaluated for ptosis by measuring the distance between the upper and lower margins using a transparent graduated rule. Ptosis was further classified into mild (4–8 mm), moderate (2–4 mm), and complete (<2 mm). Pupillary light reflexes were checked and documented. The red-green glass was used to investigate the diplopia. Furthermore, patients underwent neurological, cardiovascular, endocrinologist, and otorhinolaryngologic examinations and computerized tomography (CT) scan imaging study. Cases of congenital OMNPs were not included in the study. Issues regarding the site of the lesion were out of the scope of this study and were, therefore, not included.

RESULTS

The frequency distribution of different forms of OMNPs in our study was as follows [Table 1]. Isolated OMNPs were seen in the majority of the patients with the third and the sixth cranial nerve being affected in 53.3% (19) and 32.3% (10), respectively. One case of combined OMNP was reported.

Symptoms, as reported by the patients at presentation, were as follows: Ptosis in 20 patients (66. 7%) and ocular deviation in 8 patients (26.7%).

Clinical examination did not reveal any case of visual impairment.

Out of 19 eyes with the 3rd cranial nerve palsies, 6 cases (31.57%) have pupil involvement, that is, presented with mydriasis while the remainder (68.42%) were pupil sparing. Furthermore, it was observed that pupil involvement was found to be more frequently associated with isolated 3rd nerve palsy cases [Table 2]. Ptosis was observed in all cases of the third nerve palsy [Figure 1].

Table 1: The frequency distribution of different forms of OMNPs

Cranial nerve palsy	3rd nerve	6th nerve	Combined (3rd+6th+4th nerve)	Total
No. of patients	19	10	1	30

Overall, an etiological diagnosis could be made in 28 patients (93.4%). The common causes were vascular in 18 patients (60%), craniofacial trauma in 70 patients (23.4%), and otorhinolaryngologic diseases in 2 patients (6.7%). One patient had Herpes Zoster ophthalmicus (HZO) [Table 3].

CT scan failed to reveal any abnormality in 53.4% of cases.

DISCUSSION

The etiology of OMNPs remains categorized as idiopathic in more than 7% of cases.[2,3] Due to the marked progress in the field of imaging studies, our chances of arriving at an etiological diagnosis have improved significantly.[4] Our protocol based on a tight multidisciplinary collaboration has allowed us to determine the cause of OMNP in most cases even in the absence of advanced imaging techniques such as magnetic resonance imaging.

As per several previous reports,[5,6] isolated cases of OMNP were more frequent in our study.

Paralysis of the sixth cranial nerve is recognized as the most common type, in most of the series[3,7] throughout the literature, even though in some series,[5,6] the third cranial nerve was the most affected. The latter being the case in our study. The low frequency of the fourth cranial nerve involvement can be explained due to the fact that congenital cases were excluded. Indeed, palsy of the fourth cranial nerve is mostly found to be congenital according to many sources.[8-10]

Ptosis in connection with the 3rd CN palsy was the most common presentation which was of varying degrees. All patients with mild ptosis were not aware of the abnormality. Moreover, in such cases, ptosis was not very obvious even on clinical examination until it was objectively measured. Should any doubt arise, we suggest that objective measurement be done to confirm the presence or absence of ptosis in cases of the 3rd CN palsy.

We also encountered a patient diagnosed with HZO who presented to us with symptoms of the third nerve palsy.

Head trauma-related OMNPs were not excluded from this series of patients which has substantially contributed to the proportion of causes found. The limitation of a

Table 2: Clinical presentation of the third nerve palsy cases

Patients with	Isolated 3rd nerve (*n*=19)	Combined (*n*=1)	Total	Percentage
Pupil involvement	6	1	7	35
Ptosis	19	1	20	66.7

Table 3: Causes of OMNPs

Causes	3rd (*n*=19)	6th (*n*=10)	Combined (*n*=1)	Total	Percentage
Diabetes	14	4		18	60.0
Trauma	4	2	1	7	23.4
ENT		2		2	6.7
Herpes zoster ophthalmicus	1			1	3.2
Unknown		2		2	6.7

Figure 1: Third nerve palsy with ptosis

small sample size in our study can be considered to be counterbalanced by the advantage provided by our strict protocol of a multidisciplinary approach.

It is well known that the resolution power and, subsequently, the probability of disclosing lesions are lower with CT scan than with MRI. This can help explain the fact that CT scan imaging failed to reveal any anomaly in 53.4% of the cases in our study. In addition, most cases were due to vascular and inflammatory causes, which are known to be hardly recognizable on CT scan images. This furthermore sheds light on the necessity for a multidisciplinary approach in all neuro-ophthalmology cases, especially in a developing country like ours where access to MRIs is still limited.

CONCLUSION

Our study stresses the importance of a multidisciplinary collaborative approach in the evaluation of patients with ocular motor nerve palsy, especially where sophisticated, complementary investigations are impossible.

ACKNOWLEDGMENT

1. Dr. Gopinath G.S, Professor, Department of Ophthalmology, Mysore Medical College, Mysore
2. Dr. Madhuri Parande, Assistant Professor, Department of Ophthalmology, Mysore Medical College, Mysore.

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How to cite this article: Ramappa R, Jhalakshreemol KV, Bhatt H. Clinical and Etiological Study of Ocular Motor Nerve Palsies in a Tertiary Care Hospital. Int J Sci Stud 2021;8(11):75-78.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Imaging Features of Benign and Malignant Adenomyoepithelioma of Breast – A Rare Entity

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Abstract

Purpose: The aim of the study was to retrospectively analyze the imaging features of AME of breast and possible imaging features that differentiate AME from other breast lesions and benign AME from the malignant AME.

Materials and Methods: The histologically proven cases of AME from 2004 to 2020 were identified from the pathology database. A total of 7 cases were identified. The clinical details were obtained from the hospital case records and the imaging database. The histopathology results were blinded and the USG and mammography of the patients were retrospectively reviewed. All the cases were analyzed individually by two radiologists and the breast imaging reporting and data system (BIRADS) category was assigned.

Results: A total of seven female patients were analyzed. The mean age was of 54 years (Range 32–76 years). The mammography was not available for all the patients. The USG findings such as size, shape, orientation, margin, echogenicity, posterior features, presence of calcifications, and vascularity as well as associated findings such as architectural distortion and skin thickening were evaluated. The lesions were classified according to American College of Radiology BIRADS. Radiological and histopathological correlation was done.

Conclusion: There is neither specific imaging feature to differentiate AME from other breast lesions nor in differentiating benign AME from malignant lesions. Imaging aids in the evaluation of occult axillary node involvement or to evaluate for distant metastasis. Despite being a rare entity it is essential to consider these lesions in the differential diagnosis of solid/solid cystic lesions due to the necessity of complete excision.

Key words: Adenomyoepithelioma, Biphasic tumor of breast, Recurrent breast lesion, Solid cystic breast tumor

INTRODUCTION

Adenomyoepithelioma (AME) of the breast is characterized by simultaneous proliferation of ductal epithelial and myoepithelial elements. Even though the majority of these lesions are benign they have the tendency to recur locally and may undergo malignant transformation. Despite being rare, it is essential to consider this entity in the differential diagnosis of solid or solid cystic lesions noted in mammogram or ultrasound (USG). However, a definite diagnosis is achieved with histopathologic correlation. In this retrospective study, we intend to study the various imaging features AME of the breast in mammogram and USG.

Access this article online

www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

MATERIALS AND METHODS

The histologically proven cases of AME from 2004 to 2020 were identified from the pathology database. A total of seven cases were identified. The clinical details were obtained from the hospital case records and the imaging database. The histopathology results were blinded and the USG and mammography of the patients were retrospectively reviewed from the imaging database. All the cases were analyzed individually by two breast

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radiologists and the breast imaging reporting and data system (BIRADS) category was assigned.

All seven patients had undergone preoperative imaging with sonomammography. Sonomammography was performed using a linear array high-frequency transducer (7–15 MHZ) in the Toshiba Aplio 500 machine. The mammogram was available for four patients. Conventional craniocaudal and mediolateral oblique views along with digital tomosynthesis were performed on the AMULET Innovality machine. One patient had undergone a contrast-enhanced computed tomography scan as metastatic work up for malignant AME. USG-guided core needle biopsy (CNB) was performed using 14G automated gun and the samples were immersed in formalin and sent for histopathological examination.

We retrospectively analyzed the USG findings for factors such as size, shape, orientation, margin, echogenicity, posterior features, presence of calcifications, and vascularity as well as associated findings such as architectural distortion and skin thickening (ST) on USG. The lesions were classified according to American College of Radiology BIRADS. Radiological and histopathological correlation was done.

RESULTS

A total of seven female patients were analyzed. The mean age was of 54 years (Range 32–76 years). The initial clinical presentation was a palpable non-tender mass in six patients. One patient was detected on routine screening breast imaging. Clinical examination was otherwise unremarkable, with no evidence of associated lymphadenopathy or nipple retraction in any cases. USG-guided CNB was done in all patients.

Details of the clinical and pathological features of seven adenomyoepithelial tumors seen at our institution are summarized in Table 1.

USG features of benign and malignant are summarized in Table 2. The size of the lesions ranged from 1 to 4.2 cm. All the benign AMEs (n = 4) showed circumscribed margin, parallel orientation, posterior enhancement, and were categorized under BIRADS 4A [Figures 1 and 2]. Among the benign AMEs (n = 4), two lesions (n = 2) were oval, complex cystic-solid with mild vascularity in solid components, and two others (n = 2) were irregular, hypoechoic with minimal internal vascularity.

The malignant lesions revealed irregular shape, spiculated margin, non-parallel orientation, a combined pattern of posterior features, and vascularity and were categorized under BIRADS 4C [Figures 3 and 4]. The internal echogenicity of two lesions was complex cystic and solid, one lesion was solid hypoechoic. Surrounding architectural distortion and ST were seen in one of the malignant lesions. None of the lesions had associated suspicious axillary lymphadenopathy. One malignant lesion (invasive carcinoma of no special type arising in a background of AME) had metastasis to the lung and liver.

All four patients with benign AME underwent an excision biopsy. Two malignant patients had undergone modified radical mastectomy. One patient with malignancy had an image-guided Tru-Cut biopsy and lost to follow-up. None of the patients received chemotherapy or radiotherapy. Follow-up of the four (two benign and two malignant lesions) out of seven patients are uneventful. The remaining two benign and one malignant patient were lost to follow-up.

DISCUSSION

Hamperl was the first person to describe AME in 1970.[1] The normal acini and ductal network are lined by an inner epithelial layer and an outer layer of myoepithelial cells, and a basement membrane separating the myoepithelial cells from the stroma.[2,3] Adenomyoepithelial tumors are characterized histologically by the simultaneous proliferation of ductal epithelial and myoepithelial cells.

Most commonly these lesions are seen in women.[4] It is seen in women of all ages, ranging from 20 to 90 years with a mean age of 60 years.[5,6] Rare cases have been described

Table 1: Summary of clinical and histopathological features

Pt	Age	Symptom	Side	Multiplicity	Procedure	Histopathology
1	56	Palpable mass	Right	Single	CNB, EX	AME
2	32	Asymptomatic (screening USG)	Left	Single	CNB	AME
3	49	Palpable mass	Left	Single	CNB, Ex	Sclerosing adenosis with AME
4	33	Palpable mass	Left	Single	CNB	AME
5	69	Palpable mass	Right	Single	CNB, MRM	Invasive carcinoma of no special type arising in a background of AME
6	76	Palpable mass	Right	Single	CNB, Ex	Adenomyoepithelial carcinoma
7	67	Palpable mass	Left	Single	CNB, MRM	Carcinosarcoma in a background of AME

CNB = Ultrasonography-guided core needle biopsy, Ex: Excision; Pt: Patient; MRM: Modified radical mastectomy; USG: Ultrasound; AME: Adenomyoepithelioma

Table 2: Summary of USG features of benign and malignant AME

Patient	Shape	Size (cm)	Orientation	Margin	Echogenicity	Posterior features	Calcification	Associated Features (SAD, ST)	Vascularity	BIRADS
1	Oval	1.5 × 0.7	Parallel	Circumscribed	Complex cystic and solid	E	No	No	No	4A
2	Irregular	1.4 × 1.0	Parallel	Circumscribed	Hypoechoic	E	No	No	Yes	4A
3	Oval	1.1 × 0.8	Parallel	Circumscribed	Complex cystic and solid	E	No	No	No	4A
4	Irregular	4.2 × 2.5	Parallel	Circumscribed	Hypoechoic	E	No	No	Yes	4A
5	Irregular	1.0 × 0.9	Non parallel	Spiculated	Hypoechoic	Combined pattern	No	No	Yes	4
6	Irregular	3.5 × 3.0	Non parallel	Spiculated	Complex cystic and solid	Combined pattern	No	SAD, ST	Yes	4C
7	Irregular	2.8 × 2.2	Non parallel	Spiculated	Complex cystic and solid	Combined pattern	No	ST	Yes	4C

E: Enhancement; SAD: Surrounding architectural distortion; ST: Skin thickening; Pt: Patient; BIRADS: Breast imaging reporting and data system AME: Adenomyoepithelioma

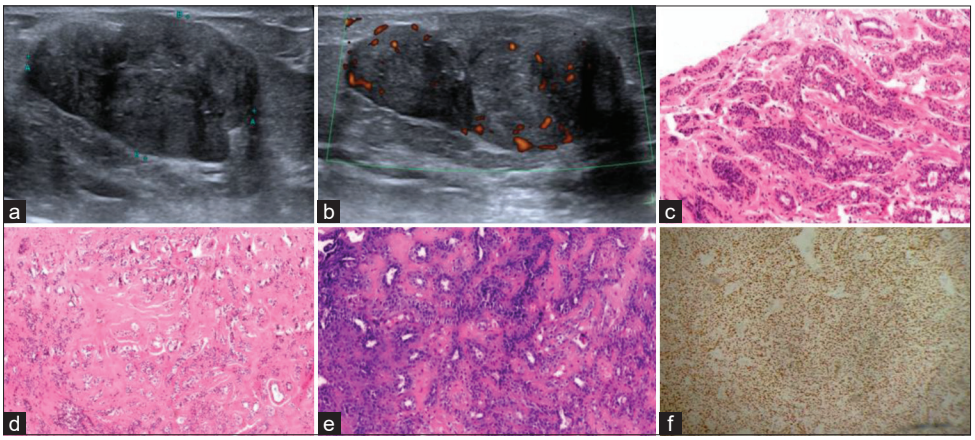

Figure 1: (a) and (b) Grey scale ultrasound reveals an irregular (>3 lobulations) solid hypoechoic lesion with increase internal vascularity. Breast imaging reporting and data system-4A; (c) HPE-Microscopy showing the proliferating ductal component (H and E × 400); (d) histopathology showing the proliferating myoepithelial cells with a clear morphology (H and E × 200); (e) histopathology showing the ducts surrounded by proliferating myoepithelial cells (H and E × 400); (f) nuclear positivity for P 63 highlighting myoepithelial cells (IHC × 200)

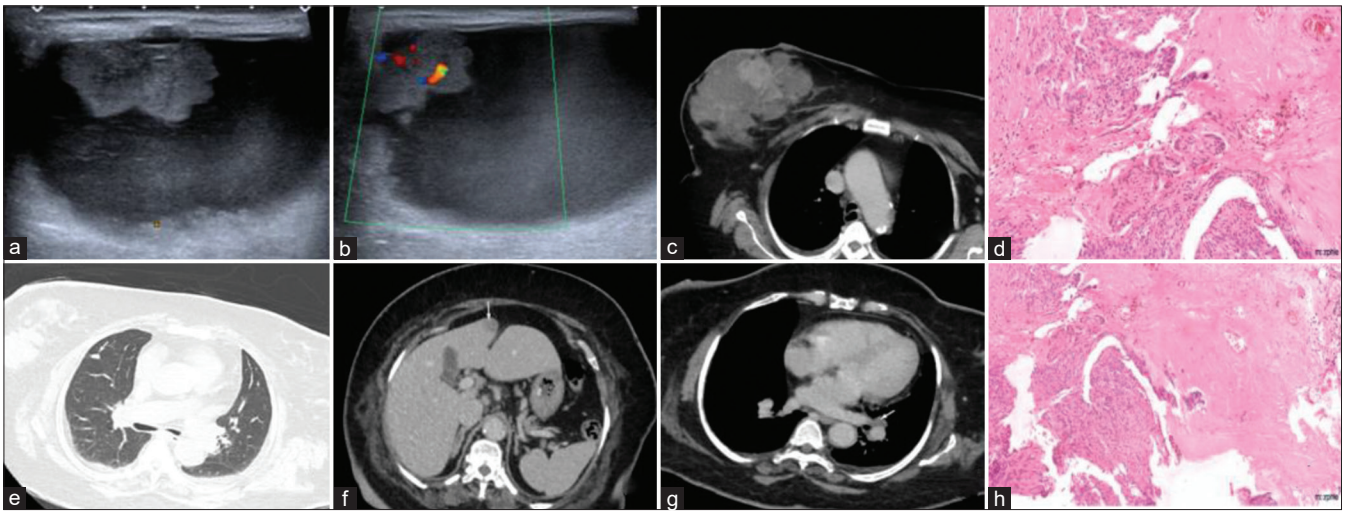

Figure 2: (a,b) Grey scale ultrasound reveals an irregular poorly circumscribed solid cystic lesion in right breast. Breast imaging reporting and data system category- 4C; (c) CT-scan reveals irregular solid cystic lesion with overlying skin thickening in the right breast. Solid component shows intense enhancement. Contrast-enhanced computed tomography scan reveals (e) suspicious right lung nodule; (f) hypodense lesion in liver; and (g) left hilar lymph node-suspicious for metastasis; and (d,h) HPE malignant adenomyoepithelioma

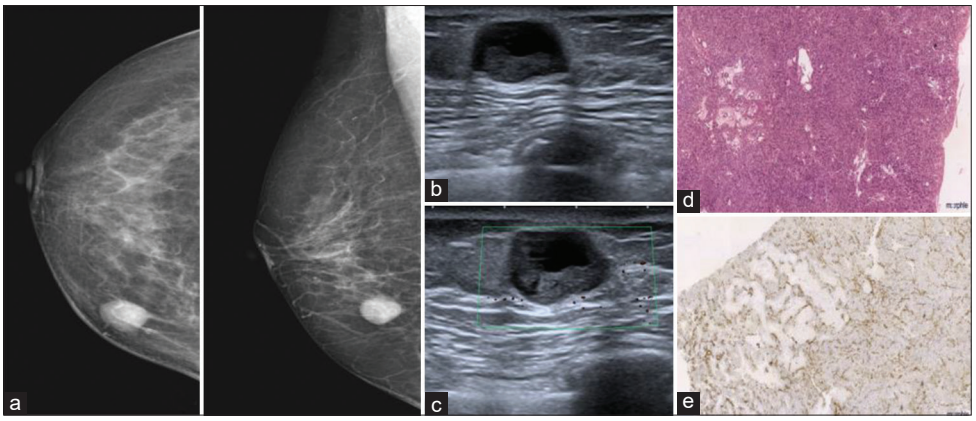

Figure 3: (a) Digital X-ray mammogram: Craniocaudal and mediolateral oblique view reveals an oval well circumscribed equal density lesion in the lower inner quadrant of right breast; (b) and (c) ultrasound shows a well-defined solid cystic lesion in the right breast with minimal internal vascularity in the solid component–breast imaging reporting and data system 4A; (d) histopathology of excision biopsy shows a diffuse sheets of tumor cells arranged in a syncytial pattern (H and E × 100); (e) IHC of the sample shows myoepithelial cells showing P63 nuclear positivity (IHC × 100)

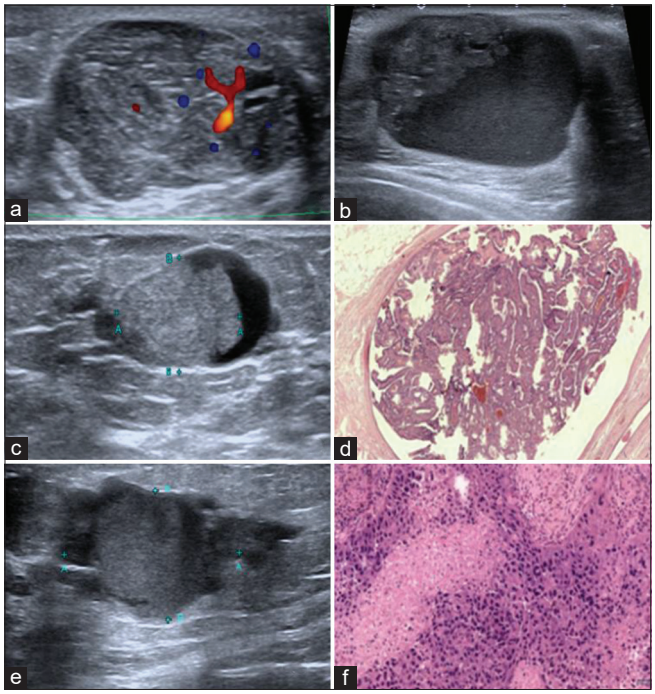

Figure 4: (a) Ultrasound reveals an oval, well circumscribed solid hypoechoic lesion with internal vascularity. HPE – Benign phyllodes tumor; (b) ultrasound shows a large cystic lesion with an eccentric irregular hypoechoic solid component. HPE – Invasive ductal carcinoma; (c) ultrasound reveals an oval well circumscribed solid lesion with eccentric cystic component; (d) HPE – benign intraductal papilloma; (e) Ultrasound reveals an irregular non-circumscribed hypoechoic mass with peripheral cystic changes; (f) HPE – invasive papillary carcinoma

in males.[5,6] Most of the adenomyoepithelial tumors are benign but malignant changes in the myoepithelial or, more commonly, epithelial component results in myoepithelial or epithelial carcinoma have been reported.[2,4,5,7,8] The occurrence of sarcoma and carcinosarcoma from AME has been described.[6]

The usual clinical presentation is a palpable, nontender, and centrally located mass, although a more peripheral distribution and a painful lesion may occur.[5] Rapid enlargement in a pre-existing lump may indicate malignant transformation[9] In our study, seven out of the six symptomatic patients presented with a non-tender palpable mass.

The most common mammographic abnormality is an irregular non-calcified mass with microlobulated margins.[2,7,8] Architectural distortion is usually associated with malignancy.[8] In our study, we had mammography of two patients with benign AME [Figure 3] which revealed a well-circumscribed oval equal density lesion with no associated architectural distortion or microcalcifications, and mammography of two malignant AME patients which revealed an irregular spiculated high-density mass with no associated microcalcifications.

On ultrasonography, benign lesions are commonly seen as circumscribed hypoechoic masses and may have posterior enhancement, while malignant tumors may show poorly defined margins and posterior shadowing.[8] In a study by Lee *et al.*, it is concluded benign AME appears as solid or complex echoic masses with suspicious malignant ultrasonographic features, which may be associated with adjacent duct ectasia.[10] In our study, USG evaluation, among the benign lesions, we found 2 lesions were oval-shaped but were complex solid cystic (50%) [Figure 3] and two irregular lesions were completely hypoechoic (>3 lobulations) [Figure 1] making it difficult to differentiate from a malignant entity based on shape and echo pattern. All the benign lesions were well-circumscribed, and parallelly oriented and had posterior acoustic enhancement. The three malignant lesions were irregular or solid cystic [Figure 2],

poorly circumscribed, non-parallel orientation with combined posterior features and mild internal vascularity. None of the lesions had adjacent ductal dilatation.

Metastases from malignant AME appear to be hematogenous rather than lymphatic. There is potential for local invasion and recurrence after excision of both benign and malignant lesions.[3] In the original Tavassoli study, the median recurrence time was 6.1 years and there were three recurrences in 27 cases.[7] Association of AME with concurrent ipsilateral breast cancer was reported in other studies.[7] Synchronous ductal carcinoma *in situ* or invasive ductal carcinoma have also been cited in several case reports.[11] In our study, one patient had metastasis to the lung and liver [Figure 2]. None of the patients had multicentric or contralateral breast involvement.

The differential diagnosis of the well-defined solid lesion on mammography and USG is fibroadenoma, phyllodes [Figure 4a], triple-negative breast tumors, medullary, and mucinous tumors. The differential diagnoses for a solid cystic lesion on USG are benign papillomas [Figure 4c and d], malignant papillary lesions [Figure 4e and f], and invasive ductal carcinoma [Figure 4b]. It is not always possible to differentiate these entities and histopathology correlation is essential.

Pathologically, hyperplasia of the breast can be in the epithelial and myoepithelial component and this can be seen in various benign and malignant conditions, ranging from adenomyoepithelial adenosis, pleomorphic adenoma, AME with carcinoma, and adenoid cystic carcinoma. The proliferation may form irregular multiple lobules, where the myoepithelial cells are seen surrounding the ductal epithelial cells. Fibrous and adipose tissue can be seen separating the lobules. The myoepithelial cells may show a range of morphologies from spindle cell to epithelioid or glycogen-rich clear cell type. The ducts may be forming tubules or may be compressed by the proliferating myoepithelial cells. Apocrine or squamous metaplasia may be noted in the ductal epithelial cells. The nuclei are generally of moderate size and round to oval. Usually, the mitosis will be low (<2 mitoses per ten high power fields). Chondromyxoid changes may be seen in the surrounding stroma.[12]

Fattanch further subdivided AME into spindle cell, tubular, and lobulated variants.[7] The spindle cell type shows a predominant spindle cell pattern, whereas, in the tubular cell variant, the ductal component is seen as forming tubules. The lobulated variant shows proliferating myoepithelial cells with compressed ductal elements.

Immunohistochemical staining confirms the nature of the cells, where the myoepithelial cells show cytoplasmic positivity for smooth muscle actin and calponin and nuclear positivity for P63. Immunohistochemistry of the luminal epithelial cell component is positive for low molecular weight cytokeratins (AE1/AE3 and CK 7, CK 8/18, CEA, EMA, and a variable ER expression).

The management of benign adenomyoepithelioma is complete excision as there is a potential risk of malignant transformation or recurrence. Regular follow-up of the ipsilateral as well as the contralateral breast is essential.

The treatment of malignant AME is not established except for complete excision at an early stage. Kihara *et al.* concluded that complete local excision is the only way to reduce the chance of local recurrence and distant metastases.[13] The role of axillary lymph node sampling/ effective adjuvant chemotherapy or post-operative radiotherapy is unclear. In a study by Bult *et al.* and Takahasi *et al.*, it is stated that chemotherapy was found ineffective in malignant cases.[14,15] Lee *et al.* reported that eribulin had a beneficial effect on malignant AME of the breast with multiple hepatic, pleural, and abdominal wall metastases.[16] Logie *et al.* suggest in the setting of AME with axillary metastasis, adjuvant radiotherapy may provide additional local control.[17]

The demerits of our study are it is a retrospective study; hence, clinical information is limited. The study sample is less, being the rare incidence of the disease. Mammography correlation could not be done for all the patients as few had done initial evaluation outside our institute for which images were not available.

To conclude, there is neither specific imaging feature to differentiate AME from other breast lesions nor in differentiating benign AME from malignant lesions. Imaging aids in the evaluation of occult axillary node involvement or to evaluate for distant metastasis. Despite being a rare entity it is essential to consider these lesions in the differential diagnosis of solid/solid cystic lesions due to the necessity of complete excision.

CONCLUSION

AME is an unusual breast neoplasm and should be considered in the differential diagnosis for a focal solid or solid cystic lesion in the breast. No specific features exist to identify this entity on imaging alone; hence, core biopsy is mandatory to establish the diagnosis. It is essential to do complete excision even in pathologically proven benign adenomyoepithelioma due to the risk of recurrence and malignant transformation. The post-surgical management of the malignant lesions remains controversial.

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How to cite this article: Chinnappan S, Nisha GS, Dev B, Joseph LD, Vidhya V, Gnanavel H, Palanisamy P, Mohanarangam VSP. Imaging Features of Benign and Malignant Adenomyoepithelioma of Breast – A Rare Entity. Int J Sci Stud 2021;8(11):79-84.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

A Comparative Study to Assess the Cardiovascular Complications in Patients of Liver Cirrhosis

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Abstract

Introduction: Cirrhosis is associated with a wide spectrum of characteristic clinical manifestations consisting of clinical and hemodynamic alterations. Involvement of the cardiovascular system is crucial during the course of cirrhosis. The most common cardiac abnormality that occurs among cirrhotic patients is the left ventricular diastolic dysfunction. Apart from increasing morbidity, it may also contribute to significant post-transplantation mortality. Therefore, this study was conducted to assess the cardiovascular complications of liver cirrhosis.

Materials and Methods: This case–control study was conducted on 100 ultrasound confirmed cases of cirrhosis of liver among males aged 20–60 years. A total of 40 controls were included in the study. Detailed histories were recorded. Physical examination was done. Echocardiographic findings assessing the systolic and diastolic functions were recorded and compared.

Results: The cirrhotics had the increased E/A ratio and isovolumic relaxation time and decreased deceleration time. The parameters relating to systolic function were similar in the cases and controls.

Conclusion: It can be effectively concluded from the present study that significant diastolic dysfunction is present in cirrhotics.

Keywords: Cardiovascular complications, Cirrhosis, Deceleration time, Diastolic dysfunction, E/A ratio

INTRODUCTION

Cirrhosis is associated with a wide spectrum of characteristic clinical manifestations consisting of clinical and hemodynamic alterations. Clinical features of cirrhosis derive from the morphological changes and often reflect the severity of hepatic damage rather than the etiology of the underlying liver disease. Progressive structural and functional impairment of the liver inevitably involve other organ systems such as central nervous system in the form of hepatic encephalopathy, kidneys in the form of hepato-renal syndrome, the cardiovascular system (CVS) in the form of cirrhotic cardiomyopathy, and respiratory system such as porto-pulmonary hypertension.[1]

Loss of functioning hepatocellular mass may lead to jaundice, edema, coagulopathies and a variety of metabolic abnormalities: Fibrosis and distorted vasculature leads to portal hypertension and its sequelae, including gastro-esophageal varices and splenomegaly. Involvement of the CVS is crucial during the course of cirrhosis due to its pathophysiological, clinical, and therapeutic relationships with the liver.

In 1953, Kowalski and Abelmann first documented that cirrhosis is associated with a hyperdynamic circulatory syndrome, characterized by an increase in cardiac output and a decrease in peripheral vascular resistance.[2] Since then, it has been realized that cardiovascular alterations are frequently observed in cirrhosis. Cirrhosis may result in subclinical latent cardiomyopathy with hyperdynamic circulation characterized by increased cardiac output and decreased peripheral resistance and volume overload state. It was previously reported that chronic alcoholism may have an effect on heart.[3] However, the exact pathogenetic mechanisms of these hemodynamic alterations remain uncertain.

The most common cardiac abnormality that occurs among cirrhotic patients is the left ventricular diastolic dysfunction (LVDD) related to the development of myocardial fibrosis,

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www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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hypertrophy, and subendothelial edema.[4,5] Diastolic dysfunction occurs when the passive elastic traits of the myocardium are reduced due to the increased myocardial mass and changes in the extracellular collagen.[6] According to different studies, the prevalence of LVDD in cirrhotic patients ranges from 25.7% to as high as 81.4%.[7] Evidence suggests that patients with cirrhosis display primarily LVDD with normal systolic function at rest.[8] Diastolic dysfunction may progress to systolic dysfunction, although this has not been directly shown in cirrhotic patients.[9,10]

Apart from increasing the morbidity in the cirrhotic patients, cardiac failure has also emerged as an important cause of mortality after liver transplantation and accounts for 7–21% of deaths in post-orthotopic liver transplantation period.[11] Diastolic dysfunction has been proved to be an early marker of cardiac dysfunction occurring before systolic dysfunction at rest.[12] A stable cardiac status is important before the performance of interventional procedures or liver transplantation. It has been suggested that this cardiac dysfunction may be reversible after liver transplantation.[13]

Thus, cardiovascular complications are an important cause of morbidity in the patients with liver cirrhosis. However, studies in this regard, particularly in the Indian population, are scarce. Therefore, this study was conducted to assess the prevalence of cardiovascular diseases in patients with liver cirrhosis.

MATERIALS AND METHODS

This case–control study was conducted after the approval of Institutional Ethics Committee. This study was conducted on 100 cases of cirrhosis of liver (ultrasound confirmed) among males aged 20–60 years, was included in the study. A total of 40 age and sex matched controls were enrolled in the study. Cases and controls having comorbidities of systemic arterial hypertension, primary cardiac or pulmonary disease, hepatic encephalopathy, gross ascites, viral hepatitis, anemia, diabetes mellitus, thyroid dysfunction, collagen vascular diseases, and malignancies were excluded from the study. Patients having septicemia and patients not consenting to participate in the study were also excluded.

A written informed consent was obtained from each patient. Demographic details and relevant past and personal history were recorded. Physical examination was done. Color Doppler Echocardiogram (using Mindray M7 Echo machine) was done to assess the cardiac involvement. The echocardiographic findings were categorized and recorded as follows:

Systolic Function Indices

- Left ventricular internal dimension in systole (LVIDs)
- Left ventricular internal dimension in diastole (LVIDd)
- Interventricular septal diameter in diastole (IVSd)
- Left ventricular posterior wall thickness in diastole (LVPWd)
- Ejection fraction (EF)%.

Diastolic Function Indices

- Isovolumic relaxation time (IVRT)
- Mitral E deceleration time (DT)
- Mitral E and A velocity.

All the data were recorded and compared.

Statistical Analysis

The data were analyzed using the SPSS. The results were expressed as Mean ± SD. Quantitative data were analyzed by unpaired *t*-test. $P < 0.05$ was considered to be statistically significant.

RESULTS

The mean age of the patients with cirrhosis was 44.70 ± 8.65 years and of the controls was 46.02 ± 8.89 years. The difference was statistically insignificant with $P = 0.418$.

Table 1 shows the distribution of the systolic function indices among the cirrhotic cases and controls. The difference between the two groups was statistically insignificant ($P < 0.05$).

Table 2 shows the distribution of the diastolic function indices among the cirrhotic cases and controls. The E/A ratio and IVRT were significantly decreased in the cirrhotics ($P < 0.001$) and the DT was significantly increased ($P < 0.001$).

DISCUSSION

Cirrhosis of liver affects many organs and systems; hence, it may be considered as a systemic disease.[14] Cardiovascular changes have been realized to be a frequent

Table 1: Distribution of the systolic function indices among the cirrhotic cases and controls

Parameter	Controls	Cirrhotics	*P*-value	Significance
LVIDs (cm)	3.20±0.48	3.14±0.15	0.285	Not significant
LVIDd (cm)	4.79±0.50	4.71±0.35	0.282	Not significant
EF (%)	67.66±8.67	66.28±3.43	0.179	Not significant
IVSd (cm)	0.86±0.19	0.89±0.09	0.338	Not significant
LVPWd (cm)	0.88±0.26	0.85±0.15	0.357	Not significant

LVIDs: Left ventricular internal dimension in systole; LVIDd: Left ventricular internal dimension in diastole; IVSd: Interventricular septal diameter in diastole; LVPWd: Left ventricular posterior wall thickness in diastole; EF: Ejection fraction

Table 2: Distribution of the diastolic function indices among the cirrhotic cases and controls

Parameter	Controls	Cirrhotics	*P*-value	Significance
E/A	1.39±0.48	1.13±0.15	<0.001	Significant
DT	147.15±41.71	203.53±4.01	<0.001	Significant
IVRT	99.86±26.87	79.60±14.49	<0.001	Significant

IVRT: Isovolumic relaxation time; DT: Deceleration time

complication in the cirrhotics. LVDD can be seen as an early manifestation of many cardiovascular diseases since any change in myocardial structure may affect the function of the left ventricle causing an abnormal filling pattern. The cardiovascular changes may be attributed to the hyperdynamic circulation, characterized by increased cardiac output, and decreased peripheral vascular resistance and arterial pressure. These cardiovascular abnormalities have been suggested to induce or aggravate several complications of cirrhosis such as renal salt and water retention, variceal bleeding, hepatopulmonary syndrome, and increased cardiovascular fragility under stress.[15]

Thus, the knowledge of CVS involvement in a cirrhotic patient is important in planning the treatment and assessing the prognosis. However, very few studies have been conducted in this regard.

In the present study, the cardiovascular complications of cirrhosis of liver were assessed. Hundred patients diagnosed with liver cirrhosis were included in the study. A total of 40 healthy controls were included in the study. The mean age of the cirrhotics and the controls was almost similar ($P = 0.418$).

Systolic Dysfunction

In the present study, it was observed that there were no difference in the cirrhotics and the controls, in terms of the mean values of LVIDs, LVIDd, EF, IVSd, and LVPWd ($P < 0.05$). Thus, there was no significant systolic dysfunction in the cirrhotics and the controls.

In the study by Somani *et al.*,[16] they found no difference in the systolic function in the cirrhotics and the controls. Similar were the findings in the study by Sampaio *et al.*[17] and Dadhich *et al.*[18]

Thus, it can be effectively concluded that there is no systolic dysfunction in the cirrhotics.

Diastolic Dysfunction

In the present study, significant diastolic dysfunction was observed in the cirrhotics as compared to the controls as indicated by the decreased E/A ratio ($P < 0.001$) and IVRT ($P < 0.001$) and increased DT ($P < 0.001$).

In the study by Somani *et al.*,[16] they studied the cardiovascular complications of cirrhosis and included a total of 60 cases and 30 controls. They observed that the DT was significantly prolonged in cirrhotics compared to the controls ($P = 0.02$).

Similar were the findings of significantly decreased E/A ratio and increased DT in cirrhotics compared to controls in the studies by Sampaio *et al.*[17] and Dadhich *et al.*[18]

Diastolic dysfunction in cirrhosis was first reported in 1997.[19] The pathophysiological background of the diastolic dysfunction in cirrhosis is an increased stiffness of the myocardial wall, most likely because of a combination of mild myocardial hypertrophy, fibrosis, and subendothelial edema.[4] With Doppler echocardiography, Finucci *et al.*[20] found impaired left ventricular relaxation, decreased E/A ratio, and delayed early diastolic transmittal filling in patients with cirrhosis compared with controls.

In the study by Karagiannakis *et al.*,[21] they investigated 45 cirrhotic patients. They observed no difference in the left ventricular EF%. They concluded that diastolic dysfunction precedes systolic dysfunction in the cirrhotic patients. During the 2-year follow-up, they found that the presence of LVDD was a poor prognostic factor for the survival of the cirrhotic patients. They found that cirrhotic patients who died had lower E/A ratio and high DT.

Thus, diastolic dysfunction, in addition to being an early marker for cardiac involvement, may also be a prognostic factor for the long-term survival in the cirrhotics.

Limitations

The study was limited by the outpatient department attendance of the patients. Therefore, the results may not be generalized.

CONCLUSION

It can be effectively concluded from the present study that significant diastolic dysfunction is present in cirrhotics, as indicated by the impaired E/A ratio, DT, and IVRT. However, further studies need to be conducted to ascertain the role of diastolic dysfunction in the prognosis and survival. Furthermore, there was no systolic dysfunction in the present study. Therefore, diastolic dysfunction may indicate an early stage of cardiac involvement. Further studies need to be conducted to evaluate the patterns of cardiac involvement in cirrhotics and its role in the long-term prognosis.

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How to cite this article: Sharma N, Chaudhary A. A Comparative Study to Assess the Cardiovascular Complications in Patients of Liver Cirrhosis. Int J Sci Stud 2021;8(11):85-88.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Hospital-Acquired Infections in Patients with Major Trauma – Outcome Evaluation in a Tertiary Care Hospital

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Abstract

Introduction: Hospital-acquired infections (HAIs) following major trauma result in significant mortality and morbidity in a generally active population. Delay in diagnosis and treatment results in a worse outcome. Our study aims to delineate the magnitude of the problem in a tertiary care teaching hospital and evaluate the major types of HAIs prevalent in such a setting.

Materials and Methods: This institution-based, observational descriptive study was conducted over a period of 18 months. The sample included patients with major trauma to the head, abdomen (blunt and penetrating), and chest. Patients with isolated orthopedic trauma and burns were excluded from the study. Incidence of HAIs including pneumonia, urinary tract infection (UTI), and wound sepsis was recorded. Various factors likely to affect final outcome were recorded. The appropriate treatment was provided and post-operative recovery and any complications including mortality data were recorded and analyzed.

Results and Analysis: A total of 101 patients were included in the study. Males outnumbered females. Mean age of presentation was 35.16 years signifying a younger population. Abdominal trauma was the most common presentation followed by chest injury and head injury. Mortality rate was 6.93%. Of the HAIs, pneumonia was the most common followed by sepsis, UTI, and wound infection. HAIs significantly increased the length of hospital stay.

Conclusion: HAIs in patients with severe trauma are a stumbling block in the recovery and rehabilitation of patients, especially in a young and active population. Efforts to reduce their incidence are the need of the hour and measures to decrease the resulting mortality and morbidity are definitely possible in a well-equipped, tertiary care setting. This requires sincere, well-directed measures and strategies to defeat this major impediment to a quick recovery.

Key words: Trauma, Infection, Hospital, Pneumonia

INTRODUCTION

Trauma remains one of the main causes of mortality worldwide and is responsible for nearly one-third of "all lost years of productive life before age 65, exceeding losses from heart disease, cancer, and stroke combined." In India too, trauma is a major problem.

Infections are second only to head injury as the leading cause of death beyond the first 3–4 days of trauma and are responsible for 80% of late deaths in adult trauma patients.

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2020
Month of Publishing : 02-2021

Patients with traumatic injuries are at increased risk for infections. The interruption of tissue integrity, hemorrhage and tissue hypoperfusion, frequency of invasive procedures, and impaired host defense mechanisms all have a major impact on subsequent infection. A hospital-acquired infection (HAI) is usually one that first appears 3 days after a patient is admitted to a hospital or other health-care facility. Infections acquired in a hospital are also called nosocomial infections.

HAIs can be caused by bacteria, viruses, fungi, or parasites already present in the patient's body or coming from the environment. Hospital-acquired infections may develop from surgical procedures, catheters placed in the urinary

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tract or blood vessels, or from material from the nose or mouth that is inhaled into the lungs.

Pneumonia, urinary tract infections (UTIs), and surgical wound infection are the most common HAIs encountered.

Trauma patients with HAIs have longer hospital stays, increased risk of dying, and higher inpatient costs.

The interaction between victims of trauma and intensive care unit (ICU) is considered additive for morbidity, mortality, hospital days, and carries an economic burden for both patient and hospital.

With the recent establishment of trauma care centers in India and a multidisciplinary approach to handle these patients, it is important to understand the epidemiology of infections, which will be the first step toward prevention and effective treatment.

This study aims at finding out the incidence of HAIs and evaluates the type of infections prevailing in patients with major trauma in a tertiary care hospital so that appropriate measures may be initiated to minimize the incidence of HAIs and prevent loss of productive man-years.

Aims

The aims of the study were as follows:

1) To find out the incidence of HAI in patients with major trauma.
2) To evaluate the impact of HAI on in hospital mortality.
3) To compare the length of hospital stay in patients with major trauma with or without HAIs.

REVIEW OF LITERATURE

Ancient physicians initially treated injuries by observation and only by tentative trial and error were surgical interventions developed. The surgeons of Egypt, surely some of the first trauma surgeons, are reported to have performed amputations, lithotomies, and removal of cataracts, extraction of foreign bodies, and the dressing of wounds. Egyptian civilization, which began as early as 6000 BC, has produced various medical documents to this effect.[1]

The Edwin Smith papyrus, dated 1600 BC, presents 48 cases of trauma described from head to foot, capita ad calcem, an approach still in use.[2]

The Sushruta Samhita, which was probably written around 600 BC, emphasized the importance of adequate preparation of the surgeon, as well as cleanliness throughout the operative procedure.[3]

In India, trauma is a major problem, due to a very high incidence of vehicular accidents (6% of global vehicular accidents), other accidental injuries, crime, and violence.[4]

In the United States too, injuries constitute the fourth leading cause of death over all ages (6% of all deaths) and the leading cause of death among children, adolescents, and young adults aged 1–44.[5]

About 50% of all deaths occur within minutes of the injury either at the scene or on route to the hospital. These immediate deaths are typically the result of massive hemorrhage or severe neurologic injury. An additional 20–30% die primarily of neurologic dysfunction within several hours to 2 days post-injury. The remaining 10–20% die of infection or multiple organ failure many days or weeks after the injury.[6,7]

Elderly trauma victims have been shown to have increased morbidity and mortality compared to younger trauma victims.[8]

Chronic diseases have also been shown to have a significant impact on morbidity and mortality in the trauma victim independent of age and injury severity.[9,10]

Cardiopulmonary, hepatic and renal disease, diabetes mellitus, malignancy, or neurologic disorders have been found to have increased mortality rates compared to their disease-free counterparts.[11]

Morris *et al.* identified liver cirrhosis, chronic obstructive pulmonary disease (COPD), congenital coagulopathy, diabetes mellitus, and congenital heart disease as preexisting conditions with a worse prognosis following trauma.[10]

The incidence of infection following traumatic injury is approximately 25%.[12]

Trauma patients are at high risk of infection for many reasons, including the host immunosuppressive response to injury,[13] direct inoculation of wounds by clothing, dirt, or debris, inadequate infection control practice under emergency conditions, blood transfusions, and poor control of blood sugar.

Infections following injury occur in the injured tissue itself (or an incision made to treat the injury) or as nosocomial infections, such as pneumonia or catheter-related blood stream infection (CR-BSI) and UTI.[14]

A HAI is usually one that first appears 3 days after a patient is admitted to a hospital or other health-care facility.

Among the HAIs, pleuropulmonary infections (e.g., pneumonia and empyema) are more common than CR-BSIs, which, in turn, are more common than UTI.[15]

Hospital-acquired infections can be caused by bacteria, viruses, fungi, or parasites. These microorganisms may already be present in the patient's body or may come from the environment, contaminated hospital equipment, health care workers, or other patients [Table 1].[16]

Pneumonia is the most common type of hospital-acquired infection with organisms sourced from contaminated equipment or the hands of health care workers. Trauma patients are particularly susceptible particularly if they require mechanical ventilation. Ventilator-associated pneumonia (VAP), defined as pneumonia occurring at some point after endotracheal intubation, is the most common infection in the ICU among trauma patients. The incidence of VAP increases with the duration of mechanical ventilation at a rate of 3% per day during the first 5 days, 2% per day during days 5–10, and 1% per day after that [Table 2].[17,18]

Sepsis is the second most common type of HAIs. It is systemic inflammatory response to infection, that is, SIRS plus documented infection.

In UTIs, Gram-negative bacteria predominate.[19]

Table 1: Hospital-acquired infections in the intensive care unit

Common	Uncommon
Pneumonia	Sinusitis
Catheter-related infection	Empyema
Intra-abdominal (in surgical units)	Endocarditis
Urinary tract infection	Endophthalmitis
Skin/soft tissue	Parotitis
Decubitus ulcer	Suppurative phlebitis
Surgical site infection	

Talmor *et al*. Relationship of SIRS to organ dysfunction, length of stay, and mortality in critical surgical illness: Effect of ICU resuscitation. Arch Surg 134:81, 1999

Table 2: Risk factors for ventilator-associated pneumonia[18]

Age > 60 years	Blood transfusion
Acute respiratory distress syndrome	Organ failure
Chronic obstructive pulmonary disease	Supine position
Coma or impaired consciousness	Large volume gastric aspirate
Serum albumin<2.2 g/dL	Sinusitis
Burn trauma	Immunosuppression

Celis *et al*. Nosocomial pneumonia: A multivariate analysis of risk and prognosis. Chest 93 (2):318-24, 1988

MATERIALS AND METHODS

It is an observational descriptive study carried out at a tertiary care hospital over a period of 18 months. Patients admitted with principal diagnosis of trauma (head injury, chest trauma, blunt trauma, or penetrating trauma) and length of hospital stay >3 days were included in the sample. Patients with burns and isolated orthopedics trauma or presenting with late effects of injury were excluded from the study.

On admission, they were assessed for preexisting sepsis, pneumonia, or UTI by blood investigations, urine examination, chest X-rays, and computed tomography thorax. Patients with major trauma were assessed for the presence of HAIs starting 3 days after admission. Evaluation included development of wound sepsis, pneumonia, and UTI. The mortality, morbidity and length of stay in the hospital were recorded.

The collected data were analyzed using standard statistical methods with SPSS v25 statistical software including frequency analysis and descriptive statistics.

RESULTS AND ANALYSIS

A total number of 101 patients ($n = 101$) with major trauma were included in the study. Males numbered 86 (85.1%) with 15 (14.9%) females. Ages ranged from 13 years to 66 years (mean= 35.17 years). Most of them suffered from abdominal trauma ($n = 56$, 55.4%) and others had head injury ($n = 16$, 15.8%) and chest trauma ($n = 29$, 28.7%).

Among chest injuries, contrast-enhanced computed tomography (CECT) thorax revealed pneumothorax ($n = 12$), hemothorax ($n = 5$), and hemopneumothorax ($n = 3$).

Interventions done were exploratory laparotomy (53 of 56 abdominal injuries) and intercostal water seal chest drain insertion (26 of 29 chest injuries). Twenty-two patients were treated conservatively.

Forty-nine patients developed HAIs while 52 did not. Of the HAIs, pneumonia was the most common ($n = 20$, 40.8%), followed by sepsis ($n = 16$, 32.6%), UTI ($n = 7$, 14.3%), and wound infection ($n = 6$, 12.2%).

Comorbidities ranged from type II diabetes mellitus ($n = 7$), hypertension ($n = 4$), and obstructive airway disease ($n = 5$).

Mean hospital stay in patients with HAIs was 15 days whereas patients without HAIs stayed for a mean of 9 days in hospital.

Seven patients died postoperatively, four due to pneumonia and three due to sepsis (mortality rate of 6.93%).

Statistical analysis of the data shows up factors such as age, gender, type of injury, and presence of comorbidities which may or may not affect outcomes such as mortality, postoperative complications (morbidity), and length of hospital stay.

Using the Pearson's method, no significant correlation could be found between these factors and outcomes ($P > 0.05$) except that hospital stay was significantly affected by all the above factors. HAIs were significantly more common in the elderly and those with comorbidities. A longer hospital stay was associated with a higher mortality [Table 3].

DISCUSSION

Rising population, urbanization, industrialization, and a drastic rise in vehicular transport have contributed to an annual increase in road traffic accidents. As most of them are young adults, with no underlying illness, there is a greater need to save them. Thus, there is a growing population of traumatized patients requiring highly sophisticated and specialized care in India.[4]

In our study, the mean age of the trauma patients was 35.17 years ranging from 13 years to 66 years.

HAIs are one of the most important causes of death in traumatized patients. Infections are second only to head injury as the leading cause of death beyond the first 3–4 days of trauma.[20]

In our study, it has been found that out of 101 major trauma patients, 49 (48.51%) patients developed HAI such as pneumonia, sepsis, UTI, and wound sepsis. The most common infections in trauma patients are pneumonia (49%), blood stream infections (19%), and UTI (12%).[21]

In our study, it has been found that among 101 trauma patients who had HAI, 20 (40.8%) patients developed pneumonia, 16 (32.6%) developed sepsis, 7 (14.3%) developed UTI, and 6 (12.2%) patients developed wound sepsis.

Table 3: Correlation between factors affecting adverse events (*P* values from two-tailed test)

	Complications	Hospital stay	Mortality
Age	0.005 (sig.)	0.002 (sig.)	0.245
Sex	0.071	0.003 (sig.)	0.256
Type of trauma	0.323	0.004 (sig.)	0.337
Comorbidities	0.038 (sig.)	0.001 (sig.)	0.148

Pearson's correlation; Sig: Significant ($P<0.05$)

It is found that trauma patients with HAIs have longer hospital stays, increased risk of dying, and higher in patient cost.[22] In this study, trauma patients who developed HAIs had longer duration of hospital stay (average 15 days), whereas in 63 trauma patients without HAIs, the average length of hospital stay was 9 days.

Comorbid conditions such as diabetes mellitus, hypertension, COPD, immune suppression, and other illnesses have been associated with an increased risk of HAIs in trauma patients, which cause increased morbidity and mortality after major trauma.[23]

In our study, seven patients had diabetes mellitus, four patients had hypertension, and five patients had COPD, out of which 10 patients developed HAIs.

CONCLUSION AND SUMMARY

Our study aims at finding out the incidence of HAIs and evaluates the type of infections prevailing in patients with major trauma in a tertiary care hospital so that appropriate measures may be initiated to minimize the incidence of HAIs and prevent loss of productive man-years.

In our study, 101 cases were evaluated with the objective to find out the incidence of HAIs and the infections prevailing among the major trauma patients by history and clinical features, imaging (chest X-ray and CECT thorax), blood counts, urine for routine and microscopic examinations, urine for culture, and sensitivity.

Additional features studied were age, sex, and history of comorbid conditions such as diabetes mellitus, hypertension, and COPD.

In our study, it has been found that out of 101 major trauma patients, 48.51% of patients developed HAIs.

The most prevailing infections were pneumonia (40.8%), sepsis (32.6%), and UTI (14.3%). It is seen that trauma patients with comorbidity have more chances of HAIs.

In this study, it has been found that major trauma patients who develop HAIs had longer duration (mean 15 days) of hospital stay in comparison to patients without HAIs.

This study reports various types of HAIs in major trauma patients in a tertiary care hospital.

There was high incidence of HAIs in patients with major trauma. Trauma patients with HAIs are at increased risk for morbidity as well as mortality.

In light of the preventability of many HAIs and the magnitude of the clinical and economic burden associated with HAIs, policies aiming to decrease the incidence of HAIs may have a potentially large impact on outcomes in injured patients.

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How to cite this article: Mandal R, Hossain A. Hospital-Acquired Infections in Patients with Major Trauma – Outcome Evaluation in a Tertiary Care Hospital. Int J Sci Stud 2021;8(11):89-93.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Close Reduction and Percutaneous Pinning in NEER Type 2 and 3 Proximal Humerus Fractures in Adults

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Abstract

Introduction: Proximal humeral fractures account for 4–5% of all fractures. Open reduction and internal fixation entail an extensive surgical exposure and risks damage to the vascular supply of the fragments. Closed reduction and percutaneous pinning (CRPP) have a low risk of neurovascular complications or interference with glenohumeral joint motion.

Materials and Methods: Thirty patients with proximal humeral fracture were taken into consideration and treated with CRPP. Patients were assessed using Constant-Murley score (CMS) (pain, activity of daily living, range of motion, strength).

Results and Analysis: There was excellent outcome = 36.4% (4) and good = 63.6% (7) of patients (11) in NEER' type 2 group and in type 3 group, there was excellent = 26.3% (5), good = 57.9% (11), fair = 10.5 (2), and poor = 5.3% (1) of patients (19) according to CMS.

Conclusion: CRPP of proximal humerus fractures in adults is a viable alternative modality of treatment as this method possess affordability, minimal invasive, stable construct pertaining good control of infection, shorter hospital stays, early return to work, and easy implant removal under local anesthesia and most importantly easy to learn and reproducible.

Key words: External fixation, K-wires, NEER type, Percutaneous pinning

INTRODUCTION

Proximal humeral fractures account for 4–5% of all fractures; most of them involving elderly and osteoporotic people. About 51% of such fractures are displaced. Fractures with minimal displacement, regardless of the number of fracture lines, can be treated with closed reduction and early mobilization, but anatomical reduction in displaced fractures is difficult to obtain and the incidence of pseudarthrosis is high.[1,2]

Open reduction and internal fixation entail an extensive surgical exposure and risks damage to the vascular supply of the fragments. Fixed angle locking plates enable fixation of many complex fractures although their long-term functional outcomes remain unknown. It provides early functional recovery, but we had to pay special attention to some of the surgical details to minimize complications.[3-9] Locked intramedullary nails can be inserted using a minimally invasive technique but associated with the risk of proximal impingement.[10-15]

Closed reduction and percutaneous pinning (CRPP) have a low risk of neurovascular complications or interference with glenohumeral joint motion.[16-25] Transcutaneous reduction and external fixation achieve a satisfactory fracture stability once closed reduction is achieved, safer healing, superior functional result, low cost, and less patient morbidity as compared to conservative treatment.[26-50] We evaluated the results of close reduction and external fixation of proximal humeral fractures in adults.

In this study, we evaluated the role of CRPP in the management of proximal humerus fractures in adults for effective functional recovery of shoulder.

Access this article online

www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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MATERIALS AND METHODS

We conducted the study at the Orthopaedics Department of Institute of Post Graduate Medical Education and Research and S.S.K.M. Hospital, Kolkata-20, from January 2015 to August 2016. In this prospective longitudinal study, 30 patients with proximal humeral fracture were taken into consideration and treated with CRPP. Minimum follow-up period was 6 months (6–20 months).

Operated patients were assessed using Constant-Murley score (CMS) (pain, activity of daily living, range of motion, strength).

Patients age, sex, fracture duration, NEER' type, etc., were taken into consideration. Average age of our study population was 48.57 years. Majority were female 16 (53.3%) and 14 (47.7%) were male. Frequency of NEER' type 3 was more 19 (63.30%) and type 2 was 11 (36.70%).

Only NEER type 2 and 3 fractures were included in the study. We excluded any head split fracture, fracture with dislocation, and fracture with significant bone loss requiring bone grafting and untreated fracture more than 3 weeks old.

Surgical Technique

Under regional or general anesthesia, manipulation done and the fracture is reduced. Reduction is checked with C-arm in both the views. Reduction is maintained with gentle traction [Figure 1a and b]. Then 3 kires are planned to be inserted as- the first one just lateral to bicipital groove, the other one in true lateral plane, and the third one posterior to the central one. The shoulder kept externally rotated during placement of the greater tuberosity K-wire so as to move the axillary nerve and the posterior circumflex artery farther away from the humeral neck. Three threaded K-wires were inserted in the shaft of humerus 2 cm distal to the fracture line in the same horizontal plane: Central one in true lateral plane, another one at 30° anteriorly, and the other one at 30° posteriorly. One K-wire inserted just proximal to the lateral k-wire in line with the central K-wire of head and proximal shaft. Aim of reduction was to bring the fragment in an acceptable position, i.e., <45° of angulation and <1 cm of displacement, and to hold these fragments in place [Figure 2a and b]. After fixing with sufficient numbers of K-wires, link joints and connecting rods are attached and the final frame is formed [Figure 3].

Following instruments are required:

External stabilization system with the associated instrumentation set including:

- Threaded K-wires, 2–2.5 mm thick
- Link joints of stainless-steel blocks with 2 offset holes to which K-wires and connecting rods are clamped
- Connecting rods, 3–4 mm in diameter and of suitable lengths
- Allen keys
- K-wire bender
- K-wire cutter
- Power drill/T handle.

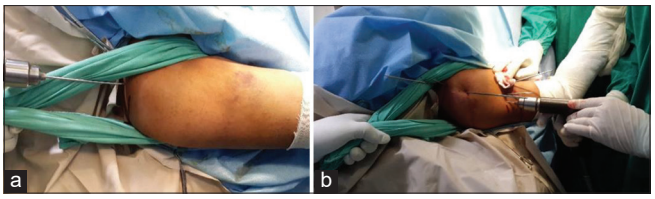

Figure 1: (a) Reduction followed by superior K-wires insertion (b) anterior and lateral K-wire

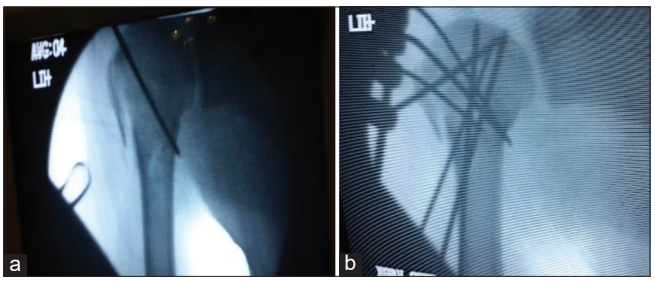

Figure 2: (a) Confirmation by C-ARM (b) final construct C-ARM picture

Figure 3: Final construct

Rehabilitation started as soon as pain tolerance. Patients were encouraged to start shoulder and elbow mobilizing exercises. Special importance was given to prevent pin tract infection by doing regular dressing with saline and application of gentamycin drops locally.

Patients were followed at 4 weeks, 6 weeks, 8 weeks, and then 4 weekly intervals, looking for clinical and radiological union, movements achieved, CMS and for complications if any [Figures 4 and 5].

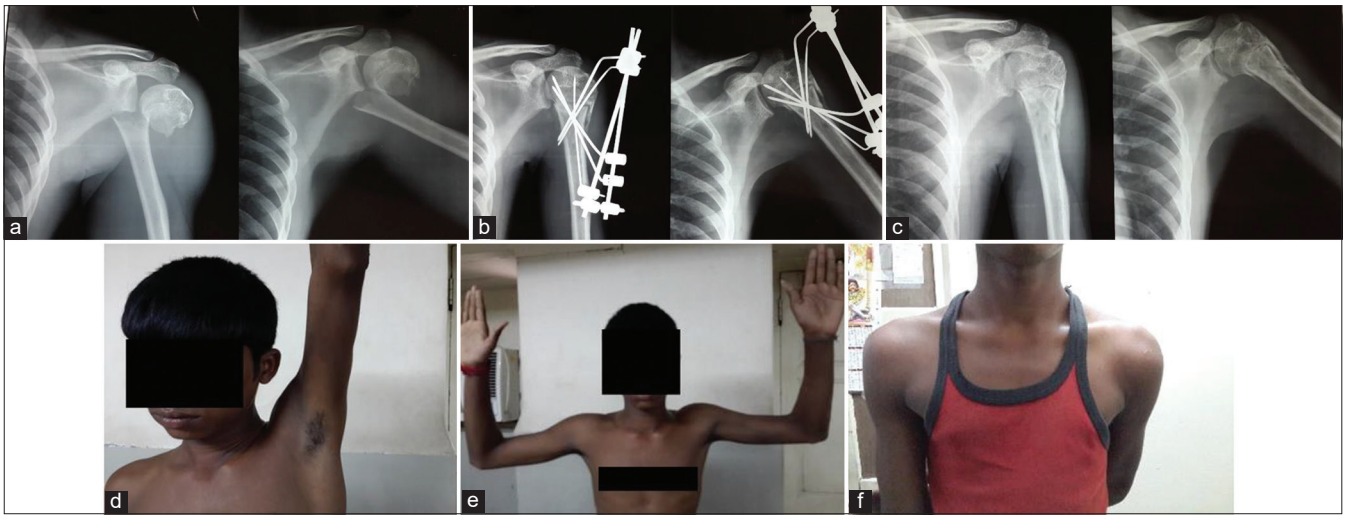

Figure 4: (a) Case 1-19 years male pre of X-ray AP/lat, (b) Case 1–6 weeks post-operative X-ray, (c) Case 1 – X-ray after implant removal, (d) Case 1 – final ROM elevation, (e) Case 1 – final ROM external rotation, (f) Case 1 – final ROM internal rotation

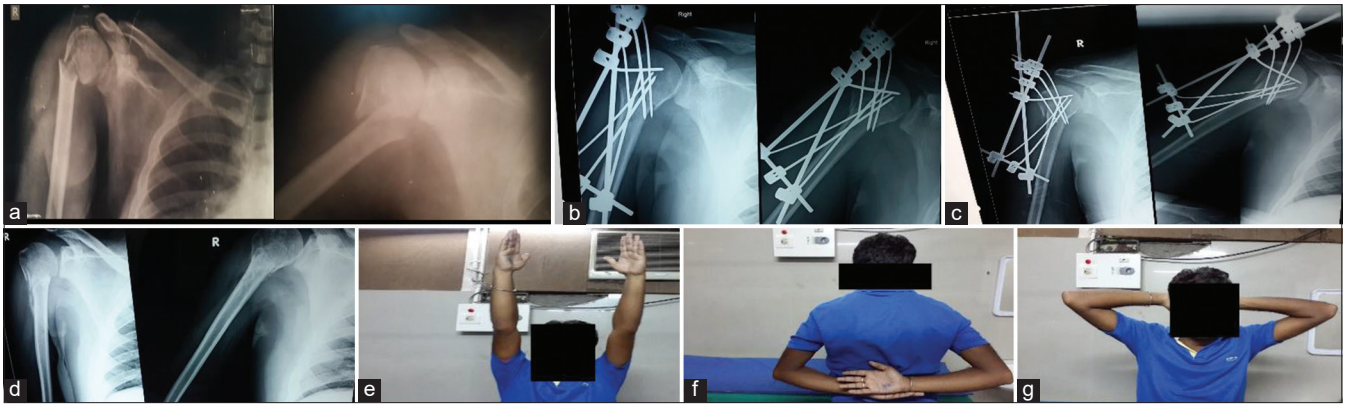

Figure 5: (a) Case 2 – 23 years male pre-operative X-ray AP/lat, (b) Case 2 – immediate after post-operative X-ray, (c) Case 2 – 4 weeks after post-operative X-ray, (d) Case 2 – X-ray after implant removal, (e) Case 2 – final ROM elevation, (f) Case 2 – final ROM extension, (g) Case 2 – final ROM external rotation

RESULTS AND ANALYSIS

The frequency of NEER's type in study group was: NEER' type 2 = 36.7% (11) and type 3 = 63.3% (19) [Chart 1].

The distribution of age (years) in type 2 NEER' group, minimum age was 19 years, maximum 52 years and mean age 40.9 years; in type 3 NEER' group, minimum age was 40, maximum 70 years and mean age 53 years [Chart 2].

The distribution of sex in NEER' type 2 study group was 10 (90.9%) male, 1 (9.1%) female and 4 (21.1%) male, 15 (78.9%) female in NEER' type 3 group [Chart 3].

The distribution of side in study group was NEER' type 2 left side = 7 (63.6%) and right side = 4 (36.4%); type 3 left side = 5 (26.3%) and right side = 14 (73.7%) [Chart 4].

The earliest recorded time of fracture union as determined by clinical and radiological evaluation was 1.5 months among the study group and longest recorded time was 2.5 months with mean time of union being 2.04 months in type

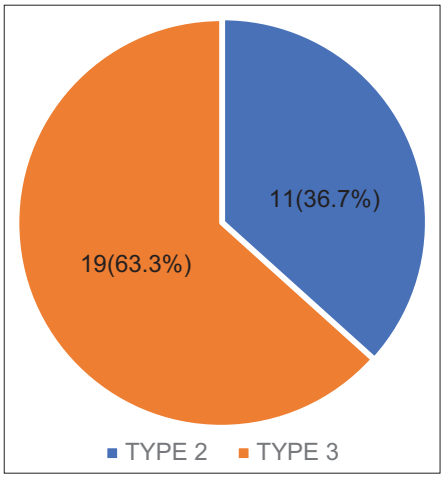

Chart 1: Pie chart showing frequency of NEER' type (2/3 part) in study group. Interpretation: Frequency of NEER' type: type 2=36.7% (11) and type 3=63.3% (19)

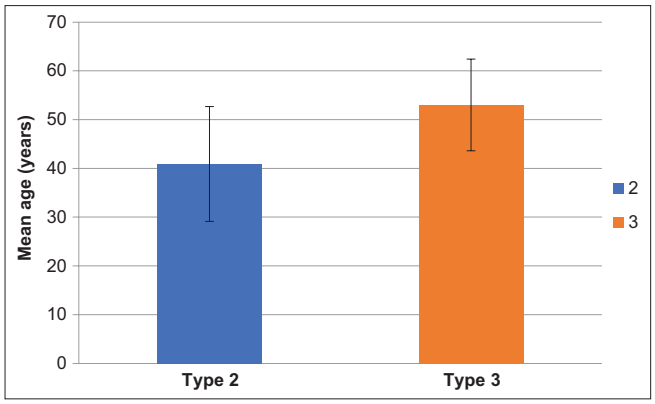

Chart 2: Bar diagram showing distribution of age (years) in NEER' type of group. Interpretation: In type 2 NEER' group, minimum age (years)=19, maximum=52, and mean age=40.9; In type 3 NEER' group, minimum age=40, maximum=70, and mean age (years)=53

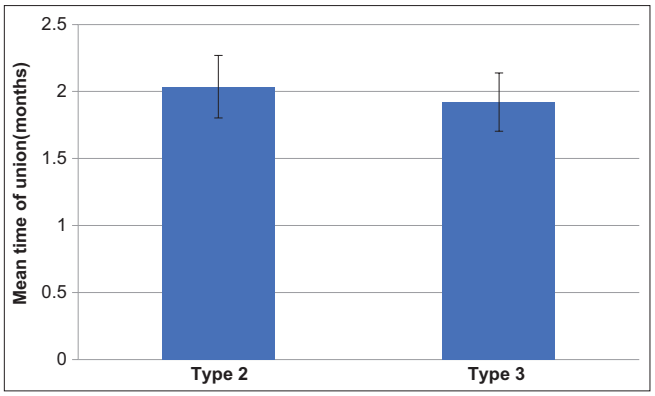

Chart 5: Bar diagram showing distribution of mean time of union (months) in NEER' type of study group. Interpretation: NEER' type 2 patients' (11) minimum time of union (month)=1.5, maximum=2.5, and mean=2.04; type 3 patients'(19), minimum=1.5, maximum=2.2, and mean=1.92

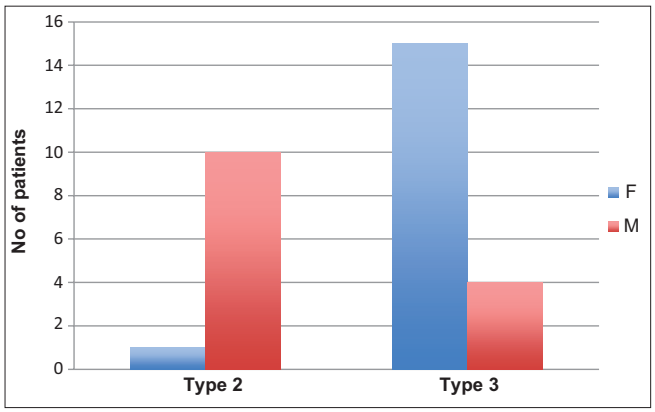

Chart 3: Distribution of sex in NEER' type of study group. Interpretation: There were 10 (90.9%) male, 1 (9.1%) female in NEER' type 2 group and 4 (21.1%) male, 15 (78.9%) female in NEER' type 3 group

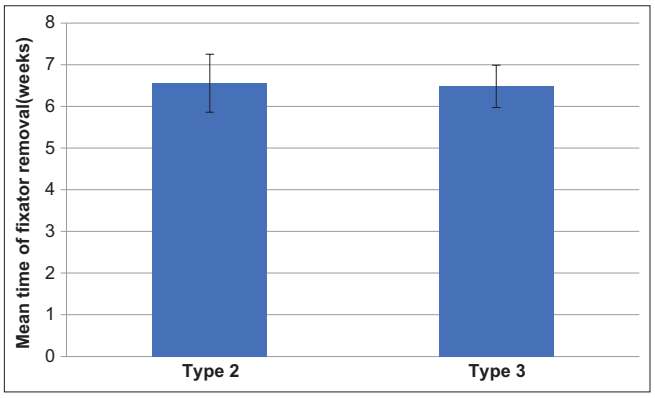

Chart 6: Bar diagram showing distribution of mean time of removal of fixation (weeks) in NEER' type of study group. Interpretation: Minimum time of removal of fixation (weeks)=6, maximum=8, and mean=6.55 in NEER' type 2 (11); in type 3 (19), minimum=6, maximum=7, and mean time=6.48

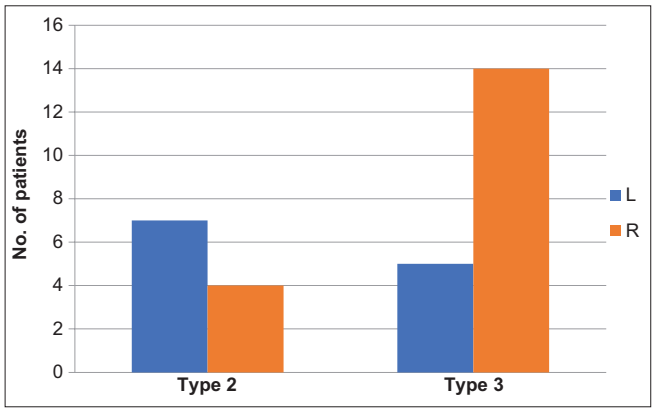

Chart 4: Distribution of side in NEER' type of study group. Interpretation: NEER' type 2 left side=63.6% and right side=36.4%; type 3 left side=26.3% and right side=73.7%

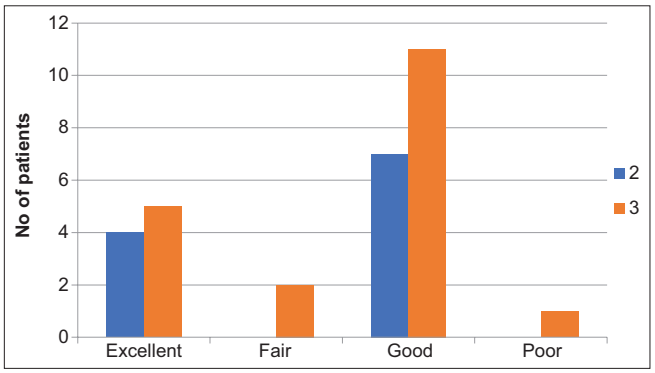

Chart 7: Distribution of outcome in NEER' type of study group. Interpretation: In NEER' type 2 group, there were excellent=36.4% (4), good=63.6 (7) outcome and in NEER' type 3 group, there were excellent=26.3 (5), good=57.9% (11), fair=10.5 (2), and poor=5.3% (1) outcome and *P* = 0.5704

2 NEER' group and for type 3 group it was 1.5 months and longest recorded time was 2.2 months with mean time of union being 1.92 months [Chart 5].

The earliest implant (K-wires) removal time was 6 weeks and longest recorded time was 8 weeks with mean removal time being 6.55 weeks in type 2 NEER' group and for type

3 group it was 6 weeks and longest recorded time was 7 weeks with mean removal time being 6.47 weeks [Chart 6].

In type 2 NEER' group, there was two patients with pin tract infection (resolved later on) and in type 3 group, one patient with pin tract infection (resolved later on), two patients with K-wire loosening (statistically non-significant data with $P = 0.3126$) [Table 1].

There was excellent outcome = 36.4% (4), good = 63.6% (7) of patients (11) in NEER' type 2 group and in type 3 group, there was excellent = 26.3% (5), good = 57.9% (11), fair = 10.5 (2), and poor = 5.3% (1) of patients (19) according to CMS (statistically non-significant data with $P = 0.5704$) [Chart 7].

The CMS of all the patients also suggest the good outcome [Chart 8].

Table 1: Distribution of complications in NEER' type of study group

	NEER' type		
Complications	2	3	Total
K-wire loosening	0	2	2
Row %	0.0	100.0	100.0
Col %	0.0	10.5	6.7
None	9	16	25
Row %	36.0	64.0	100.0
Col %	81.8	84.2	83.3
Pin tract infection (resolved later)	2	1	3
Row %	66.7	33.3	100.0
Col %	18.2	5.3	10.0
Total	11	19	30
Row %	36.7	63.3	100.0
Col %	100.0	100.0	100.0

P=0.3126; Chi-square=2.3254

DISCUSSION

Court-Brown *et al.*[30] conducted 5-year prospective study of the epidemiology of 1027 proximal humeral fractures and found that higher incidence occurs in female. In our study, we found higher incidence in females in type 3 fracture.

Gupta *et al.* (2012)[50] evaluated 16 patients the functional results of closed NEER's 2- and 3-part proximal humerus fractures treated by Joshi's external stabilizing system and they found mean time of union was 6.5 ± 1.18 weeks. Whereas in our study it was 8 weeks in type 2 fracture and 7 weeks in type 4 fractures.

Gupta *et al.* (2012)[50] also reported one case of K-wire loosening and one case of pin tract infection which is very much similar to our study.

Table 2: Showing outcome comparing with other series

Results	Our study (%)	Gupta *et al.*[50] (2012) (%)	Altay *et al.*[49] (%)	Monga *et al.*[50] (%)	Kristiansen *et al.*[49] (1987) (%)
No. of cases	30	16	14	19	23
Excellent	30	18.75	Nil	50	8.69
Good	60	62.5	62.5	30	43.48
Fair	6.67	18.75	25	10	43.48
Poor	3.33	Nil	12.9	10	4.35

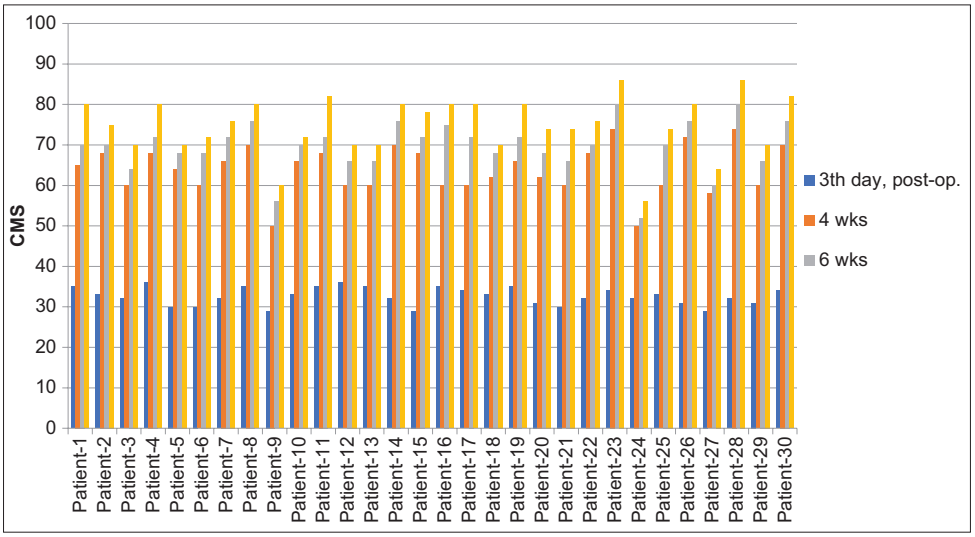

Chart 8: Constant–Murley shoulder score during the follow-up period of the study group

The study was randomized for age, sex, and fracture pattern and baring the exclusion criteria, it demonstrated results that are comparable to authors who have attempted to treat such fractures with external fixation. It also showed statistically comparable incidences of union, shoulder function, and complications with authors who have published results of close reduction and external fixation for such fractures [Table 2].

CONCLUSION

We conclude that CRPP of proximal humerus fractures in adults is a viable alternative modality of treatment as this method is promising and avoids the complication of other methods. The main advantage of the procedure being affordability, minimal invasive, stable construct pertaining good control of infection, shorter hospital stays, early return to work, and easy implant removal under local anesthesia and most importantly easy to learn and reproducible.

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How to cite this article: Mura S, Karmakar A, Datta T, Biswas D, Pal AK. Close Reduction and Percutaneous Pinning in NEER Type 2 and 3 Proximal Humerus Fractures in Adults. Int J Sci Stud 2021;8(11):94-100.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Renal Stones in Children of Hilly Population: Role of Vitamin D and Serum Calcium Levels

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Abstract

Background: Renal stones in pediatric population are important disease which causes morbidity in children. Presentation of renal stones in pediatric population is quite different as compared to adults. The causes of renal stones have been postulated to be hypercalciuria, hyperoxaluria, hyperuricosuria, cystinuria, or infection. Elevated Vitamin D has been implicated as cause of hypercalciuria. However, levels of Vitamin D can be actually low in some patients of renal stones.

Objective: This study was planned to find any correlation between high Vitamin D levels and serum calcium levels in children presenting with renal stones.

Study Design: One hundred pediatric patients coming to surgery OPD with renal stones. Serum calcium, Vitamin D levels, and urinary calcium creatinine ratio were noted in all these patients.

Participants: One hundred pediatric patients coming to surgery OPD with renal stones/nephrolithiasis.

Intervention: All patients undergo USG to confirm the diagnosis. Serum Vitamin D and serum calcium levels were checked in all the patients. Data analyzed to find any correlation between serum Vitamin D and serum calcium levels and renal stones.

Outcomes and Results: We could not find any correlation between high Vitamin D levels, serum calcium, and renal stones. Rather, 87% of patients have low serum Vitamin D levels.

Conclusion: Children presenting with renal stones can have low levels of Vitamin D and calcium. In these children, supplementation should be given with regular follow-up to look for hypercalcemia and hypercalciuria.

Key words: Hypercalcemia, Renal stones, Vitamin D

INTRODUCTION

Renal stones in pediatric population are important disease which causes morbidity in children. Presentation of renal stones in pediatric population is quite different as compared to adults. Children present with abdominal pain, hematuria, or features of urinary tract obstruction. Imaging of choice in pediatric population should have less 177 ionizing radiation. Chances of recurrence are also common so metabolic profile should be done in all patients of renal stones in pediatric age group.[1,2]

The causes of renal stones have been postulated to be hypercalciuria, hyperoxaluria, hyperuricosuria, cystinuria, or infection. Out of these most common cause is hypercalciuria.[1,2] The cause of hypercalciuria can be high serum levels of calcium. Elevated Vitamin D has been implicated as cause of hypercalciuria.[3] A meta-analysis conducted by Hu *et al.* showed that increased Vitamin D levels are associated with urinary stones.[4] Other causes of hypercalciuria are renal tubular acidosis, spongy kidney, and certain drugs like corticosteroids.

However, in several studies, it has been observed that Vitamin D level is actually low in some patients of renal stones. In these patients, supplement of Vitamin D is

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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known to cause increase in calcium excretion in urine.[5] There is also correlation with high serum calcium levels and hypercalciuria. Some studies from the UK have shown normal level of serum calcium levels in patients with renal stones.[6,7] This study was planned to find any correlation between Vitamin D levels and serum calcium levels in children presenting with renal stones.

Aim

The aim of the study was as follows:

1. To study the levels of Vitamin D and calcium in patients of renal stones
2. To find correlation between Vitamin D, serum calcium levels, and water intake in children with renal stones.

MATERIALS AND METHODS

This study was planned in pediatric patients coming to surgery outpatient department (OPD) with renal stones. Demographic data were collected from the patients. It was prospective study from October 2017 to October 2018. Ethical clearance for the study was taken before the study.

Inclusion Criteria

The following criteria were included in the study:

1. Age <18 years
2. Unilateral or bilateral stones.

Exclusion Criteria

The following criteria were excluded from the study:

1. Anatomical abnormalities such as horseshoe kidney and S-shaped kidney
2. Metabolic abnormalities which cause hyperoxaluria and hypercalciuria.

The patients were interviewed for their presenting signs and symptoms. Each child was asked about amount of water intake per day. Examination was done. Imaging of choice was ultrasound. In all patients, serum calcium levels and Vitamin D levels, urinary calcium, and renal functions were done. The value of these noted to find if renal stones are associated with high Vitamin D levels or serum calcium levels. Spot urinary calcium and creatine ratio were recorded.

Statistical analyses were performed with SAS version 9.2 (SAS Institute Inc., Cary, NC). Within-group differences were assessed by a paired *t*-test. $P < 0.05$ was considered statistically significant.

Observations

One hundred patients coming to surgery OPD with renal stones/nephrolithiasis were analyzed and following observations were made. Figure 1 shows age distribution

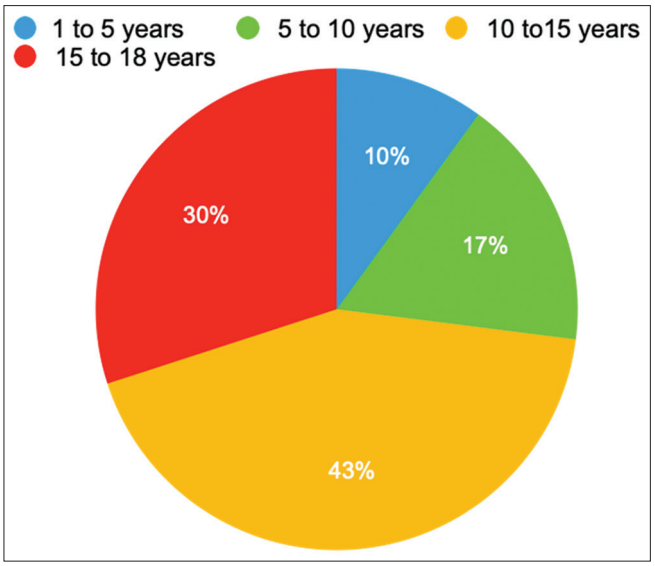

Figure 1: Age distribution of patients

in our patients. Table 1 shows demographic data and presenting complaints in our patients.

Daily intake of water was noted in all the patients. Presenting complaints in most of the patients were vague abdominal pain (90%). Severe abdominal pain was found only in eight patients. Features of urinary tract infection (UTI) were found in 87% of patients. Hematuria as presenting was seen only in 37% of cases. Only one patient had gross hematuria. Value of serum calcium, renal functions, urinary calcium, and serum Vitamin D obtained in all patients is shown in Table 1. Mean serum calcium level was 9.05 mg/dl and mean serum Vitamin D level was 14.9 ng/dl. Spot urinary calcium and creatine ratio were recorded. Mean value was 0.18 (0.16–0.25).

RESULTS

In our study, we could not find any correlation between high vitamin D levels and renal stones, p value > 0.05. Even high serum calcium was also not found in children with renal stones.

DISCUSSION

Renal stones are common cause of morbidity in adults and children. Although this is less frequent in developed nations, this is endemic in Indian subcontinent. Incidence of renal stones increases with age.[8] They are found more frequent in teenagers as compared to children <10 years. Male-to-female ratio found in our study was 3:2. Similar observations were made by study conducted by Agnieszka.[9]

Table 1: Showing demographic data and laboratory values in patients

Parameter (*n*= 100)	Value
Age in years (mean ± SD)	13±4
Male (%)	64
Male: Female	3:2
Presenting complaint	
Vague abdominal pain	90%
Urinary tract infection	87%
Haematuria	37%
Renal function (mean ± SD)	
Serum creatinine (mg/dl)	0.9±0.2
25-hydroxyvitamin D (ng/ml) n (%)	
0–9	19 (19)
10–19	68(68)
20–29	13(13)
Serum calcium	
≤8	12
8- 9	45
9- 10	37
>10	6
Urine calcium: creatine (range)	0.18(0.16–0.25)

Presentation of renal stones is quite different in children as compared to adults. We found that severe pain was less common presentation as compared to UTI. Our finding was also confirmed by Robert *et al.*[10] Another common presentation reported is hematuria by Copelovitch which was not found in our study.[8] Presenting complaints in most of the patients were vague abdominal pain (90%). Severe abdominal pain was found only in eight patients. Features of UTI were found in 87% of patients. There are more chances of UTI in patients of renal stones as compared to non-stone formers.[1] Hematuria as presenting was seen only in 37% of cases. Only one patient had gross hematuria. Similar findings were obtained by Kokorswhi *et al.*[1]

High serum calcium levels were not observed, $P > 0.05$. Similar observations were made by Abbaszadeh[11] who did not find any correlation between serum calcium and renal stones in children. Though levels of serum calcium and Vitamin D are interrelated, high serum vitamin D can lead to increased level of serum calcium which in turn can cause renal stones, but in our study, we could not find any correlation between high vitamin D levels and renal stones, p value > 0.05.

In our study, we could not find any correlation between high Vitamin D levels and renal stones, $P > 0.05$. This is in correlation with findings of Johri *et al.*[12] who also observed deficiency of Vitamin D in patients of renal stones. Some studies have shown a positive association between urinary calcium excretion and 25-hydroxyvitamin D serum levels in adult stone formers.[3] We did not find a relationship between 25-hydroxyvitamin D and urine calcium excretion or prevalent kidney stone disease. Spot urinary calcium and creatine ratio were recorded. Mean value was 0.18 (0.16–0.25).

Despite the importance of Vitamin D in bone health, many clinicians are reluctant to give Vitamin D therapy in patients of renal stones even if there is hypovitaminosis as hypervitaminosis is considered a risk factor in renal stone formation. Vitamin D is essential for calcium absorption and maintaining bone health in pediatric population. Deficiency of Vitamin D can lead to rickets, hypocalcemia which can be symptomatic leading to tetany and seizures. In Vitamin D deficient patients, intestinal absorption of calcium and phosphorus is decreased.[10]

Cutaneous synthesis of Vitamin D due to ultraviolet radiation is significant source of Vitamin D supplementation.[13] However, children require less exposure to sunlight due to greater surface area and volume ratio. Other factors which affect synthesis of Vitamin D are pollution, dark skin, and indoor confinement. There are more reports of Vitamin D deficiency in children belonging to high altitude in spite of abundant sunlight and less pollution.[14] Whether these Vitamin D deficient patients with renal stones need Vitamin D supplementation or not are still not clear. Hypervitaminosis can lead to formation of renal stones due to increased excretion of calcium.[6] High levels of Vitamin D are reported to increase the incidence of urolithiasis, particularly in children.[15] Wang *et al.* also found that serum Vitamin D level in renal stone patient was high as compared to non-stone formers.[16] Tang[6] conducted a study which showed no correlation between high serum Vitamin D and prevalent renal stone. Leaf *et al.* also advocated Vitamin D repletion in stone formers who have Vitamin D deficiency.[17] Among stone formers with Vitamin D deficiency, a limited course of Vitamin D repletion does not seem to increase mean urinary calcium excretion, although a subset of individuals may have an increase. Leaf *et al.* suggested that Vitamin D therapy, if indicated, should not be withheld solely on the basis of stone disease, but 24 h urinary calcium excretion should be monitored after repletion.

Since there are more cases of Vitamin D deficiency in children who are residents of Himalayan range, and deficiency of Vitamin D can cause growth problems in these children, the authors recommend Vitamin D supplementation in these patient.

However, this supplementation should be done with caution with regular follow-up to look for hypercalcemia and hypercalciuria.

CONCLUSIONS

Children presenting with renal stones can have low levels of Vitamin D and calcium. Message delivered: In these children with low levels of Vitamin D, supplementation should be given with regular follow-up with serum calcium and 24 h urinary calcium to look for hypercalcemia and hypercalciuria.

What is already known – Children with renal stones usually have high levels of Vitamin D.

What this study adds – Children with renal stones can have low levels of Vitamin D and these patients should be given supplementation of Vitamin D.

Limitations of study – We did not measure 24 h urinary calcium levels in these patients. Hypercalciuria can occur in patients given Vitamin D supplementation.

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How to cite this article: Virdi VJS, Gupta M, Mandial V, Sharma R. Renal Stones in Children of Hilly Population: Role of Vitamin D and Serum Calcium Levels. Int J Sci Stud 2021;8(11):101-104.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Study of Patients Undergoing Amputation for Diabetic Foot Ulcer – An Observational Study

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Abstract

Introduction: Diabetes associated with foot problems constitutes the primary cause of hospitalization. Among diabetes, 15% of people develop leg ulcer. Lower limb amputation in non-diabetic patients is 30 times higher than diabetic patients. Due to diabetes, one leg is amputated every 30 s.

Aim: This study aims to study the patients undergoing amputation for a diabetic foot ulcer (DFU).

Materials and Methods: A total of 50 patients with DFU were included in this study. The variables investigated were related to diabetes, infection, and surgical treatment. Our series amputation was done at different levels of anatomical levels ranging from toe level to above-knee amputation. Results were statistically analyzed and discussed below.

Results: Out of 50 patients, 44 were male, and 6 were female. Mean age was 56.24 years, and mean HbA1c was 8.24. Amputation was done for 18 patients and non-amputation for 32 patients. Based on the organisms present, 18 patients had *E. coli*, 12 had *Klebsiella*, 8 patients had *Proteus*, 6 patients had *Staphylococcus*, 3 patients had *Pseudomonas*, and 3 patients had mixed bacteria. Based on antibiotic sensitivity, majority were sensitive to amikacin followed by cefotaxime. Amputation was done above the knee for 5 patients, below knee for 19 patients, knee for 5 patients, and toe disarticulation for 21 patients.

Conclusion: From this study, we concluded that lack of awareness about diabetes mellitus and its lower limb complications, poor compliance to the treatment, uncontrolled blood sugar levels, delay in diagnosis, and late presentation are all factors which led to the occurrence of DFU.

Key words: Amputation, Diabetes, Disarticulation, HbA1C

INTRODUCTION

Despite the advances made in medical management combined with nutrition and behavioral education, diabetes mellitus is still a significant health problem worldwide. Diabetic foot ulcers (DFU) are among the most frequently associated problems with 6.3% global predicament of DFU.[1] While DFU development is multifactorial; three major risk factors are present. In 35–45% of all DFUs, diabetic peripheral neuropathy (DPN) is considered the leading cause of DFU and is the causative factor.[2,3] The most common site for a neuropathic DFU is the foot plantation.[4] A peripheral arterial disease (PAD) accounts for 24–50% of the DFUs in conjunction with DPN and occurs at a diabetic foot's foot borders.[3,5,6]

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

In DFUs, the prevalence of pathogenic species is complex.[7] The production of foot infection is due to polymicrobiology. This includes no. of bacteria, different microbes, infective organisms, and synergistic interactions between microbial species.[8] It was estimated that possible causative DFUs include *Staphylococcus*, *Streptococcus*, *Proteobacteria*[9] and *Pseudomonas aeruginosa*, as well as coliforms.

Inflammatory cytokines, vascular disease, peripheral neuropathy, and vulnerability to infection contribute to DFUs. Barefoot walks skins, infection in wound healing, ischemia, impaired vision, reduced joint mobility, poor foot coverage, and excess foot pressure are all risk factors associated with a DFU. Topical therapy, including systemic care and surgery, is particularly beneficial in contrast with secondary treatment.

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Patients who suffer from DFUs were not aware of ulcers until being told by physicians.[10] It was, therefore, so necessary for DM patients to check their feet regularly, as a consequence. Today, studies show a decrease of 25–60% in lower severe amputation in patients with a high risk of foot complications, inappropriate screening, and examination.[11] The analysis of the lower extremity of the diabetic patients includes dermatological, vascular, neurological, and musculoskeletal measures.

The infected DFUs must only be treated with ample experience and equipment. The ulcer regulation is broken down into three parts: Eliminating a callus, the abolition of inflammation, and weight-bearing forces. Excess keratin with a scalpel blade should be carefully removed to drain the lesion to efficiently reveal the ulcer's floor. Virtually any diabetic lesion clinically infected needs antibiotic therapy; antibiotic therapy should have avoided clinically unaffected wounds. Proper treatment requires proper insulin glycemic regulation, adequate wound care, and antimicrobial prescription drugs. Initial antibiotic treatment is typically selected empirically and subsequently updated because additional clinical and microbiological results are available.

Aim

This study aims to study the patients undergoing amputation for a DFU.

MATERIALS AND METHODS

A total of 50 patients were included in this prospective observational study. In the pro forma, name and age of the patient, sex, occupation complaints, and history in detail were obtained and recorded. History of diabetes, hypertension, tuberculosis, and ischemic heart disease were enquired into. Smoking and alcohol history were elicited with special reference. Patients were examined in detail about the general condition such as anemia, jaundice, fever, blood pressure, and peripheral pulses. The affected part of the ulcer was examined in detail for all the features of an ulcer. Unhealthy granulation, amount of slough, site of ulcer, and line of demarcation were noted. A motor and sensory change was examined in detail. Loss of protective sensation was examined using Semmes-Weinstein 10 g monofilament. Ankle-brachial pressure index, hematology, pus culture and sensitivity, color Doppler study, and skin biopsy were examined. Our series amputation was done at different levels of anatomical levels ranging from toe level to above-knee amputation. Results were statistically analyzed and discussed below.

RESULTS

Out of 50 patients, 44 were male, and 6 were female [Table 1].

Out of 50 patient's, amputation was done for 18 patients and non-amputation for 32 patients [Table 2].

Based on the organisms present, 18 patients had *Escherichia coli*, 12 had *Klebsiella*, 8 patients had *Proteus*, 6 patients had *Staphylococcus*, 3 patients had *Pseudomonas*, and 3 patients had mixed bacteria [Table 3].

Based on antibiotic sensitivity, majority were sensitive to amikacin, followed by cefotaxime, gentamycin, ciprofloxacin, norfloxacin, metronidazole, erythromycin, and cloxacillin [Table 4].

Out of 50 patients', amputation was done above the knee for 5 patients, below knee for 19 patients, through knee for 5 patients, and toe disarticulation was done for 21 patients [Table 5].

DISCUSSION

Foot ulcers affect one in 10 people with diabetes during their lifetime. Patients with diabetes have increased risk of lower extremity amputations. The main cause is diabetic PAD accelerated by the direct damage to the nerves and blood vessels by high blood glucose levels. Wound healing is also impaired from affected collagen synthesis. The diabetic vascular disease has three main components: Arteritis and small vessel thrombosis; neuropathy (possibly ischemic in the cause); and large vessel atherosclerosis. In combination, these are almost bound to cause problems in the weight-bearing areas. The DFUs are often deeper and more frequently infected than other leg ulcers reflecting the severe end vessel ischemia and opportunistic infection, which is the common experience of the diabetic.[12-15]

Factors, such as age and the disease's duration, will increase its incidence and risk of death from uncontrolled infection. Due to peripheral neuropathy, there is a loss of sensation. As a result, neuropathic changes, such as foot deformity, decreased protective sensation, and skin fissures, caused by diminished sweating lead to diabetic foot infections, which lead to further damage ultimately leading to gangrene formation. Diabetic neuropathy develops as a consequence of chronically elevated blood sugar levels, which cause vascular and metabolic abnormalities.[16]

In our study, the majority were male compared to females. This was similar to Ozan *et al.* in his study stated that major amputation was significantly higher in male patients.[17]

Table 1: Gender distribution

S. No.	Gender	No. of patients
1	Male	44
2	Female	6

Table 2: Distribution of amputation

S. No.	Management	Frequency	Percentage
1	Non-amputation	32	64
2	Amputation	18	36

Table 3: Distribution of organisms

S. No.	Organism	Frequency	Percentage
1	*Escherichia coli*	18	36
2	*Klebsiella*	12	24
3	*Staphylococcus*	6	12
4	*Proteus*	8	16
5	*Pseudomonas*	3	6
6	Mixed	3	6

Table 4: Distribution of antibiotic sensitivity

S. No.	Antibiotic sensitivity	Frequency	Percentage
1	Cloxacillin	3	6
2	Erythromycin	3	6
3	Norfloxacin	9	18
4	Metronidazole	3	6
5	Gentamycin	18	36
6	Ciprofloxacin	11	22
7	Amikacin	36	72
8	Cefotaxime	31	62

Table 5: Distribution of type of amputations

S. No.	Amputation	Frequency	Percentage
1	Above knee	5	10
2	Through knee	5	10
3	Below knee	19	38
4	Toe disarticulation	21	42

In our study, mean HbA1c was 8.4, where Lehto *et al.* reported that HbA1c levels and the risk of amputation increase largely in a linear fashion. Ozan *et al.* found no significant differences between the major and minor amputation groups in HbA1c levels.[17,18]

In our study, the majority were older age group. In his study, Ozan *et al.* found that the mean age of patients in major amputation group was significantly higher than in minor amputation group. Still, Abbott *et al.* reported a higher incidence of major amputation in the younger age group probably because they were more mobile and more predisposed to trauma.[17,19]

In our study, the most common organism found was *E. coli*. Latif *et al.* and Ozan *et al.* recorded positive culture in 69.1% and 95% of cases, respectively, and most common organism in their study was also *Staphylococcus aureus*.[17,20]

CONCLUSION

From this study, we concluded that lack of awareness about diabetes mellitus and its lower limb complications, poor compliance to the treatment, poorly controlled blood sugar levels, delay in diagnosis, and late presentation are all factors which led to the occurrence of DFU.

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How to cite this article: Prabakar S. Study of Patients Undergoing Amputation for Diabetic Foot Ulcer – An Observational Study. Int J Sci Stud 2021;8(11):105-108.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Study of Hypertensive Intracerebral Hemorrhage

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Abstract

Introduction: Cerebrovascular accident is one of the most common leading causes of morbidity and mortality in the world. Arterial occlusion with subsequent near brain infarction and arterial rupture with subsequent hemorrhage is the two important types of cerebrovascular accidents.

Aim: The aim of the study was to correlate the clinically presumed hypertensive intracerebral hemorrhage site with C.T. scan findings and prognostic factors.

Materials and Methods: The study was conducted at the medical wards of Mount Zion Medical College Hospital, Chayalode, Adoor, Pathanamthitta District, Kerala. All the patients admitted in medical wards with a clinical diagnosis of hypertensive intracerebral hemorrhage were taken for study.

Results: Of 50 patients, 30 patients were male, and 20 patients were female. In 50 patients, 15 patients were below 50 years, 13 patients were aged between 51 and 60 years, based on the site and size of hemorrhage, 43 patients had a large hemorrhage, and 7 patients had a small hemorrhage. Based on hemorrhage, 24 patients had hemorrhage site in basal ganglia, 2 patients in the brain stem, 7 patients in the thalamus, 1 patient in the cerebellum, and 8 patients in the cortex, 6 patients in multiple areas, and 2 patients in intraventricular areas. Based on complications, 23 patients had intraventricular extension/subarachnoid extension, 12 patients had a midline shift, and 4 patients had hydrocephalus. Thirty-four died among these patients 24 patients died due to intracranial pressure, 5 patients due to aspiration pneumonia, 3 patients because of septicemia 1 patient had atrial fibrillation, and 1 patient had aspiration pneumonia and septicemia.

Conclusion: From this study, we concluded that the death rate was more common in the higher age group, and patients had other medical problems. The correct sites of hypertensive intracerebral hemorrhage were made clinically in 52% of the patients. Small hemorrhages were associated with better prognosis, whereas large hemorrhages were associated with poor prognosis.

Key words: Intracerebral, Hemorrhage, Hypertension, Computed tomography scan

INTRODUCTION

Cerebrovascular accident is one of the most common leading causes of morbidity and mortality in the world. Arterial occlusion with subsequent near brain infarction and arterial rupture with subsequent hemorrhage is the two important types of cerebrovascular accidents.[1,2]

Intracerebral hemorrhage is one of the most common neurological emergencies encountered in medical wards apart from cerebrovascular infarction. Many etiological factors such as hypertension, aneurysms, arteriovenous malformations, and arteritis, which lead to intracerebral hemorrhage.[3-5]

Hemorrhage may be described as massive, small, slit, and petechial. Massive refers to hemorrhage several centimeters in diameter; small applies to those 1–2 cm in diameter; and slit that lies subcortically at the junction of white and gray matter. The most common sites of hypertensive hemorrhage are (1) the putamen and adjacent internal capsule (50%), (2) various parts of central white matter (lobar hemorrhage), (3) thalamus, (4) cerebellar hemisphere, and (5) pons. The vessels involved are usually a penetrating artery.[6]

The hemorrhages at these various sites produce specific clinical features, by identification of which, a fairly good

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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idea about the site of hemorrhage can be made. This study is aimed at such a clinical localization of hemorrhage site with the available signs and to correlate the presumed clinical site of hemorrhage with the site of hemorrhage in the computed tomography (C.T.) scan picture.

Increase in intracranial pressure with consequent brainstem compression, secondary medical complication such as aspiration pneumonia, septicemia, and deep venous thrombosis and worsening of underlying other medical disorders such as diabetes mellitus, cardiac failure, and renal failure are some of the reasons for mortality in hypertensive intracerebral hemorrhage.

Aim

The aim of the study was to correlate the clinically presumed hypertensive intracerebral hemorrhage with C.T. scan findings and prognostic factors.

MATERIALS AND METHODS

The study was conducted at the medical wards of Mount Zion Medical College Hospital, Chayalode, Adoor, Pathanamthitta District, Kerala. All the patients admitted in medical wards with a clinical diagnosis of hypertensive intracerebral hemorrhage were taken for study. Inclusion criteria include patients who had a history of hypertension in the past whether treated or untreated, patients who did not have a history of hypertension in the past but who were found to be hypertensive at the time of admission and hypertensive end-organ changes like retinal vascular changes, all forms of hypertension with intracerebral hemorrhage such as essential hypertension and renal hypertension were taken for study. Exclusion criteria include patients who suffered from some form of cerebrovascular accidents in the past, patients who were not found to be hypertensive at the time of admission and patients who did not have a history of hypertension.

A detailed history was taken from all selected patients with particular emphasis on hypertension's duration, nature of the treatment taken, and whether they were taking it regularly or not. The presence of other major diseases such as diabetes mellitus, ischemic heart disease, renal disease, and left ventricular failure were also enquired. A detailed history of the present episode of intracerebral hemorrhage was taken with emphasis on the following factors, time of onset, what the patient was doing at the time of stroke, loss of consciousness, occurrence of convulsions, paucity of limb movements, and history of vomiting and headache. A clinical diagnosis of intracerebral hemorrhage was made, when the cerebrovascular accident had occurred during day time or work, with immediate, profound loss of consciousness associated with or without vomiting or convulsions with clinical features fitting into hemorrhage at well-defined sites such as putamen, thalamus, pons, cerebellum, and cortex.

A clinical diagnosis of site of bleed and possible complications was made. Other findings such as loud A2, heaving apical impulse, electrocardiogram criteria for left ventricular hypertrophy (LVH), X-ray findings for LVH, and fundus changes were noted. Complete basic investigations were done in all the patients. After confirmation of hemorrhage by C-T scan, all the patients were treated with a standard regimen.

While these patients were being treated on these lines, they were examined daily for the following – state of consciousness, improvement or further deterioration of neurological deficit, control of hypertension, futures of increased intracranial tension, complications, particularly (a) bedsores, (b) pneumonitis, (c) urinary tract infection, (d) deep vein thrombosis, (e) metabolic and electrolytic disturbances, and others.

The following factors which are known to influence the outcome of hypertensive intracerebral hemorrhage were studied. These are age, sex, hypertension – duration, treated or untreated, admission blood pressure, admission blood sugar level, and presence of other medical diseases. The size and other hemorrhage consequences such as intraventricular extension, midline shift, and hydrocephalus in CT scan picture and complications.

RESULTS

Of 50 patients, 30 patients were male, and 20 patients were female [Table 1].

Of the 50 patients, 15 patients were below 50 years, 13 patients were aged between 51 and 60 years, 17 patients were aged between 61 and 70 years, and 5 patients were aged above 70 years [Table 2].

Of 50 patients, 43 patients had a large hemorrhage and 7 patients had a small hemorrhage. Based on hemorrhage, 24 patients had hemorrhage site in basal ganglia, 2 patients in the brain stem, 7 patients in the thalamus, 1 patient in the cerebellum, 8 patients in the cortex, 6 patients in multiple areas, and 2 patients in intraventricular areas [Table 3].

Based on complications, 23 patients had intraventricular extension/subarachnoid extension, 12 patients had a midline shift, and 4 patients had hydrocephalus [Table 4].

Out of 50 patients, 34 were died among these patients, 24 patients died due to intracranial pressure, 5 patients due to

aspiration pneumonia, 3 patients because of septicemia, 1 patient had atrial fibrillation, and 1 patient had aspiration pneumonia septicemia [Table 5].

DISCUSSION

In our study, more patients died in the age group of 50–70 years (75%), whereas survival was better in patients aged less than 50 years. Similar observations were made by Whisnant *et al.* in 2009, Douglas; Hearer in 2010, Kwak *et al.* in 2010, and Banet; 1994.[7-10] Death rate is equal in both male and female sexes. Hence, sex alone is not a prognostic indicator.

In our study, the majority had severe hypertension and patients' higher death was among the severe hypertension patients. Suzuki, Kelley, Duncan in 2014 observed that persistent inadequate blood pressure control adversely affects the prognosis in hypertensive intracerebral hemorrhage.[11] Proper control of hypertension with regular medical treatment will reduce hypertension related vascular damage. This is also observed by authors such as Douglas and Hearer in 1982 and Feschi *et al.* in 1977.[8,12]

The presence of hyperglycemia alone is not a bad prognostic factor. Diabetes mellitus may be a contributory factor in causing death by predisposing the patient to infection and consequent septicemia. Diabetes exerting bad prognosis was earlier observed in their studies by Kadoya, Susuki in 1983, Caplan *et al.* in 2018.[8,9,13]

The presence of underlying cardiac disease can be taken as a bad prognostic factor as the cardiac disease itself can lead to death irrespective of the cerebral complications. A similar observation was made by Caplan in 2005, Feldman in 2011, and Furlan *et al.* in 1979.[7,13-15]

If the size of the bleeding is small chances of survival is more. Only two out of seven died, and death was not due to cerebral cause but due to aspiration pneumonia, so prevention of complication is one of the main principles in managing intracerebral hemorrhage. Ojemann Heros observed large hemorrhages and multiple hemorrhages exerting bad prognosis. R.C. in 2005, Feldman E in 1991, and Susuki, Kelley in 1995 observed that chances of death from brain stem hemorrhage are more with any hemorrhage than 50 ml in volume.[11,14,16]

In CT scan, midline shift alone cannot be taken independent prognostic indicator because midline shift can occur in the following ways: Large cortical or subcortical hemorrhages may increase the intracranial pressure very much to produce massive cerebral edema which can shift the midline structures and hemorrhages small or large near the midline can also directly shift the midline to the opposite side. Hence, in C.T. scan, the prognostication of the midline shift's presence should not be considered alone and independently. It has to be considered along with other features in C.T. such as the size of the hemorrhage, site of hemorrhage, and associated cerebral edema.

As a consequence of intraventricular hemorrhage, adhesion may form in the cerebrospinal fluid (CSF) pathway, obstructing the CSF flow causing stagnation of CSF and dilatation of ventricle, increasing the intracranial pressure which will have an adverse effect on the outcome. Hence, the

Table 1: Sex distribution

S. No.	Sex	No. of. patients
1	Male	30
2	Female	20

Table 2: Age distribution

S. No.	Age (years)	No. of. patients
1	Below 50	15
2	51–60	13
3	61–70	17
4	Above 70	5

Table 3: Site and size of hemorrhage distribution

S. No.	Large hemorrhage		Small hemorrhage	
	Site	No. of patients	Site	No. of patients
1	Basal ganglia	21	Basal Ganglia	3
2	Brian stem	0	Brain stem	2
3	Thalamus	6	Thalamus	1
4	Cerebellum	0	Cerebellum	1
5	Cortex	8	Cortex	0
6	Multiple areas	6		
7	Intraventricular	2		

Table 4: Complications

S. No.	Complications	No. of patients
1	Intraventricular extension/subarachnoid extension	23
2	Midline shift	12
3	Hydrocephalus	4

Table 5: Causes of death

S. No.	Causes	No. of Patients
1	Intracranial pressure	24
2	Aspiration pneumonia	5
3	Septicemia	3
4	Aspiration pneumonia+Septicemia	1
5	Others (atrial fibrillation)	1
6	Total	34

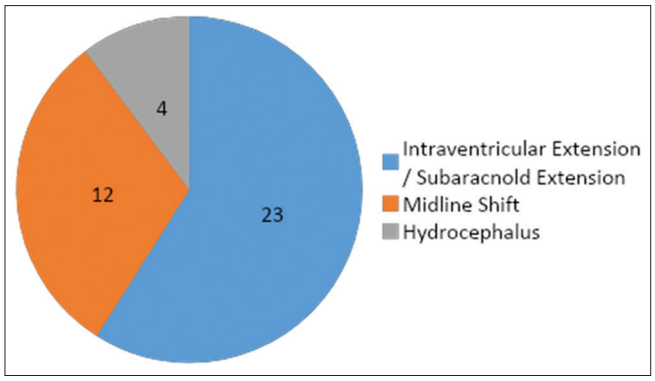

Figure 1: Complications

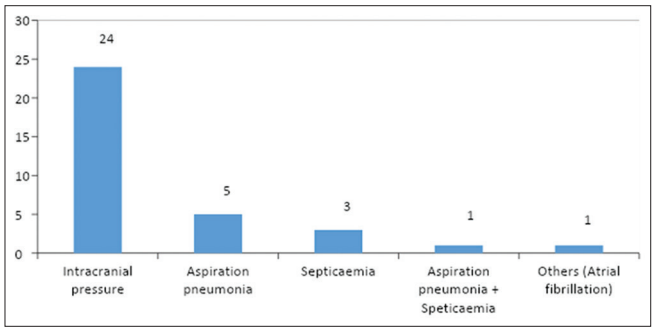

Figure 2: Causes of death

presence of dilated ventricles in C.T. scan can be taken as a bad prognostic indicator. Broderick JP opined from his studies that displacement of ventricles and or early hydrocephalus were associated with poor prognosis [Figure 1].[17]

Aspiration pneumonia, septicemia, urinary tract infection, bedsores, and cardiac arrhythmias were some of the extracerebral complications observed from the study. Few patients died exclusively of these complications. These complications usually occur in the 2nd week, whereas death due to increased intracerebral pressure occurred earlier in the 1st week. These complications were usually associated with other underlying medical problems such as diabetes mellitus, renal disease, and cardiac disorders. Thus, the occurrence of complications like the above may be taken as harmful prognostic factors. These complications can influence prognosis adversely. Those were also described earlier by Caplan L, 2005, Doug; Hearer, 2016, Feschi, Carolet, Fiorelli in 2000, Kwak, Kadoya, Susuki in 2005, and Whisnant *et al.* in 2005 [Figure 2].[7-9,12,13]

CONCLUSION

This study concluded that the death rate was more common in higher age groups and patients had other medical problems. The correct sites of hypertensive intracerebral hemorrhage were made clinically in 52% of the patients. Small hemorrhages were associated with better prognosis, whereas extensive hemorrhages were associated with poor prognosis.

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How to cite this article: Manmatharaj K, Vargheese R, Anandan H. Study of Hypertensive Intracerebral Hemorrhage. Int J Sci Stud 2021;8(11):109-112.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Correlation between Birth Weight and Other Anthropometric Parameters

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Abstract

Introduction: There is high incidence of low birth weight (BW) newborns in India. Several of these deliveries are conducted at home where accurate weighing scale may not be available. There is a need to have other anthropometric parameters which can accurately correlate with BW.

Aim: This study was aimed to find anthropometric parameter which can correlate with BW accurately.

Materials and Methods: A total of 254 newborns delivered by normal delivery were examined and anthropometric measurements–mid-arm circumference, mid-thigh circumference, calf circumference (CC), crown heel length, head circumference, chest circumference (ChC), and BW were carried out.

Results: CC had highest sensitivity and comparable specificity with ChC. ChC had highest correlation with BW followed by CC.

Key words: Anthropometric parameter, Calf circumference, Chest circumference, Low birth weight

INTRODUCTION

About 30% of total birth in India are low birth weight (LBW) which is severe hindrance to development.[1,2] It accounts for more than 50% of perinatal deaths and nearly 1/3 of infant deaths. Morbidity associated with LBW babies is also very high.[3] Almost 80% of deliveries in India occur at home and in community setting conducted by trained or untrained birth attendants which lack the basic facilities like accurate weighing scales. This study was planned to find a reliable alternative method to identify LBW babies.

Aim

This study was designed to find methods to detect LBW with various anthropometric parameters and to check their reliability in Indian scenario. It was designed to find best parameter to correlate with birth weight (BW).

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

MATERIALS AND METHODS

In this hospital-based study, 254 term normal singleton live newborn babies delivered per vaginum were included in the study. The newborn with congenital anomalies, chromosomal anomalies, and hemolytic diseases were excluded from the study. The following anthropometric measurements were carried out in supine posture within 24 h of birth: BW on lever type weighing scale to the nearest of 50 g, mid-arm circumference (MAC) at the midpoint between acromion and olecranon process, mid-thigh circumference (MTC) just below the most inferior gluteal folds, calf circumference (CC) at the most prominent part of leg in the semi-flexed posture, crown heel length (CHL) with infantometer, head circumference (HC) by passing flexible fiber glass measuring tape around the head over the most prominent part, chest circumference (ChC) at the level of xiphisternum anteriorly, and inferior angles of scapula posteriorly. The data thus obtained were analyzed statistically using correlation matrix, regression equations, sensitivity, and specificity.

Observations

The mean values for various parameters along with standard error were as follows: BW (2846.35 ± 429.41 g), CC (9.99 ± 1.324 g), MTC (13.56 ± 2.175 g), MAC (9.73

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± 1.217 cm), CHL (47.36 ± 3.198 cm), HC (33.21 ± 1.548 cm), and ChC (31.24 ± 16.02 cm). Correlation matrix of all the anthropometric variables was derived. It showed that all the parameters had significant correlation with BW [Table 1]. The highest correlation was the ChC (0.753) followed closely by CC (0.734). The HC also showed a high degree of correlation (0.712) which was comparable to that of chest and CC. The values for MTC, MAC, and CHL were much lower than that of chest, calf, and HC.

The data were further subjected to linear regression keeping BW as dependent variable and R value was derived, as shown in Table 2. Combined R value was 66.5% with all the six variables when regressed with BW. It was also evident from Table 2 that *t*-value was not significant for MAC, MTC, and CHL and so they were deleted from further analysis. Regression analysis was further carried out with CC, HC, and ChC and R was 65.6%. It was evident that even after deletion of three of the parameters, predictive values of model did not change much. Since the study was to find BW surrogates, so various anthropometric parameters were regressed with BW and regression equations were derived. Depending on these equations, regression lines were drawn and from these lines, cutoff values for identifying 2500 g of BW were calculated which were 8.5 cm for CC, 30.0 cm for ChC, and 32.0 cm for HC. Using the above cutoff values, various anthropometric variables were comparatively assessed by determining their sensitivity, specificity, positive, and negative predict values [Table 3] which showed that CC had highest sensitivity and comparable specificity with ChC. CC also had highest negative predictive values and positive predictive value less than that of ChC.

Table 1: Correlation matrix of various parameters

	BW	CC	MAC	MTC	CHL	HC	ChC
BW	1.00						
CC	0.734*	1.00					
MAC	0.599*	0.684	1.00				
MTC	0.637*	0.779	0.703	1.00			
CHL	0.465*	0.458	0.390	0.526	1.00		
HC	0.712*	0.662	0.613	0.742	0.599	1.00	
ChC	0.753*	0.771	0.624	0.705	0.534	0.816	1.00

MAC: Mid-arm circumference; MTC: Mid-thigh circumference; CC: Calf circumference; CHL: Crown heel length; HC: Head circumference; ChC: Chest circumference; BW: Birth weight; *indicates statistically significant at *P*<0.05

Table 2: Linear regression keeping BW as dependent variable

Variable	Coefficient B	S.E.	*t*-ratio
Constant	3230.39	433.87	7.445*
CC	128.93	21.98	6.115*
MAC	23.90	19.50	1.225
MTC	24.39	13.87	1.758
CHL	1.67	6.26	0.267
HC	63.61	20.09	3.166*
ChC	86.21	18.71	4.606*

MAC: Mid-arm circumference; MTC: Mid-thigh circumference; CC: Calf circumference; CHL: Crown heel length; HC: Head circumference; ChC: Chest circumference; BW: Birth weight; R=0.6651. Adjusted R=0.6570. * Significant

Table 3: Sensitivity, specificity, positive predictive value, and negative predictive value of various parameters

Variable	Sensitivity	Specificity	Positive predictive value	Negative predictive value
CC	70.7	92.4	64.4	94.2
ChC	60.0	92.7	70.58	92.7
HC	59.5	91.9	56.8	91.9

CC: Calf circumference; HC: Head circumference; ChC: Chest circumference

RESULTS

For birth weight 2500 g, cut off values for CC was 8.5 cm, for ChC it was 30.0 cm and for HC it was 32.0 cm. Using these cut off values it was found that CC had highest sensitivity and comparable specificity as of ChC.

DISCUSSION

Anthropometry provides a simple and objective method of the assessment of fetal growth at the time of birth. Some recent studies have documented CC as a better predictor of LBW.[4-8] From observations of the present study, it was evident that calf and ChC had high correlation with BW (0.734 cm and 0.753 cm, respectively).[9] Other anthropometric parameters such as MAC and ChC did not show any significant correlation between with BW as also observed by other authors.[5,9,10]

The predictive power R of the model was 66.5%. When all the six anthropometric parameters were combined, 53.8% of predictive values of model were contributed by CC alone. CC combined with either HC or CC had a predictive power of 64.7% and 62.8%, respectively. A comparable value of R is obtained for two combined variables, namely, ChC and CC, CC, and HC and addition of other parameters did not change the predictive power of the model much. The previous studies had shown cutoff value of 10 cm for CC with a sensitivity of 79%.[8,11] In the present study, a cutoff valve of 8.5 cm for CC showed a specificity of 92.7%.

Thus, we conclude that CC is best simple practical and cost effective alternative to BW but needs to be studied extensively to get the mean values at birth as well as the cutoff value based on which color tapes can be made

to be used by health care workers for identifying LBW babies.

CONCLUSIONS

The parameters studied included MAC, MTC, CC, CHL, HC, ChC, and BW correlation matrix and regression equations were derived which showed that ChC had highest correlation with BW (0.753) followed by CC (0.732) and HC (0.712). Regression analysis of data gave a cutoff value of 8.5 cm for CC for 2500 g of BW which showed 92.7% specificity for identifying low birth rate babies.

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How to cite this article: Virdi VJS, Gupta M. Correlation between Birth Weight and Other Anthropometric Parameters. Int J Sci Stud 2021;8(11):113-115.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Comparison of Various Cuff Inflation Techniques for Microcuff Tubes in Pediatric Patients Undergoing Surgery under General Anesthesia

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Abstract

Background: In pediatric airway management, the primary goal of endotracheal cuff inflation techniques is to create an adequate tracheal seal allowing positive pressure ventilation and decreasing the risk of gastric aspiration without exerting excessive pressure on the tracheal wall. In this study, we assessed the safety and reliability of the sealing pressure of the microcuff pediatric tracheal tube's cuff in the prevention of the post-extubation airway complications compared with the other inflation techniques.

Materials and Methods: 90 pediatric patients of either sex, aged 3–8 years of American Society of Anaesthesiologists physical Status I-II, scheduled for surgeries of <2 h duration, were randomly allocated to Group C (n = 30) in which the patient's tracheal tube cuff was aspirated to the maximum and then inflated with air to attain a cuff pressure of 20 cm of water, Group S (n = 30) in which the patient's tracheal tube cuff was completely aspirated and then inflated with air during the inspiratory phase of mechanical ventilation of the patients to prevent air leak when the peak airway pressure was 20 cm of water and Group F (n = 30) in which the patient's tracheal tube cuff was aspirated completely and then inflated to an adequate pressure using finger estimation. The incidence and severity of post-operative pharyngo-laryngeal morbidity was assessed postoperatively.

Results: Mean cuff pressures and the volume of air needed to fill the cuff were significantly lower in Group S as compared to Group C and Group F. Total incidence of sore throat in the study was 31.11%. Highest incidence was observed in the 4th h. Statistically significant difference was seen when Group C and Group S were compared with Group F (P < 0.05). On comparing Group S and Group F, the incidence of post-operative sore throat was reduced in Group S and was statistically significant at 2, 4, 8, 12, and 24 h postoperatively (P < 0.05). Cough, dysphagia, post-extubation stridor, and hoarseness were also reduced in Group S. Seven out of 30 patients in the control group developed tracheal leak.

Conclusion: We concluded that sealing cuff pressure technique is safer than the other two techniques in preventing post-extubation complications.

Key words: Finger estimation, Microcuff pediatric tracheal tube, Sealing cuff pressure

INTRODUCTION

Before 1940, endotracheal intubations in pediatric population were considered as potentially dangerous and traumatic invasive procedures.[1] In 1960, polyvinyl chloride incorporated uncuffed endotracheal tubes were introduced which have been the standard for tracheal intubation in infants and children ever since. At present, endotracheal intubation is regularly done for critical care management in children for maintenance of oxygenation, for airway protection, pulmonary toileting, and ease of positive pressure ventilation as well as in the conduct of anesthesia.[2]

Pediatric airway management is critical in routine anesthesia practice. One of the more recent changes that have taken place in the clinical practice of pediatric anesthesia has been the transition from the routine use

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www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2020
Month of Publishing : 02-2021

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of uncuffed to cuffed endotracheal tubes but the general use of cuffed tubes in children aged below 8–10 years has been considered inappropriate largely due to the differences in the airway anatomy of adult and pediatric population.[3] The major concern regarding the use of an inflatable cuff in the pediatric population today is the potential risk of tracheal mucosal ischemia due to cuff hyperinflation[4] which can lead to sore throat, loss of cilia in tracheal rings, tracheal mucosa pressure necrosis, scarring, and subglottic stenosis,[5,6] which is the most common cause of post-extubation upper airway obstruction. This resulted in the introduction of microcuff (high-volume and low-pressure cuff) endotracheal tubes in the pediatric population. Cuff pressure monitoring devices have been proven to reliably measure cuff pressures and to prevent hyperinflation in cuffed endotracheal tubes.[7] Microcuff endotracheal tubes vary from the normal cuffed ones in that the cuffs are made of thinner material, fixed closer to the tip of the endotracheal tube and are cylindrical in shape which leads to sealing of the pediatric upper airway at the lower pressures compared with traditional cuffs, thus reducing the risk of ischemic mucosal damage.[8]

In our study, we used three different ways of cuff inflation, that is, endotracheal tube cuff of the patient's in the control group was aspirated as much as possible and then inflated with air to achieve a cuff pressure of 20 cm of water, in the sealing group patient's endotracheal tube cuff was fully aspirated and then inflated with air to prevent air leaks during the inspiratory phase of mechanical ventilation of the patients when the peak airway pressure was 20 cm of water and in the finger group patient's endotracheal tube cuff was aspirated as much as possible and then inflated to a suitable pressure using finger estimation. Hence, in this study, we assessed the safety and reliability of the sealing pressure of the Microcuff pediatric tracheal tube's cuff in the prevention of post-operative pharyngolaryngeal morbidity (post-extubation cough, stridor, sore throat, dysphagia, and hoarseness) compared with the other inflation techniques.

MATERIALS AND METHODS

After approval from Institutional Ethics Committee of Government Medical College Amritsar, a prospective controlled, randomized, double-blinded, comparative study was conducted in a total of 90 children undergoing surgery under general anesthesia of either sex male/female in the age group of 3–8 years of American Society of Anaesthesiologists Grades I or II who needed oro-tracheal intubation for planned controlled ventilation during the elective surgical procedures of up to 2 h. Children having oropharyngeal pathology, suspected difficult intubation or airway anomalies, planned post-operative ventilation in the ICU, a recent attack (within 6 weeks) of the upper respiratory tract infection, and history of bronchial asthma were excluded from the study. Informed consent from parents/guardians of each and every patient enrolled in the study was taken.

Study Design

This was a prospective double-blinded randomized clinical study which included a total of 90 children between the age group of 3–8 years. Sample size was selected after consulting the statistician and taking into account the parameters such as incidence of sore throat, tracheal leak, post-extubation cough, stridor, hoarseness, dysphagia, and also data based on the previous studies to get the power of study >85%. Each group included 30 patients undergoing surgery under general anesthesia using Microcuff pediatric tracheal tubes.

Randomization was done by computer generated randomization number list. The Microcuff was inflated using different techniques by the anesthesiologist who was not a part of the study and post-extubation morbidity was studied by different anesthesiologist; thereby ensuring double blinding.

Technique

GROUP C: Control group (n = 30):

In this group, the patient's tracheal tube cuff was aspirated to the maximum and then inflated with air to attain a cuff pressure of 20 cm of water.

GROUP S: Sealing group (n = 30):

In this group, the patient's tracheal tube cuff was completely aspirated and then inflated with air during the inspiratory phase of mechanical ventilation of the patients to prevent air leaks when the peak airway pressure was 20 cm of water.

GROUP F: Finger group (n = 30):

In this group, the patient's tracheal tube cuff was aspirated completely and then inflated to an adequate pressure using finger estimation [Figure 1].

All the patients received pre-medication with injection (inj.) Glycopyrrolate 0.01 mg/kg intravenously (IV) and inj. fentanyl 2 mg/kg IV before induction of anesthesia and were pre-oxygenated for 3 min (min). Then, the patient was induced with inj. propofol 2.5 mg/kg IV and endotracheal intubation was done by senior anesthesiologist having experience of 3 years after aiding with inj.

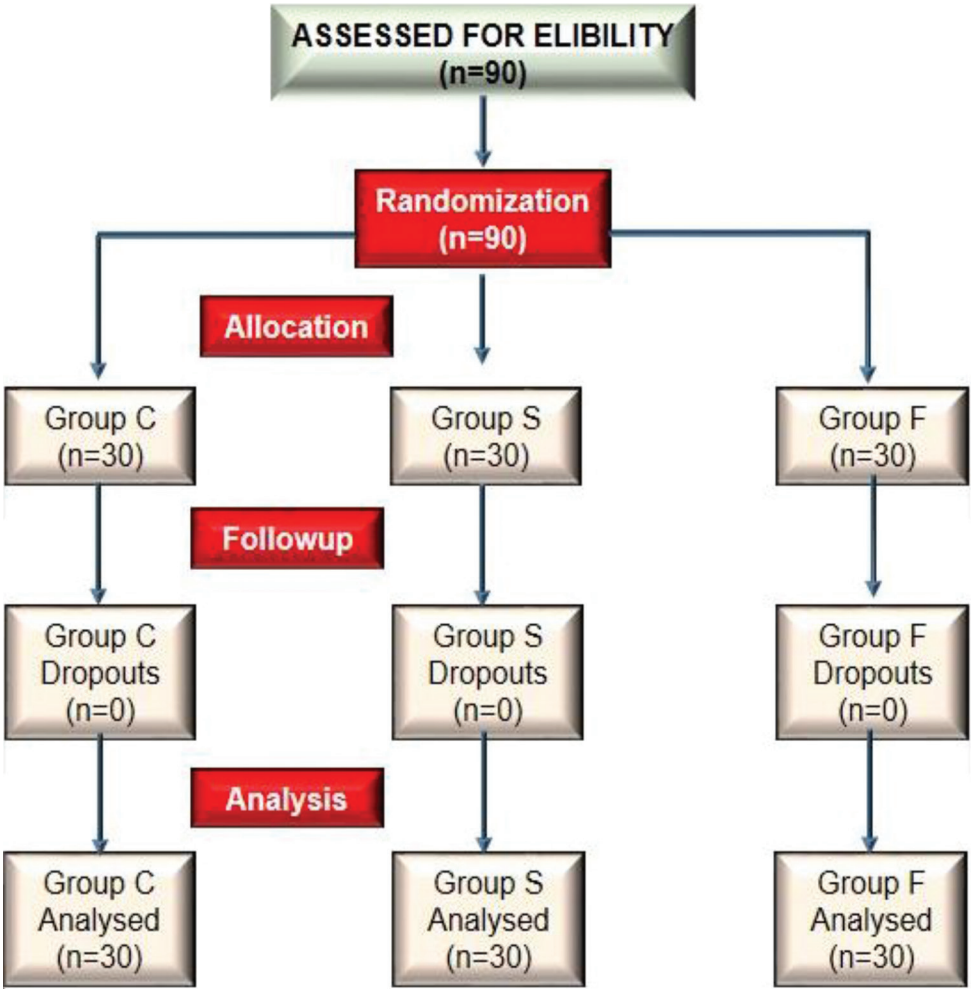


Figure 1: Consort diagram

vecuronium bromide 0.08 mg/kg IV, using oral Microcuff pediatric tracheal tube. The size of the tubes which were used was calculated according to the Khine's *et al*. formula (ID = age/4+3).

The volume of air which was used to fill the cuff as depicted by the cuff pressure was recorded using the hand held cuff pressure gauge in each group. The tracheal leakage was noted both by observing the difference between inspiratory and expiratory tidal volume and by audible technique. Controlled mechanical ventilation was adapted to maintain end-tidal carbon dioxide at 30–35 mm Hg. Maintenance of anesthesia was done with sevoflurane (2% end-tidal), 30% oxygen in the air and with inj. vecuronium bromide 0.01 mg/kg IV. Additional boluses of inj. fentanyl (2 mg/kg/body weight) IV were administered to maintain surgical anesthesia. The patient was ventilated with 100% oxygen after discontinuation of sevoflurane and the pharynx was suctioned gently on completion of surgery. Inj. neostigmine 0.05 mg/kg IV and inj. glycopyrrolate 0.01 mg/kg IV were used to reverse the residual muscle paralysis. The trachea of the patient was extubated after fulfilling the following criteria: (1) Efficient spontaneous respiration and (2) fully awake patient. The duration of laryngoscopy, duration of surgery, and post-extubation stridor (new high pitched inspiratory sound within 1 h of extubation) was recorded. Post-extubation coughing was recorded and graded based on the modified four point scale as follows:

Grade 0 = No cough.
Grade 1 = (Mild) single bout of cough.
Grade 2 = (Moderate) more than one episode of unsustained (≤5 s) coughing.
Grade 3 = (Severe) sustained (>5 s) hours of coughing.

Post-operative sore throat (POST) was graded on a four-point scale (0–3).

0 = No sore throat.
1 = Mild sore throat (complained of sore throat only on asking).
2 = Moderate sore throat (complained of sore throat on his/her own).

3 = Severe sore throat (change of voice or hoarseness, associated with throat pain).

Inj. fentanyl (2 mg/kg/body weight) was used for rescue analgesia when visual analogue scale (VAS) >4 in all the groups. The same blinded anesthesiologist recorded coughing, sore throat, and hoarseness using VAS (VAS: 0–10 cm) at various intervals up to 24 h after tracheal extubation.

We used Aldrete score of nine out of ten for discharge of the patient from recovery room. Aldrete's score also known as post anesthetic discharge scoring system is a medical scoring system that measures the recovery after anesthesia which includes consciousness, respiration, activity, oxygen saturation, and blood circulation (blood pressure) which were observed for 24 h postoperatively.

Statistical Analysis

Raw data were recorded in a Microsoft Excel spread sheet and analyzed using Statistical Package for the Social Sciences (SPSS version 24.00 Armonk, NY: IBM Corp.). The continuous data were presented as mean with standard deviation (mean ± SD). Number of patients and/or percentage of cases expressed as discrete categorical data. Categorical variables were analyzed using Chi-square test. Normally distributed continuous variables were analyzed using independent sample *t*-test. The *P* value was determined finally to evaluate the levels of significance. $P > 0.05$ was considered non-significant, $P = 0.01–0.05$ was considered significant, and $P < 0.001$ was considered highly significant. The results were then analyzed and compared to the previous studies.

RESULTS

Ninety patients were enrolled in the present study in three different groups. No patients were lost in follow-up and excluded from analysis. All the three groups were comparable in terms of demographic parameters.

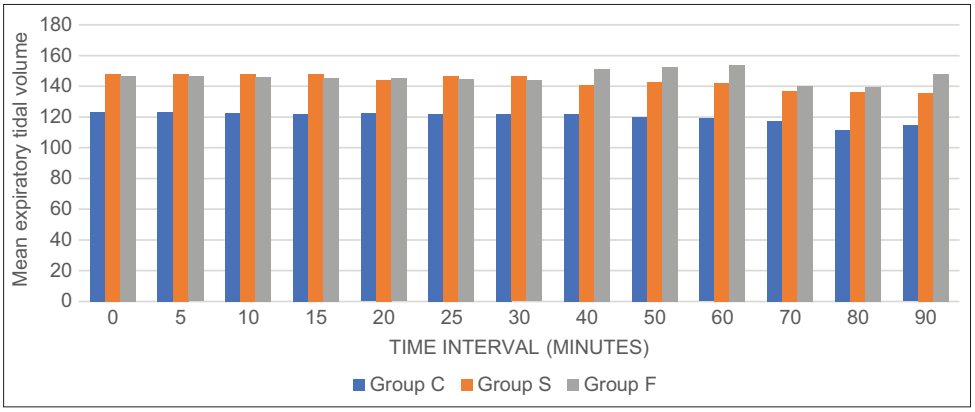
The mean expiratory tidal volume was measured intraoperatively at 0, 5, 10, 15, 20, 25, and 30 min and then at an interval of every 10 min till the end of the surgery. Seven out of 30 patients in the control group developed tracheal leak, that is, incidence of 23.33%. There was zero incidence of tracheal leak in the sealing and the finger group. The difference between mean expiratory tidal volume at all the measured intervals was statistically significant ($P < 0.05$) between Groups C and S, and Groups C and F but was non-significant ($P > 0.05$) between Groups S and F [Graph 1].

The mean cuff pressure that also depicted the volume of air required to fill the cuff was measured intraoperatively at 0, 5, 10, 15, 20, 25, and 30 min and then at an interval of every 10 min till the end of the surgery. The mean cuff pressure and the volume of air to fill the cuff were significantly lower in the Group S as compared to the Group C ($P < 0.05$), whereas their values were significantly high ($P < 0.05$) in the Group F when compared to both the Group C and Group S [Graph 2].

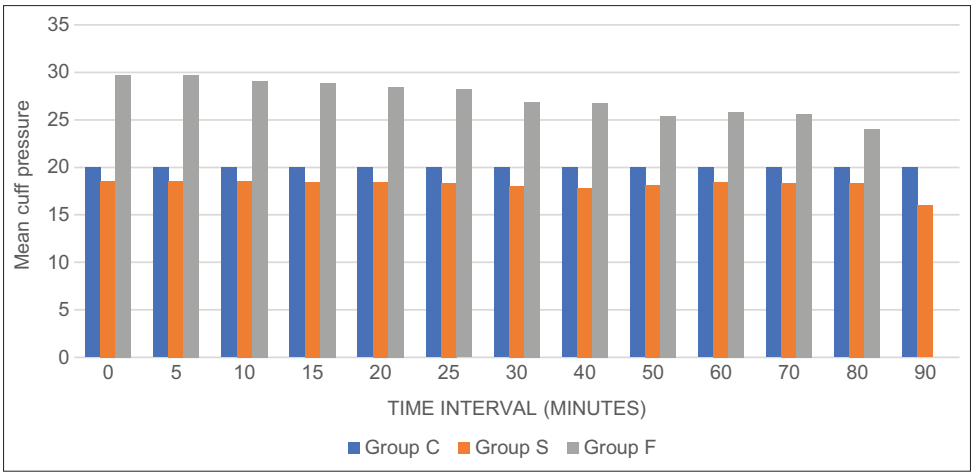
The overall incidence of sore throat was 31.11% (28/90) [Table 1]. The overall incidence of POST was higher in F group than in other groups. In Group F, the incidence of POST was observed to be 46.67% (14/30). In Group C, the incidence of POST was observed to be 23.34% (7/30). In Group S, the incidence of POST was observed to be 16.67% (5/30).

Maximum incidence of POST was observed at 4 h postoperatively in each group. Number of patients with sore throat was significantly higher in F group ($P < 0.05$) as compared to Group C and Group S. The incidence of sore throat in Group C and Group S after extubation was reduced when compared to the F group which was statistically significant ($P < 0.05$).

The intensity of sore throat was evaluated in three groups using VAS. VAS was measured postoperatively for sore



Graph 1: Mean expiratory tidal volume at different time intervals



Graph 2: Mean cuff pressure at different time interval

Table 1: Incidence of POST at different time interval

POST at	Group C		Group S		Group F		Total		*P*-value		
	No.	%	No.	%	No.	%	No.	%	C/S	S/F	C/F
2 h											
0 (Nil)	24	80.00	25	83.33	16	53.33	65	72.22	0.739	0.017	0.027
1 (Mild)	6	20.00	5	16.67	9	30.00	20	22.22			
2 (Moderate)	0	0.00	0	0.00	5	16.67	5	5.56			
3 (Severe)	0	0.00	0	0.00	0	0.00	0	0.00			
4 h											
0 (Nil)	23	76.67	25	83.33	14	46.67	62	68.89	0.768	0.009	0.047
1 (Mild)	5	16.67	4	13.33	9	30.00	18	20.00			
2 (Moderate)	2	6.67	1	3.33	7	23.33	10	11.11			
3 (Severe)	0	0.00	0	0.00	0	0.00	0	0.00			
8 h											
0 (Nil)	25	83.33	26	86.67	16	53.33	67	74.44	0.601	0.010	0.038
1 (Mild)	4	13.33	4	13.33	9	30.00	17	18.89			
2 (Moderate)	1	3.33	0	0.00	5	16.67	6	6.67			
3 (Severe)	0	0.00	0	0.00	0	0.00	0	0.00			
12 h											
0 (Nil)	26	86.67	27	90.00	16	53.33	69	76.67	0.601	0.005	0.019
1 (Mild)	3	10.00	3	10.00	10	33.33	16	17.78			
2 (Moderate)	1	3.33	0	0.00	4	13.33	5	5.56			
3 (Severe)	0	0.00	0	0.00	0	0.00	0	0.00			
24 h											
0 (Nil)	27	90.00	29	96.67	17	56.67	73	81.11	0.301	0.001	0.012
1 (Mild)	3	10.00	1	3.33	11	36.67	15	16.67			
2 (Moderate)	0	0.00	0	0.00	2	6.67	2	2.22			
3 (Severe)	0	0.00	0	0.00	0	0.00	0	0.00			
P value					C/S				NS		
					S/F				S		
					C/F				S		

POST: Post-operative sore throat, S: Significant ($P<0.05$), NS: Non-significant ($P>0.05$), HS: Highly significant ($P<0.001$)

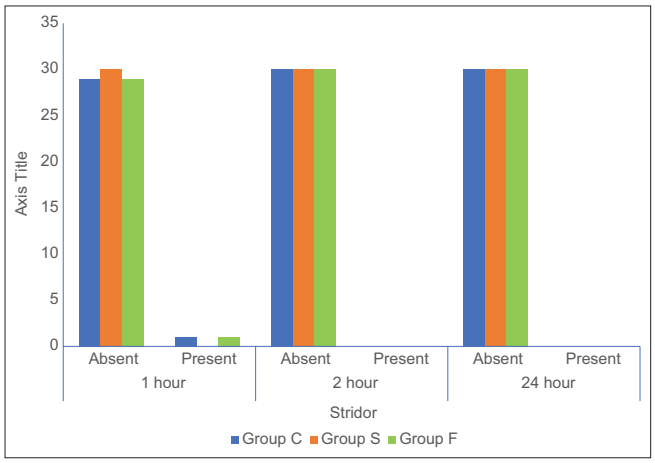
throat at 2, 4, 8, 12, and 24 h [Table 2]. Maximum mean VAS scores were observed at an interval of 4 h postoperatively in all the three groups but being maximum in the finger group. Mean VAS scores were significantly ($P < 0.05$) higher in the F group as compared to the C and S group. On comparing Group S with Group C, VAS score was reduced in Group S and it was statistically non-significant throughout all the time intervals. Inj. Fentanyl (2 mcg/kg) was given as rescue analgesia in all the patients when the VAS >4.

The overall incidence of stridor in the present study was 2.2% (2/90) [Graph 3]. 1 patient each in Group C and Group F developed stridor at 0 h postoperatively, that is, immediately after extubation. There was no patient in the Group S who developed stridor at the same time interval. At 2 and 24 h postoperatively, no stridor was seen in any group. Number of patients with stridor was higher in F and C group as compared to Group S but statistically non-significant ($P > 0.05$).

Table 2: Mean visual analog scale score at different time intervals

Duration	Group C		Group S		Group F		*t*-value			*P*-value		
	Mean	SD (+)	Mean	SD (+)	Mean	SD (+)	C/S	S/F	C/F	C/S	S/F	C/F
2 h	2.00	0.58	1.60	0.55	3.00	1.18	1.04	−3.53	−3.06	0.13	0.01	0.02
4 h	4.00	0.93	3.40	0.55	5.17	1.62	1.37	−4.74	−3.95	0.11	0.01	0.04
8 h	2.20	0.84	2.00	0.82	3.07	0.92	0.51	−3.72	−3.64	0.36	0.03	0.04
12 h	2.00	1.41	2.33	0.58	3.71	1.20	0.18	− 4.18	−4.14	0.36	0.04	0.01
24 h	1.75	1.26	2.00	0.00	2.07	1.14	1.26	−4.07	−3.23	0.32	0.00	0.00
P value					C/S					NS		
					S/F					S		
					C/F					S		

SD: Standard deviation, S: Significant (*P*<0.05), NS: Non-significant (*P*>0.05), HS: Highly significant (*P*<0.001)



Graph 3: Incidence of stridor postoperatively

The incidence of dysphagia for the groups at 2, 4, 8, 12, and 24 h after surgery was maximum at the interval of 4 h postoperatively, being maximum in the F group as compared to Groups C and S but statistically non-significant ($P > 0.05$).

There was a definitive decrease in the incidence of cough in Groups C and S at 2, 4, and 8 h as compared to the Group F. The incidence of cough was maximum at 4 h interval postoperatively in all the three groups. Number of patients with cough was non-significantly higher in F group as compared to Groups C and S. The incidence of cough in Group C and Group S after extubation was reduced when compared to the F group which was statistically non-significant ($P > 0.05$).

There was a definitive decrease in the incidence of hoarseness in Groups C and S at 2, 4, and 8 h as compared to the Group F. Maximum hoarseness was observed at 2 h interval postoperatively in all the three groups. Number of patients with hoarseness was non-significantly higher in F group as compared to Groups C and S. The incidence of hoarseness in Group C and Group S after extubation was reduced when compared to the F group which was statistically non-significant ($P > 0.05$).

DISCUSSION

Endotracheal intubation is an integral part of pediatric anesthetic techniques and pediatric critical care units for airway isolation, protection, and ventilation. The use of cuffed tracheal tubes in children below 8–10 years lead to decreased gas leak around the tracheal tube, improved effectiveness of ventilation, decreased atmospheric pollution, more definitive end-tidal carbon dioxide monitoring, lung function and oxygen consumption testing, decreased risk of aspiration, decreased need to change ill-fitting tracheal tubes, and low flow anesthesia.[9] Nonetheless, there is increased risk of complications such as post-extubation stridor or subglottic stenosis caused by injury to the tracheal mucosa (ulcerations, edema, and circular necrosis of the subglottic region) due to cuff hyperinflation.

All the groups were compared with respect to intraoperative and post-operative hemodynamic parameters, duration and number of attempts of laryngoscopy and these were observed to be statistically non-significant ($P > 0.05$).

In our study, tube exchange rate was zero in all the three groups as the selected tube sizes were adequate in tracheal sealing. Similar results were shown by the Chand *et al.*[10] in 2018, Kutemate *et al.*[11] in 2019, and Wakana *et al.*[12] in 2019 in their study when they used uncuffed and Microcuff endotracheal tubes during surgeries and noticed decreased tube exchange rates with Microcuff endotracheal tubes than uncuffed endotracheal tubes.

The mean inspiratory and expiratory tidal volume was measured in all the three groups at different time till the end of the surgery. Seven patients out of 30 (23.3%) developed tracheal leak around endotracheal tube cuff in the control group as compared to zero patients in the Group S and Group F. This could be explained by the variations in the size and length of the trachea in the pediatric population based on age. This was consistent with the observation by Al-Metwalli and Sadek.[4]

We observed that mean cuff pressures that also represented the volume of air needed to fill the cuff was significantly lower ($P < 0.05$) in the sealing group as compared to the control and finger group. This result has been in accordance with the studies conducted by Al-Metwalli and Sadek[4] and Al-Metwalli *et al*.[13]

Our study shows that low mean cuff pressures are required for effective tracheal sealing with an ultrathin high-volume, low-pressure cuff membrane in Microcuff pediatric tracheal tubes. This is also supported by the studies of Ramachandran *et al*.,[14] Weiss *et al*.,[15] Mhamane *et al*.,[16] and Inada *et al*.[17] who all reported lower mean sealing cuff pressures to achieve the adequate tracheal seal using Microcuff pediatric endotracheal tube.

Sore throat was observed and measured on the scale from 0 to 3 in all the three groups at 2, 4, 8, 12, and 24 h postoperatively. The overall incidence of sore throat in the present study was 31.11% (28/90) and the maximum incidence was reported at 4 h postoperatively as the patients were fully awake at this time interval in all the groups. All the groups exhibited decreased incidence of POST at 8 h, 12 h, and 24 h. Number of patients with sore throat was significantly higher in F group ($P < 0.05$) as compared to Group C and Group S. The reduction in the incidence of sore throat in Group C and Group S after extubation as compared to the F group was statistically significant. This is supported by the studies conducted by Al-Metwalli and Sadek, Al-Metwalli,[4,13] Inada *et al*.[17] and Ramachandran *et al*.[14]

The incidence of hoarseness, cough, dysphagia, and post-extubation stridor was non-significantly higher in the finger group ($P > 0.05$) as compared to the other groups as these symptoms principally correlate with the tracheal intubation and airway management. This finding is in concordance with the studies conducted by Al-Metwalli and Sadek, Al-Metwalli *et al*.,[4,13] Weiss *et al*.,[15] Chand *et al*.,[10] Ramachnadran *et al*.,[14] and Kutemate *et al*.[11]

Strengths of Study

In our study, all the intubations were done by the senior anesthesiologist. We continuously measured the intracuff pressure of endotracheal tube post-operatively, which is considered to be a major risk factor for POST. No patient was excluded from the study which also adds to the plus point of our study.

Limitations of Study

First, children under 3 years of age were not included in our study. Second, Microcuff tubes are more advantageous in children undergoing prolonged surgeries for example cardiac surgeries which were not conducted in our institute. Third, this was a single center study with a small number of patients and thus, the evidence level may be low to allow generalization. To address these issues, a well-structured, prospective randomized study is needed in the future.

CONCLUSION

From our study, we concluded that sealing cuff pressure technique is a safe, reliable, and most effective technique in providing an adequate tracheal seal at much lower cuff pressures as compared to other techniques available and decreasing the incidence and severity of post-extubation cough, stridor, sore throat, dysphagia, and hoarseness in pediatric patients undergoing surgeries under GA with tracheal intubation.

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How to cite this article: Khetarpal R, Sharma A, Kashyap K, Kumar S, Chatrath V. Comparison of various cuff inflation techniques for Microcuff tubes in pediatric patients undergoing surgery under general anesthesia. Int J Sci Stud 2021;8(11):116-123.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Comparative Study of Mesh versus Suture Repair in Less than 3 cm Umbilical Hernia Defect in Adults

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Abstract

Introduction: The use of prosthetic material (mesh) has been advocated for use in recent times for repair of umbilical hernias. The present study was done with the aim to compare the complications and recurrence rates between the mesh repair and suture repair groups in cases of umbilical hernia.

Materials and Methods: This study was done in the Department of General Surgery at Indira Gandhi Institute of Medical sciences, Patna, Bihar, over a period of 2 years in 120 patients. Prior Institutional Ethical Committee approval was also obtained for this study.

Results: Out of 120 patients included in this study, maximum number of patients were males. Male-to-female ratio was 1.7:1. Among the mesh group, 1.67% of patients had recurrence while 8.33% of patients in suture repair group had recurrence. Infection rate was less in mesh repair group as compared to suture repair group (1.67% vs. 5%).

Conclusion: Widely accepted method for ventral hernias is tension-free mesh repair which is accepted globally. Primary suture repair is a type of surgery for umbilical hernia with which most of the surgeons are comfortable with especially for small hernias. Recent articles which have been published worldwide including good RCT suggest mesh repair to be the gold standard repair for all umbilical hernias with defect size measuring 1–3 cm

Key words: Infection, Mesh, Recurrence, Umbilical hernia

INTRODUCTION

Umbilical hernia is primarily a ventral hernia in midline. Among all adults suffering from ventral hernia defect, 14% of those cases account for umbilical hernia. As per the European Hernia Society, any defect of 3 cm above and below the umbilicus is considered as umbilical hernia defect.[1] In most cases, hernia consists of a rigid and fibrotic hernia gap that does not enlarge, but a hernia sac that enlarges substantially. When an umbilical hernia becomes symptomatic with a risk of incarceration, surgical repair is usually required. As per study conducted by various researchers, increasing evidences suggest that the use of prosthetic mesh is a preferable and standard method of hernia repair.[2] Various predisposing factors are there suggesting the development of umbilical hernia. Some of these factors are pregnancy, obesity, ascites, chronic cough, large intra-abdominal tumor, and high work activity such as lifting and carrying heavy loads which cause umbilical hernia due to increased intra-abdominal pressure.[3] Neck of these umbilical hernias is usually narrow which can lead to a lot of complications if not diagnosed or left untreated. There can be varying complications such as strangulation, incarceration, obstruction, skin ulceration, and rupture. As per study done by various researchers in recent years, as far as umbilical hernia of more than 3 cm size is considered, repair with mesh has been considered as the standard repair procedure.[4] However, there has been varying opinion and much debate in umbilical hernia of size <3 cm. A retrospective study of done in 393 patients compared patients with open mesh repair and patients with open primary suture repair and both groups were followed for 30 months but there was no difference of recurrence

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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rate.[5] As per a recent lancet publication which has shed light with reference to small umbilical hernia of diameter between 1 and 4 cm in 300 patients from various hospitals in two groups – mesh and suture repair, there recurrence rate was lower in mesh group as compared to open repair group (4% vs. 11%). As far as evaluation of post-operative pain was considered, chronic pain after mesh repair was a major factor in considering these types of repair.[6] Various literature with regard to mesh repair and placement found out that the recurrence rate and post-operative infection rate of retrorectus and underlay technique were the lowest. Major issues were factors such as post-operative pain, infection rate, and recurrence. Hence, the present study was done with the aim to compare the complications and recurrence rates between the mesh and suture groups after 1 year of follow-up, also to compare the results between mesh placed in sublay and onlay levels, and to evaluate proficiency of materials of mesh used (polypropylene and light weight mesh).

MATERIALS AND METHODS

The present study was done in total of 120 patients who visited Department of General Surgery over a period of 2 years at Indira Gandhi Institute of Medical Sciences, Patna. All patients above 18 years and <65 years were taken up in the study. Patients after clinical diagnosis underwent ultrasonography of whole abdomen to exclude other similar conditions and to assess the defect size and include patients with size of defect <3 cm in diameter. All the eligible participants with primary umbilical hernia of diameter 1–3 cm were randomly assigned 1:1 intraoperatively to either mesh repair or suture repair. Mesh repair was done by light macroporous and polypropylene mesh and suture repair was done using 1–0 Prolene sutures and with interrupted sutures. Details regarding the data and results were recorded separately for both groups of patients. Postoperatively, patients were followed up at regular intervals for the development of complications, if any or recurrence. All results were evaluated by Microsoft Excel sheet and were analyzed by SPSS software.

Table 1: Recurrence rate among mesh and suture repair group

Technique of repair (*n*=120)	Recurrence rate (%)
Mesh repair group (1/60)	1.67
Suture repair group (5/60)	8.33

RESULTS

In the study, 120 patients were enrolled and analyzed with 60 patients in the mesh repair group and 60 patients in the suture repair group. A total number of males were 76 as compared to females whose number was 44 with male-to-female ratio being 1.7:1. Among the mesh group, 1.67% of patients had recurrence while 8.33% of patients in suture repair group had recurrence [Table 1]. This was confirmed by clinical examination and ultrasound of whole abdomen. Most of recurrence in both groups were found when patients were followed after 6 months of repair. Complications that were mainly found were seroma formation, chronic pain, and few cases of superficial surgical site infections [Table 2]. Seroma formation was found in 6.66% of patients in mesh repair group and 3.33% of patients in suture repair group [Figure 1]. Chronic pain was not significant as it was slightly less in mesh group as compared to suture repair group. Furthermore, infection rate was less in mesh repair group as compared to suture repair group (1.67% vs. 5%). On evaluating the mesh group in detail, there was no difference in recurrence rate or complications when results of light macroporous mesh were compared to polypropylene mesh. Further in the mesh repair group, seroma formation was more common in onlay mesh repair when compared to

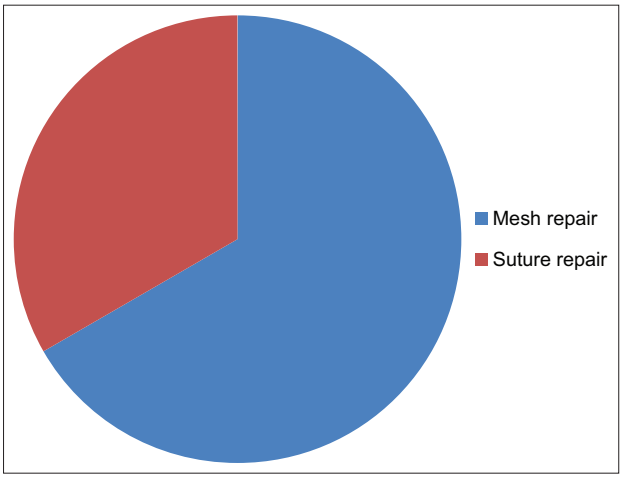

Figure 1: Seroma formation among mesh and suture repair groups

Table 2: Incidence of various post-operative complications in mesh repair and suture repair group

Complications	Mesh repair group *n*=60				Suture repair group *n*=60			
	Total (post-operative till 3-month follow-up)	1-week follow-up (*n*=30)	1-month follow-up (*n*=30)	3-month follow-up (*n*=30)	Total (post-operative till 3-month follow-up)	1-week follow-up (*n*=30)	1-month follow-up (*n*=30)	3-month follow-up (*n*=30)
Pain	4 (6.67%)	4 (6.67%)	0	0	5 (8.33%)	4 (6.67%)	1 (1.67%)	0
Infection	1 (1.67%)	1 (1.67%)	0	0	3 (5%)	3 (5%)	0	0

pre-peritoneal mesh placement. There was no difference in recurrence rate or other complications between these two mesh placement layers in abdominal wall.

DISCUSSION

Incidence of males is higher as compared to females in cases of umbilical hernia which is also evident from the present study.[7] Umbilical hernia repair is important surgical intervention as treatment failure of even smallest of umbilical hernia leads to its recurrence and due to its complications such as strangulation and incarceration.[8] Defect of more than 3 cm is unanimously advocated to be repaired by mesh. In our study, we evaluated patients with defect of <3 cm, mesh repair group had clear advantage in reducing the recurrence rate but this comes a cost of increasing seroma formation. As far as pain is considered, chronic pain at the incision site was treated with oral nonsteroidal anti-inflammatory drugs with reassurance and none complained of the same after 6 months follow-up. Light weight mesh showed no extra benefit over polypropylene mesh in terms of recurrence rates of complications.[9] It only added to additional cost to be beared by the patient After analyzing data of 332 patients from a public database of military veteran patients who were followed up for 8.5 years, the recurrence rate for open mesh repair was 2.4% and it was 9.8% for open suture repair.[10] In another study with 200 patients in two groups, in which primary interrupted suture repair and polypropylene mesh repair was done, recurrence rate was 11% in suture repair compared to 1% with mesh repair.[11] These various data are quite comparable with the present study. Mesh that was placed in pre-peritoneal space had slight advantage over onlay repair in seroma formation or rate of superficial surgical site infections.[12,13] As per data of our study, we advocate the use of mesh in patients with <3 cm defect. Even defect of any size will do well with mesh repair without adding any misery to the patient. Use of polypropylene mesh is equally good when compared to expensive light weight mesh[14] and sublay repair is more favorable than onlay method. There is no adverse consequence of using mesh even if laparotomy is required in future. No complication was serious enough to dissuade its wider use. The repair of umbilical hernia in adults and the optimal methodology of surgery remains controversial,[15] but in recent times, use of mesh has been preferred as the standard treatment and should be done in all cases either by open or laparoscopic technique. Recurrence of these hernias is a major challenge to the operating surgeon. Ascites is one of the well-known factors for recurrence of these hernias. Apart from this, obesity and excessive weight gain in the post-operative phase are also potential risk factor for recurrence.[16]

CONCLUSION

Repair of umbilical hernia is one of the most frequent operations performed worldwide. Mesh repair is being preferred over suture repair with excellent results. Laparoscopic repair of umbilical hernia is also being performed with promising results. Good infection control with suitable antibiotics is a key factor for success of these surgeries.

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How to cite this article: Nitesh, Bhushan V, Pankaj D, Kumar N, Shahi P. Comparative Study of Mesh versus Suture Repair in Less than 3 cm Umbilical Hernia Defect in Adults. Int J Sci Stud 2021;8(11):124-126.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

A Clinical Study on Severity of Ocular Injuries in Orbital Trauma – At a Tertiary Trauma Centre

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Abstract

Background: Orbital fractures are common in facial trauma, with the orbital floor and medial wall commonly affected. The goal of this study is to summarize the evaluation of commonly encountered orbital fractures and their consequent damage to ocular structures.

Materials and Methods: This is an observational hospital-based study for 1 year done in a tertiary trauma referral center. All patients with facial injuries with suspicion of orbital fractures were included in the study. A complete ocular examination was done along with radiological investigation. Orbital fractures classified according to their location and ocular injuries evaluated and recorded.

Results: The study enrolled 82 patients. Orbital trauma was most commonly recorded in males in their 3rd and 4th decades. The most common etiology was road traffic accidents. Severe vision-threatening complications were traumatic optic neuropathy (28%), globe perforation (8%), and retinal detachment (3%). Larger the orbital fracture, the lesser the intraocular injuries and vice versa.

Conclusion: This study was conducted to analyze the severity of ocular injuries due to orbital trauma. It is clear from this study that there is a high probability of associated ocular injuries in patients with orbital fractures. From this study, we conclude that the smaller the orbital fracture, the greater the ocular injuries. The general population can be educated regarding the importance of obeying traffic rules and following safety guidelines.

Key words: Globe perforation, Ocular injury, Orbital fracture, Traumatic optic neuropathy

INTRODUCTION

Trauma to the orbit can cause fractures of the orbital walls and damage to ocular structures. Orbital fractures are a common traumatic condition, more commonly occurring in young men and it has a wide range of clinical outcomes.[1] Complications may vary from mild bruising and temporary diplopia to traumatic optic neuropathy (TON), globe rupture, etc.[1] Hence, our important concern is to diagnose vision-threatening ocular injuries and timely intervention. Most fractures involving orbital walls require only close observation, whereas some require emergency orbital surgery.[1] Majority of facial fracture cases are managed by a trauma team composed of neurosurgeons, ear, nose, and throat surgeon, plastic surgeon, etc. This study emphasizes the importance of an ophthalmologist in the team. The association between facial trauma and ocular damage seems logical unassailable.[2] Recent studies of facial anatomy suggest that the primary function of hard anterior orbital rims and thin orbital walls is to protect the eye from blunt trauma.[3] This may be why the rare incidence of direct injury to the globe than that of orbital fractures.[4]

Routine ophthalmic examination is not feasible in all trauma cases. Severe ocular injuries are easily detected by an emergency physician or facial trauma surgeon, whereas other subtle injuries are often missed.[5] Therefore, the emergency physician's major responsibility is to identify patients requiring specialist ophthalmological assessment. The available evidence of indications for an ophthalmological

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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referral is extensive but also contradictory.[6] The incidence of ocular injuries of any severity in patients with orbital fracture has been reported to range from 2.7% to 90%.[7,8] Various protocols for specialist ophthalmology screening have recommended referral of all orbital fractures or using formal risk scores, or relying on the assessing physician's clinical judgment.[8-10]

Ophthalmic examination for severe ocular injuries may be delayed due to head injury, intoxication, intubation, patient unconsciousness, etc.[11] In view of life-saving procedures, given more importance to such patients with a head injury and facial fractures, the need for ophthalmic examination and management is often neglected.[12] The goal of this study is to summarize the evaluation of commonly encountered orbital fractures and their consequent damage to ocular structures.

Aim and Objectives

The study aims to assess the severity of ocular injuries in relation to orbital trauma in a tertiary trauma referral center.

1. To assess the severity of ocular injuries in relation to orbital fractures
2. To study the spectrum of ocular injuries in orbital fractures.

MATERIALS AND METHODS

This study is an observational hospital-based case series for a period of 1 year conducted in a tertiary trauma care center. All patients presenting in the emergency department with facial injuries of any etiology with suspicion of orbital fractures were included in the study.

Inclusion Criteria

Patients with facial injuries of any etiology with suspicion of orbital fractures were included in the study.

Exclusion Criteria

Patients with a history of defective vision, patients with a history of trauma or surgery in the eye were excluded from the study.

All patients underwent detailed ocular examination involving best corrected visual acuity, color vision using Ishihara's chart, slit lamp examination for anterior segment, pupillary light reflexes, fundus examination, field charting, etc. B scan ultrasonography was done for those with opaque media obscuring the posterior segment visualization. Computed tomography scan and magnetic resonance imaging of the orbit were done depending on the severity of the injury.

RESULTS

A total of 82 patients with facial injuries were enrolled in the study, of which 66 were male and 16 were female [Figure 1].

The mean age of the patients was found to be 29.1 ± 13.9 years (range 17–89 years). Most frequent involved age group was 3rd and 4th decades.

Two wall fractures, category 2 with floor involvement (21), were more commonly observed in the study. Road traffic accident (RTA) was the most common cause of injury observed in the study [Table 1 and Figure 2].

Analyzing the intraocular injuries in orbital trauma patients, it was observed that eight out of 82 had TON (28%), and one patient had retinal detachment (3%). Analyzing the severity of ocular injuries related to the severity of orbital fractures, 23 patients in small fracture group (categories 0, 1, and 2) had ocular injuries compared to only five of the large fracture (categories 3 and 4) group [Figures 3 and 4].

In this study, severe vision-threatening complications observed were TON (28%), globe perforation (8%), and retinal detachment (3%). Hematoma or periocular

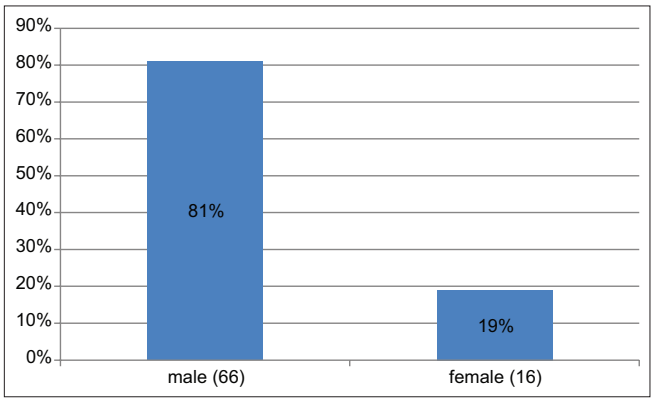

Figure 1: Distribution of gender

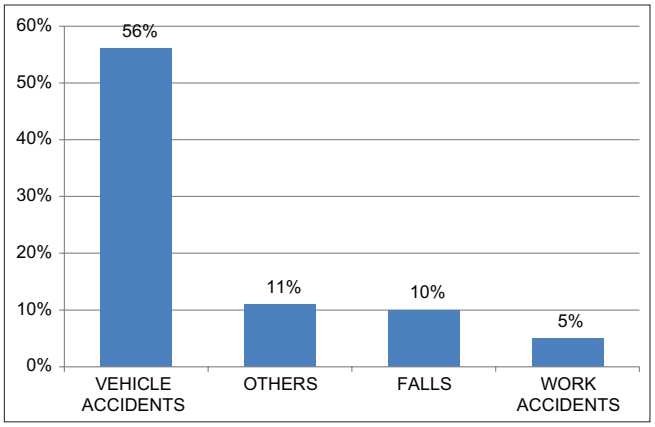

Figure 2: Distribution of etiology

Table 1: Distribution of Fractures

Category	*n* (%)	Most common wall involved	Most common mode of injury
Category 0	3 (3)	-	Assault (2)
Category 1	20 (24)	Floor (9)	RTA (7)
Category 2	36 (46)	Floor (21)	RTA (27)
Category 3	17 (20)	Lateral (10)	RTA (9)
Category 4	6 (7)	–	RTA (6)

RTA: Road traffic accidents

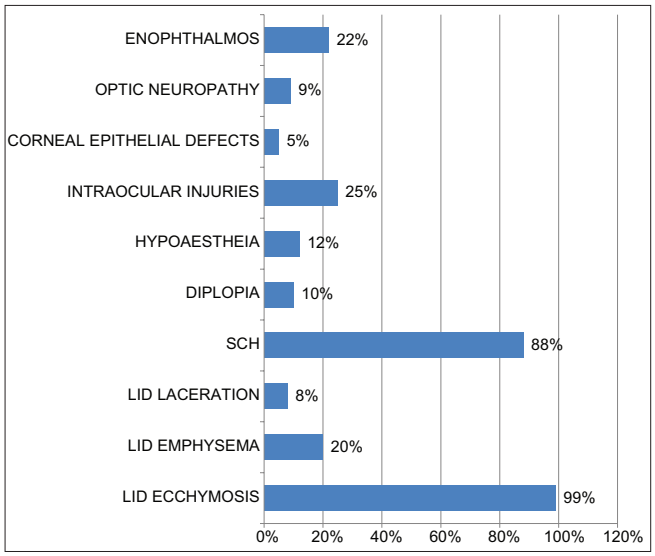

Figure 3: Spectrum of occular injuries

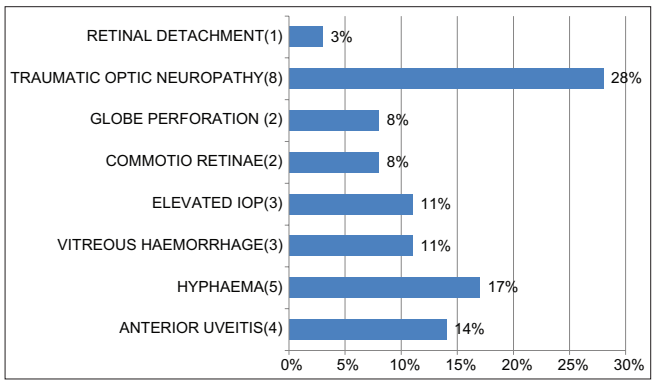

Figure 4: Prevalence of intraocular injuries

ecchymosis and edema is the most common manifestation of blunt injury to the eyelid. Retinal detachment occurred due to combined floor, roof, and lateral wall fractures Globe perforation was observed in 2 cases one in category 0 and the other in category 1, revealing that ocular injury is more severe in small fractures.

DISCUSSION

Orbital trauma associated with intraocular and periocular pathologies causes significant visual loss and debility. A hematoma or periocular ecchymosis and edema is the most common manifestation of blunt injury to the eyelid. It is easier to examine the globe before lids become edematous. Orbital roof fracture is suspected if periorbital ecchymosis is associated with subconjunctival hemorrhage without a visible posterior limit.[13] Basal skull fracture may give rise to characteristic bilateral ring hematomas (panda eyes). The effects of blunt trauma include stretching of limbal tissues, equatorial scleral expansion, posterior displacement of the lens iris diaphragm, consequent tearing of tissues in anterior chamber angle, and intraocular bleeding.

It results in lid laceration, corneal abrasion, tears in Descemet membrane, hyphema, transient miosis, traumatic mydriasis, vossius ring on the anterior lens capsule, iridodialysis, hypotony due to occult open injury (or) ciliary body shutdown (or) glaucoma associated with angle recession, cataract formation (rosette-shaped), subluxation, dislocation of the lens due to rupture of zonular fibers, globe rupture, vitreous hemorrage, commotion retinae, choroidal rupture, retinal breaks, retinal dialysis, retinal detachment secondary to giant tear, macular hole. TON, optic nerve avulsion, etc.[13]

The proposed mechanisms for blowout fractures in orbit are hydraulic theory, which states that any blunt trauma to orbit with an object larger than the aperture of orbit causes raised intraorbital pressure, which is transmitted to the globe, causing retropulsion of globe, it is then transmitted to orbital walls and decompressing fracture occurs in the weakest part of orbital floor, medial to the infraorbital canal which gives way leading to herniation of orbital soft tissues into the maxillary sinus. Buckling theory states that direct trauma to the rigid inferior orbital rim transmits force posteriorly, creating a compression fracture of the orbital floor.[14] TON occurs with sudden vision loss. It can be direct, due to damage from displaced bone fragments, a projectile or indirect in which forces transmitted secondarily to the nerve by shearing force (acceleration of nerve at the optic canal where it is tethered to dural sheath through rupture of microvascular supply).[14] Penetrating injuries are 3 times more common in males than females.[13] They typically occur in the younger age group (15–34 years). The most frequent causes are assault, RTA, and sports. The appropriate use of protective eyewear can prevent serious eye trauma.

In this study, the most common etiology for orbital trauma is RTA. The most common orbital wall fractured is the floor of the orbit, comparable with He *et al.* report. However, some studies reported that medial wall fractures are more common than floor fracture. This study revealed that most common intraocular pathologies are optic neuropathies, anterior uveitis and hyphema following orbital trauma.[15] Intraocular injuries

were found to be more prevalent in small sized fractures than in large sized fractures. Kreidl *et al.* reported that intraocular injuries were more frequent in patients with severe orbital trauma without orbital fractures (58.9%).[16]

Interestingly, in our study, we found less ocular injuries accompanying larger orbital fractures, attributed to the protective role of orbital fractures. It shows the importance of buckling mechanism in large fracture. This is comparable with Stephanie *et al.* study.[15]

CONCLUSION

This study concludes that the risk of ocular injury in orbital trauma is stratified by the degree of orbital wall involvement. Various intraocular injuries occur due to orbital fractures.

Major ocular injuries are uncommon in severe fractures. It is mandatory to perform a detailed ophthalmic examination in all patients with a head injury and facial injury, suspicious orbital fractures for timely management of vision-threatening ocular injuries. This study emphasizes the important role of ophthalmologist in the trauma team.

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How to cite this article: Anuradha TR, Beena R, Stefi T, Anandan H. A Clinical Study on Severity of Ocular Injuries in Orbital Trauma – At a Tertiary Trauma Centre. Int J Sci Stud 2021;8(11):127-130.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Comparison of Intrathecal Ropivacaine and Dexmedetomidine Adjuvant to Ropivacaine in Inguinal Hernia Surgeries

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Abstract

Introduction: Adjuvants used with local anesthetic agents can improve anesthesia quality by prolonging the blockade and post-operative analgesia duration. Dexmedetomidine is a newer α2 agonist that is shown to improve the anesthetic agent's efficacy and improves post-operative pain.

Objective: The objective of the study was to compare the clinical characteristics of intrathecal anesthesia performed with ropivacaine and ropivacaine with dexmedetomidine and evaluates the synergistic effect between dexmedetomidine and ropivacaine in intrathecal anesthesia.

Materials and Methods: Forty male patients selected for elective hernia surgery were assigned into two groups, Group R, who received 0.75% Isobaric Ropivacaine 3 ml + 0.5 ml normal saline and Group RD, who received 0.75% Isobaric Ropivacaine 3 ml + 5 mcg Dexmedetomidine in 0.5 ml normal saline. Pulse rate (PR), systolic blood pressure (SBP), and diastolic blood pressure (DBP) at baseline and after administration of the anesthetic agent were recorded, and the duration of onset of anesthesia and the total duration of the blockade were recorded.

Results: The mean age of the patients in the groups was 51.26 years and 49.48 years, respectively. The PR was significantly high in Group RD at 8 h, and significant SBP and DBP differences were observed between the two groups. The mean time of onset of sensory and motor blockade was shorter in Group RD. A prolonged duration of the block was also observed in Group RD. A decrease in the occurrence of side effects was also observed in the dexmedetomidine group.

Conclusion: Ropivacaine is a newer ideal, safe anesthetic of choice for intrathecal use in inguinal hernia surgery cases and by adding dexmedetomidine, we get prolongation of analgesia.

Key words: Dexmedetomidine, Hernioplasty, Inguinal hernia, Intrathecal ropivacaine, Ropivacaine

INTRODUCTION

Spinal anesthesia (intrathecal block), also called a subarachnoid block, is one of the most commonly used anesthetic techniques. Regional anesthesia is the priority in most procedures and the intrathecal block is preferred in lower abdominal and lower limb surgeries.[1] Bupivacaine and lignocaine have been the anesthetic agents of choice for decades, but bupivacaine's cardiotoxicity is almost impossible to treat. The prolonged motor block is another drawback associated with bupivacaine. This led to the emergence of newer anesthetic agents like ropivacaine which was released in 1996. Ropivacaine was launched recently in India and is available only as isobaric solution. Ropivacaine is effective in epidural and nerve plexus blocks and has a high therapeutic index in humans. It is also less cardiotoxic than bupivacaine.[2]

Drugs like dexmedetomidine are used for sedation and can improve the duration and quality of anesthesia. Other agents such as α2 adrenergic agonists, ketamine, midazolam, and adrenaline can be added with local

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www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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anesthetics to potentiate the anesthetic agent's effect.[3] Animal studies have proved that dexmedetomidine can be used as adjuvants with local anesthetics, reducing the need for opioid analgesics. Dexmedetomidine is a selective α2 agonist and acts by decreasing sympathetic outflow and norepinephrine release. This produces sedative, analgesic, and hemodynamic effects.[4] Recent studies have demonstrated the synergistic interactions between dexmedetomidine and local anesthetics. The important feature of dexmedetomidine is the lack of opioid-related side effects such as respiratory depression, pruritus, nausea, and vomiting. However, it produces hypotension and bradycardia, which is manageable[5,6] comp study. When added to ropivacaine, dexmedetomidine was found to have prolonged post-operative analgesia with minimal side effects.[7,8] Systemic administration of the combination also enhanced spinal and epidural anesthesia by prolonging the duration of the blockade. Apart from this, dexmedetomidine is also shown to improve the onset of anesthesia and decrease local anesthetic dose.[9]

Very few studies have been conducted so far using dexmedetomidine as an adjuvant with ropivacaine. This prospective comparative study was conducted to explore the clinical characteristics of intrathecal anesthesia performed with ropivacaine and ropivacaine with dexmedetomidine and evaluates the synergistic effect between the combinations.

Objective

The objective of the study was to compare the clinical characteristics of intrathecal anesthesia performed with ropivacaine and ropivacaine with dexmedetomidine and evaluates the synergistic effect between dexmedetomidine and ropivacaine in intrathecal anesthesia.

MATERIALS AND METHODS

This prospective comparative study was conducted in the Department of Anesthesia, — Government Medical College, Pudukkottai. The study included 40 male patients who were undergoing surgery for inguinal hernia. The study procedure was explained in detail to the patients, and they were allocated into two groups of 20 each. Group R (n = 20) included patients administered with intrathecal ropivacaine alone, and Group RD (n = 20) included patients administered with intrathecal ropivacaine and dexmedetomidine. Only male patients between the age group of 30–60 years, with weight 40–65 kg, and with American Society of Anesthesiologists (ASA) I and ASA II physical status scheduled for elective inguinal hernioplasty under intrathecal anesthesia were included in the study. Patients with ASA III or greater physical status, age >60 years, allergy to local anesthetic agents, patients with comorbid conditions such as hypertension, hepatic or renal impairment and cardiac diseases, coagulopathy, those on β-blockers, long-term analgesic therapy, and patients on drugs which are known to interact with study drugs were excluded from the study.

Spinal Administration of Drug Mixture

Group R patients were administered with 0.75% Isobaric Ropivacaine 3 ml + 0.5 ml normal saline, and Group RD patients were administered with 0.75% Isobaric Ropivacaine 3 ml + 5 mcg dexmedetomidine in 0.5 ml normal saline.

RESULTS

The 40 study patients were randomly allotted to Group R and Group RD, consisting of 20 patients in each group. All the 40 patients were males, and 34 patients belonged to ASA I physical status while six patients belonged to ASA II. The patients' mean age was 51.26 ± 3.48 years in Group R and 49.48 ± 4.21 years in Group RD, respectively [Figure 1].

Pulse rate (PR) variables at baseline in both the groups were not statistically significant (P = 0.663). The mean PR in Group R was 82.23/min, and in Group RD was 81.24/min. No statistically significant changes were observed in the systolic blood pressure (SBP) and diastolic blood pressure (DBP) between the two groups at baseline. The mean SBP in Group R was 119.2mm/Hg, and in Group RD was 118.24 mm/Hg with a P = 0.696. The mean DBP was 75.24 in Group R and 76.21 in Group RD with a P = 0.448, which is statistically insignificant [Figure 2].

There were no changes in PR until 15 min, after which a slight fall in PR was observed in Group RD, which was statistically insignificant. After 4 h, a significant reduction in PR and bradycardia was observed in Group RD patients with $P < 0.0001$. A significant increase in PR was observed

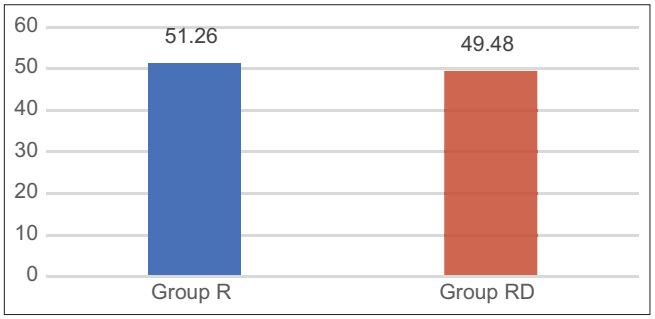

Figure 1: Mean age of patients in both the groups

after 8 h in the RD group, which could be explained due to the effect of dexmedetomidine [Figure 3].

Similarly, significant changes in SBP and DBP were also observed after 4 h in Group RD patients. The SBP was significantly high in the RD group at 4 h ($P < 0.0001$) and 8 h ($P < 0.05$), and the DBP was also significantly high in the RD group at 4 h ($P < 0.001$) and after 8 h ($P < 0.05$) of anesthesia administration [Figures 4 and 5].

Figure 6 shows the sensory level in Group R and Group RD patients. Decreased pain and temperature sensations below the T 7 level was observed in five patients in Group R and 8 patients in Group RD. However, this difference is not statistically significant ($P = 0.311$).

The mean time required for the onset of sensory and motor blocks is shown in Figure 7. The onset of sensory block in Group R was 7.64 min and in Group RD was 5.41 min with $P = 0.005$, which is significant. The mean time required for the onset of motor block is 9.28 min in Group R and 4.96 min in Group RD with $P = 0.001$, which is also statistically significant. This shows that ropivacaine with dexmedetomidine are associated with faster onset of anesthesia.

Group R patients required rescue analgesia after 228.4 min of surgery, while Group RD patients required rescue analgesia after 412.2 min post surgically. $P < 0.0001$ is highly significant. Ropivacaine with dexmedetomidine combination is associated with significant long lasting post-operative anesthetic effect [Figure 8].

The duration of sensory and motor blocks was also significantly high in the RD group with a $P < 0.0001$,

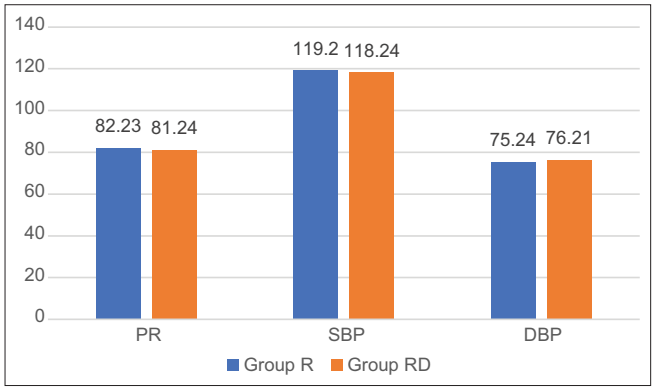

Figure 2: Baseline mean pulse rate, systolic and diastolic blood pressure in Group R and Group RD

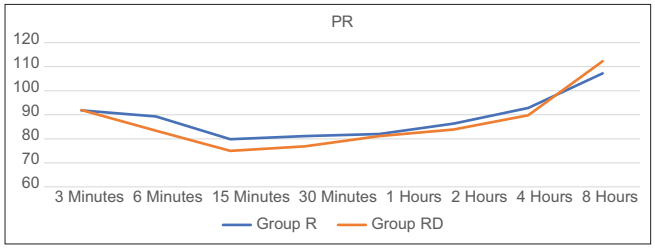

Figure 3: The pulse rate of patients in Group R and Group RD

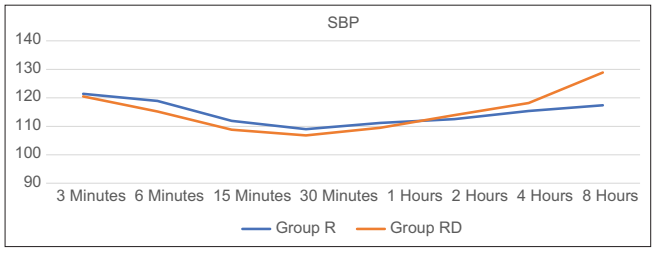

Figure 4: The systolic blood pressure of patients in both the groups

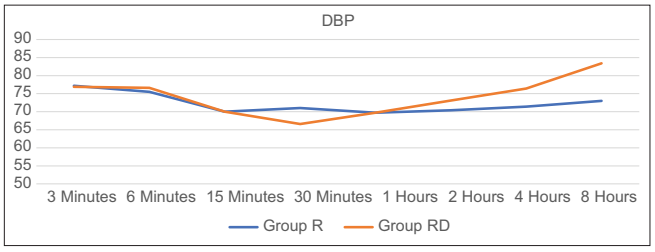

Figure 5: The diastolic blood pressure of patients in both the groups

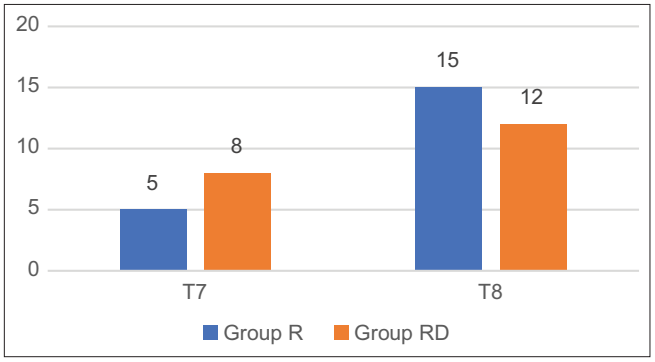

Figure 6: Sensory level in both the study groups

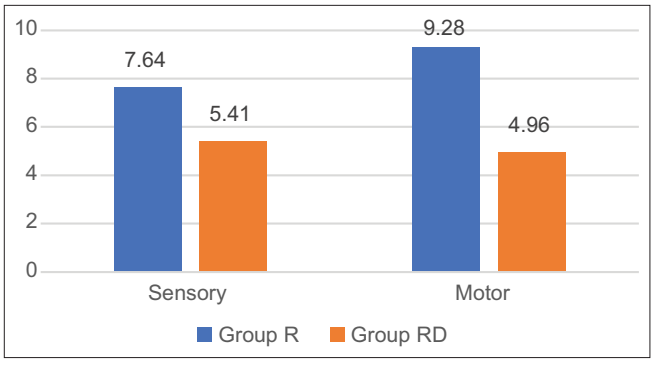

Figure 7: Mean time of onsets of sensory and motor blocks in both the groups

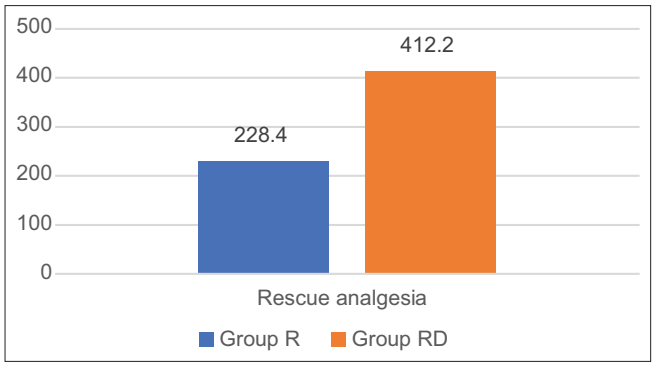

Figure 8: Rescue analgesia

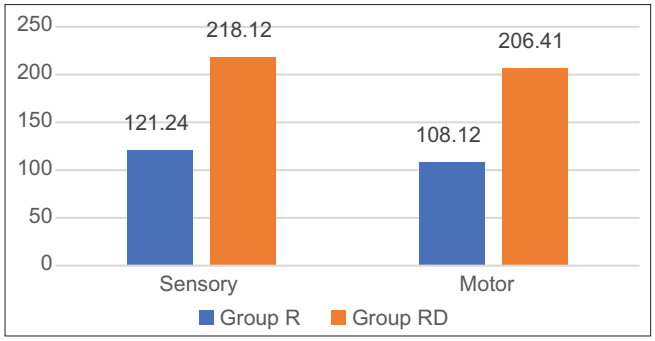

Figure 9: Block duration in minutes

showing that ropivacaine with dexmedetomidine is superior to ropivacaine alone [Figure 9].

Not much adverse effects were observed except for one case each of nausea, vomiting in both the groups and one case of hypotension and dry mouth in Group R.

DISCUSSION

An intrathecal block is an effective and frequently used technique that provides effective anesthesia to the lower limbs and lower abdomen. Inguinal hernioplasty is associated with increased post-operative pain and discomfort that may increase hospital stay and complications. An effective anesthesia and analgesia are therefore imperative to overcome this situation.[5] Increased use of opioid analgesics and NSAIDs is also associated with risk of gastrointestinal complications and sedation. An ideal anesthetic agent that serves as analgesic and prolonged anesthetic does not exist, but the addition of certain drugs can synergize the effect of a local anesthetic agent. Dexmedetomidine is one such agent, which when used in combination with ropivacaine is found to prolong the anesthesia duration and reduce the need for additional analgesics.[6]

In this study, we attempted to evaluate the clinical effects of intrathecal administration of dexmedetomidine with ropivacaine and found that there exists some synergistic interaction between the two drugs. Dexmedetomidine is also devoid of opioid side effects but may produce sedation, bradycardia, and hypotension, which was also confirmed by our study. The hemodynamic parameters were comparable between the two groups in our study. There were no significant associations between the PR, SBP, and DBP at baseline. After anesthetic administration, no significant changes were observed in PR until 15 min in both the groups, after which a fall in PR was observed in Group RD. At 4 h, a significant reduction in PR was seen in the RD group with $P < 0.0001$. The mean SBP and DBP were significantly higher in the RD group when compared with the R group in our study at the 4th h, but the levels were not above the baseline values and did not require any active treatment. Kalso *et al.* also studied the synergistic effect of dexmedetomidine with ropivacaine and found no hemodynamic instability due to drug association.[10]

A maximum sensory level of T7-T8 was observed in both the groups in our study, and there was no statistically significant difference between the two groups. Pratibha *et al.* observed the highest level of sensory block achieved was T5-T6 in the dexmedetomidine group.[11] The mean time of onset of sensory block in Group R was 7.64 min, and in Group RD was 5.41 min with $P = 0.005$, which is significant. The mean time required for the onset of motor block is 9.28 min in Group R and 4.96 min in Group RD with $P = 0.001$, which is also statistically significant. This shows that ropivacaine with dexmedetomidine combination is associated with faster onset of anesthesia. Our results regarding the onset of sensory block are similar with the reports made by Hogue *et al.*[12]

These results are consistent with the study findings of Thimmappa *et al.* who also observed that the mean time to onset of sensory block to T10 dermatome was 8.90 ± 0.99 min in dexmedetomidine group and 12.33 ± 1.56 min in ropivacaine group ($P < 0.001$).[13]

The duration of the sensory and motor blocks was also significantly high in the RD group (Sensory-218.12 min and motor-206.41 min) with $P < 0.0001$ in this study. This finding is supported by Fukushima K *et al*, who also found that the post-operative analgesia was increased when adding dexmedetomidine 2 μg/kg with 0.5% bupivacaine for epidural anesthesia in patients undergoing a hysterectomy.[14] Kaur *et al.* observed in his study that the total duration of sensory block in dexmedetomidine group (535.18 ± 19.85 min) was significantly prolonged as compared to ropivacaine group (375.20 ± 15.97 min, $P = 0.000$).[15] Brown *et al.* also obtained a total duration of sensory block of 333 ± 54 min, using 20 ml of 0.5% ropivacaine which is comparable with the findings of the present study. The

Table 1: Adverse effects

Adverse effects	Group R	Group RD
Nausea vomiting	1	1
Hypotension	1	0
Dry mouth	1	0

need for rescue analgesia was also prolonged in the RD group (412.2 min) when compared to that of the R group (228.4 min). The prolongation of motor block may be the result of binding α2-adrenergic agonists to the motor neurons in the spinal dorsal horn, resulting in profound analgesic properties.[16]

The incidence of adverse effects was also less in the RD group in our study, Table 1. Like any other study, our study also has its limitations. The pain assessment based on VAS was not done and hence patient perspective of pain is unknown. The level of sedation was also not assessed in our study which limits its findings. The small sample size is another study limitation. Further studies addressing these limitations must be conducted to assess the analgesic effects of dexmedetomidine in extensive surgeries.

CONCLUSION

Ropivacaine is a newer ideal, safe anesthetic of choice for intrathecal use in inguinal hernia surgery cases and by adding dexmedetomidine we get prolongation of analgesia. Ropivacaine with dexmedetomidine also causes quick onset of sensory and motor blockade and prolongs the need for rescue anesthesia without altering the hemodynamic variables.

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How to cite this article: Ravindran K, Kulandayan S. Comparison of Intrathecal Ropivacaine and Dexmedetomidine Adjuvant to Ropivacaine in Inguinal Hernia Surgeries. Int J Sci Stud 2021;8(11):131-135.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Comparison of Angle of Deviations Measured From Synoptophore and Prism Cover Test in Horizontal Deviations

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Abstract

Introduction: While the synoptophore is primarily an instrument for the investigation of binocular visual functions, prism cover test (PCT) is the most frequently used method to measure the angle of deviation in patients with strabismus. Since the important clinical decisions are taken based on the angle of deviation of squint, these readings must be accurate.

Aim: This study compares the angle of deviations measured from synoptophore with PCT in patients with horizontal deviations.

Methods: Data from 32 patients (n = 32) were retrospectively collected and analyzed. Subjects who had horizontal deviations were included in the study. Subjects who had vertical deviations were excluded from the study. The angle of deviation was measured with both synoptophore and PCT. Mean and standard deviations of the angle of deviations measured from both methods were found. A paired t-test was done to compare the measurements of the angle of deviations from both methods.

Results: Out of 32 subjects, 17 were male and 15 were female with a mean age of 10 ranging from 6 to 13 years. About 72% of the population had a congenital squint, at least 61% of the population had normal birth weight. About 40% of the children had esotropia and 60% had exotropia. About 22% had nystagmus. About 12% of the children were amblyopic. Paired sample t-test showed P = 0.259, indicating that there is no statistically significant difference between both the methods of measuring the angle of deviation. The mean value of angle of deviation from PCT for 32 subjects was –6.50 ▲ ± 36.35 ▲ and the mean value of angle of deviation measured from synoptophore was –5.53 ▲ ± 35.61 ▲.

Conclusion: Although synoptophore overestimates the convergence and underestimates the divergence, there is no statistically significant difference between synoptophore and PCT.

Key words: Prism cover test, Prisms, Squint, Strabismus, Synoptophore

INTRODUCTION

While the synoptophore is primarily an instrument for the investigation of binocular visual functions, it can also measure strabismic deviations. It is essentially a refined stereoscope set for distance fixation and accommodative demand is eliminated by the presentation of the targets in the focal plane of a +6.5 diopter lens. It has long been advocated, however, that the accuracy of the device is affected by the artificial viewing conditions it provides and the patient's awareness of its proximity, which results in an increase in the angle in esotropia and a decrease in exotropia.[1,2] There is a disadvantage of synoptophore in that its over-convergence is usually attributed to proximal convergence and called "instrument" or "machine" convergence.

The alternate prism cover test (PCT) is the most frequently used method to measure the angle of deviation in patients with strabismus, but it can only be used when both eyes have sufficient vision for fixation. Hence, we would like to compare both the methods of measurement of the angle of deviation.[3]

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

Corresponding Author: Dr. Lional Raj, Department of Ophthalmology, Dr. Agarwal's Eye Hospital, Tirunelveli, Tamil Nadu, India.

It is very important to calculate the angle of deviation accurately before giving any treatment, especially before squint surgery. The only recourse for the ophthalmic surgeon aiming to restore or establish alignment of the visual axes lies in changing the position of the peripheral muscle ends relative to the ocular globe. To this end, the surgeon determines the clinical data (the parameter or parameters) on which the surgical strategy is to be based.[4] Hence, the exact squint measurement is very important before squint surgery.[5]

MATERIAL AND METHODS

This retrospective study was conducted patients with horizontal deviations in the tertiary ophthalmic hospital at Tirunelveli. Data from 32 patients (n = 32) were retrospectively collected and analyzed. There were 13 esotropes and 21 esotropes, each having no vertical deviation. All had constant deviations for distance fixation and were included regardless of their primary, consecutive, or residual nature. The subjects who had ocular disease other than squint were excluded from the study. Subjects who had vertical deviations were excluded from the study. The angle of deviation was measured with both synoptophore and PCT. A PCT measurement was taken at a 6 m fixation distance in the primary position. These were performed in the usual way by one examiner (Examiner I) on the same visit. The patients wore their prescribed refractive correction and accommodation was controlled using a small Snellen optotype for fixation, or detailed foveal simultaneous perception slides with the synoptophore. With both methods, care was taken to not allow binocular interaction during the measurements.[4,6,7]

There was another examiner who was there to hold the stack prisms so that the measuring examiner does an accurate measurement. The patient's age, gender, and birth history were extracted from the medical records. The birth history included the weight of the child at the time of the birth, consanguinity among parents, congenital or acquired squint, the birth was normal, or cesarean was noted from the records. Visual acuity, diagnosis, and the type of squint were noted. The angle of deviation measured using synoptophore and PCT was noted. The mean and standard deviation of angle measurements measured from synoptophore and PCT was found. Statistical significance was tested using a paired sample t-test with the angle measurements measured from synoptophore and PCT.

RESULTS

A total of 32 subjects were included in this study. Seventeen are male and 15 were female with a mean age of 10 ranging from 6 to 13 years. The distribution of the number of subjects in the different age groups is listed in Table 1.

In this study out of 32 strabismus children, 11 children (61%) had birth weight ranging between 2 kg and 3 kg. The distribution of birth weight is mentioned in the following table. For others, the data of birth weight are not available [Figure 1, Table 2].

Out of 32 children, for 23 children, the squint was noted at birth only [Figure 2]. Out of 32 children, 9 children were born with cesarean delivery [Figure 3].

The mean value of the absolute value of angle of deviation from PCT for 32 subjects was 35.63 ▲ ± 8.50 ▲ and the mean value of the absolute value of angle of deviation measured from synoptophore was 34.22 ▲ ± 9.55 ▲.

Comparison of angle measurements from synoptophore and PCT was done using paired sample t-test that showed $P = 0.095$, indicating that there is no statistically significant difference between both methods of measuring the angle of deviation.

When we apply the negative sign for exodeviations and the positive sign for esodeviations, the mean value angle of deviations is mentioned, as shown in Tables 3 and 4.

Table 1: Age distribution

Age	No. of patients
1–5	0
5–10	15
10–15	17

Table 2: Birth weight

Birth weight (kg)	No. of patients
1–2	4
2–3	11
3–4	3

Table 3: Distribution of diagnosis

Diagnosis	No. of patients	%
Esotropia	13	40.6
Exotropia	19	59.4

Table 4: Pair *t*-test

Group	Mean in prisms	*n*	Standard deviation	*P*-value
Pair 1				
PCT reading	–6.50	32	36.35	0.259
Synoptophore reading	–5.53	32	35.61	

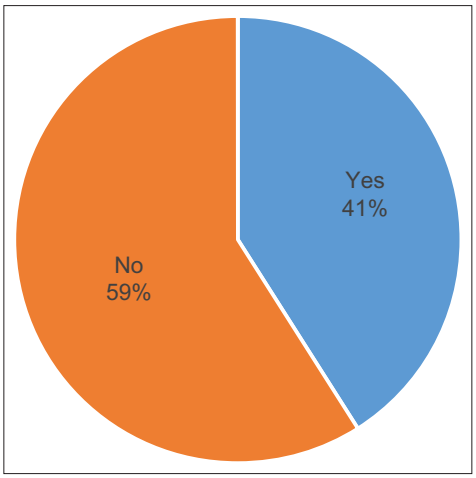

Figure 1: Consanguinity in marriage, out of 32 strabismus children, 13 children were in the group of consanguinity marriage

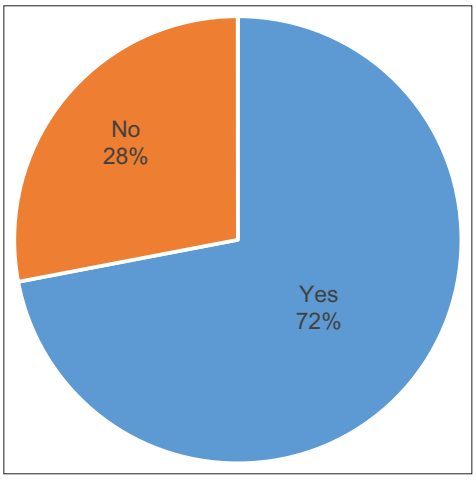

Figure 2: Congenital versus acquired squint, out of 32 children, 23 (72% of the population) had a congenital squint

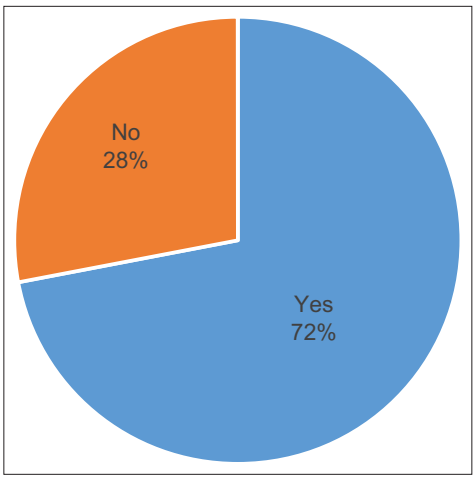

Figure 3: Normal versus cesarean delivery, 40% of the children had esotropia and 60% had exotropia. About 22% had nystagmus. About 12% of the children were amblyopic

DISCUSSION

In individuals with normal binocular function, visual feedback ensures accurate fixation on targets so that the eyes maintain a state of nearly perfect alignment. In strabismus, the inability to fuse images means that one eye is not directed at a target. Without a target, the deviated eye is more unstable in position than the fixating eye. Numerous studies have documented the variability of ocular misalignment in strabismus. It is very important that the angle of deviation is to be measured accurately.[3,8-12]

It is expected that the synoptophore overestimates the convergence and underestimates the divergence. Certainly, a (psycho) physiological basis for the phenomenon of over convergence at the synoptophore remains vague and questionable. In light of the results in the present study, the author contends that instrument convergence is not a consistent nor relevant clinical entity. Indeed, there is little support for the largely anecdotal reports that the synoptophore exaggerates the angle in ET and understates it in exotropia. This is not necessarily the case at all. Allowing for the accepted error margin of objective clinical measurement, it was found that over-convergence with the synoptophore by comparison with the PCT was just as likely to occur as under-convergence. Furthermore, it is notable that the variability between the two measurement methods was not greater than the interexaminer variability for the PCT. It would have been ideal to have Examiner 2 also perform measurements using the synoptophore so that interexaminer reliability for both tests and intertest reliability for both examiners could have been compared in more detail.[11]

The results that we see in our study are in line with the results of the study by Georgievski *et al.* We have also noticed that the synoptophore overestimates the esodeviations and underestimates the exodeviations as we shown in Table 4.

CONCLUSION

Valid measurements of both esotropia and exotropia can be obtained using both the synoptophore and PCT. Although synoptophore overestimates the convergence and underestimates the divergence, there is no statistically significant difference between synoptophore and PCT.

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How to cite this article: Anandan H, Raj L, Dhanisha JL, Ali JM, Abraham J. Comparison of Angle of Deviations Measured From Synoptophore and Prism Cover Test in Horizontal Deviations. Int J Sci Stud 2021;8(11):136-139.

Source of Support: Nil, **Conflicts of Interest:** None declared.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Effect of Occlusion Therapy in Amblyopia Patients – A Prospective Study

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Abstract

Introduction: Occlusion therapy is given to amblyopic children, which are expected to improve visual acuity. Even the visually evoked responses returned to normal after occlusion therapy. Here, we present the data taken in the South Indian population on occlusion therapy in amblyopia.

Aim: Our study aims to find the effect of occlusion therapy on the visual acuity of amblyopic subjects.

Methods: Data from 67 patients (n = 32) were retrospectively collected and analyzed. Subjects who were diagnosed to have amblyopia during worth four dot test were included in the study. The subjects who did not follow the occlusion therapy were excluded from the study. Subjects who had any other ocular disease other than amblyopia were excluded from the study. Any amblyopia was included in the study (refractive, stimulus deprivation, or strabismic amblyopia). Mean and standard deviations of the visual acuity were before and after the therapy was found. A paired t-test was done to compare the pre- and post-therapy log minimum angle of resolution visual acuities.

Results: Out of 67 subjects, 25 were male and 42 were female with a mean age of 9 ranging from 4 to 15 years. About 34% of the population had congenital amblyopia. About 46% had the other sibling with a similar diagnosis. About 85.8% had good visual improvement after the occlusion therapy.

Conclusion: Although, in conclusion, occlusion treatment (full time, part time, or minimal) is an effective method for the therapy of strabismic, strabismic-anisometropic, and anisometropic amblyopia; the level of initial visual acuity, age at initiation of treatment, and type of occlusion predict the final visual outcome. The initial visual acuity is the most significant factor determining the success of treatment in amblyopia.

Key words: Prism cover test, Prisms, Squint, Strabismus, Synoptophore

INTRODUCTION

The effectiveness of full-time occlusion therapy has been investigated in various studies.[1-4] It has been proved that it effectively improves the visual acuity in cases of amblyopia due to strabismus or anisometropia or both. Older patients have lasting improvement with or without maintenance patching.[5] A review study done by Antonio-Santos *et al.* found no evidence on the effectiveness of any treatment for stimulus deprivation amblyopia. They suggest that future randomized controlled trials are needed to evaluate the safety and effectiveness of occlusion, duration of treatment, level of vision that can be realistically achieved, effects of age at onset and magnitude of visual defect, optimum occlusion regimen, and factors associated with satisfactory and unsatisfactory outcomes with the use of various interventions for stimulus deprivation amblyopia.[1] It is also observed that there is poor understanding from parents and hence there was poor compliance. A study done by Newsham who proved that providing parental knowledge in key areas such as the critical period, the importance of occlusion improved patient compliance. Hence, we understand the importance of occlusion in

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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improving visual acuity.[4] The duration of occlusion is also very important. The full-time occlusion may lead to the occlusion amblyopia in the good eye. Studies proved that the occlusion amblyopia occurred at all ages.[3] Hence, the data on the number of hours off occlusion is required to correctly advocate the hours of occlusion. In our study, we would like to present the effect of occlusion on the visual acuity of amblyopic subjects. There is enough evidence that occlusion therapy improves visual acuity. Even the visually evoked responses returned to normal after occlusion therapy. Here, we present the data taken in the South Indian population on the improvement of visual acuity.[6]

Hence, our study aims to find the effect of occlusion therapy on the visual acuity of amblyopic subjects.

MATERIALS AND METHODS

This retrospective study was conducted in the tertiary care hospital. Data from 67 patients ($n = 67$) were retrospectively collected and analyzed. Subjects who were diagnosed to have amblyopia during worth four dot test were included in the study. The subjects who did not follow the occlusion therapy were excluded from the study. Subjects who had any other ocular disease other than amblyopia were excluded from the study. Any type of amblyopia was included in the study (refractive, stimulus deprivation, or strabismic amblyopia).

Amblyopia is defined as the reduction of best-corrected visual acuity of one or both eyes that cannot be attributed exclusively to a structural abnormality of the eye.[7] The amblyopia was confirmed with worth four dot test. If the patient saw two or three lights in worth four dot test and the corresponding eye that failed to see the color of the other lights was considered to be the amblyopic eye.[8]

The data were extracted from the electronic medical records. The number of hours of patching was noted and the number of days of occlusion therapy was noted. The visual acuity values before and after the occlusion therapy were noted. The patients wore the appropriate correction for the amblyopic eye while the good eye was occluded. The visual acuity values were converted into the logarithm of the minimum angle of resolution (MAR). The eye which received the treatment was noted.

Visual acuity was tested using Snellen's visual acuity chart. The visual acuity was tested by hiding the other optotypes to control the crowding phenomenon. The number of subjects using spectacles was noted. The number of subjects who had their siblings with a similar diagnosis was noted. The visual acuity values before and after the occlusion therapy were compared. Statistical significance was tested using a paired sample *t*-test with the visual acuity values before and after treatment was done.

RESULTS

A total of 67 subjects were included in this study. Twenty-five were male and 42 were female with a mean age of 9 ranging from 4 to 15 years.

The distribution of the number of subjects in the different age groups is listed in Table 1.

In this study, out of 67 amblyopic children, 31 children (46%) had the other sibling with a similar diagnosis. The number of hours of patching is listed in Table 2.

Congenital versus acquired amblyopia, out of 67 children, 23 (34% of the population) had congenital amblyopia [Figure 1]. In most cases, vision improved significantly. The vision improved in 115 eyes out of 134 eyes [Figure 2].

Improvement in vision after occlusion therapy was quantified using the log MAR scale. Mean log MAR value at pre-treatment was 0.64 (0.29 SD) and post-treatment was 0.25 (0.23 SD). Paired *t*-test showed $P < 0.001$ indicating a significant improvement in visual acuity with occlusion therapy, as shown in Table 3.

DISCUSSION

In the largest series of strabismic and anisometropic amblyopes, Hiscox *et al.* reported the visual outcome of

Table 1: Age distribution

Age	No. of patients
1–5	6
5–10	36
10–15	25

Table 2: Birth weight

Hours	No. of subjects
2–3	18
3–4	6
4–6	43

Table 3: Vision in log MAR pre- and post-treatment

Occlusion therapy	Log MAR		*P*-value
	Mean	SD	
Pre-treatment	0.64	0.29	<0.001
Post-treatment	0.25	0.23	

MAR: Minimum angle of resolution

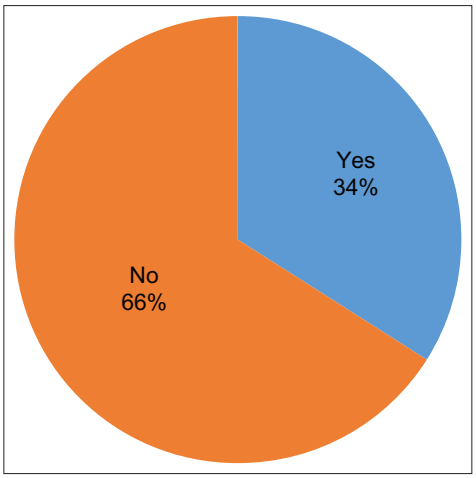

Figure 1: Distribution of Congenital amblyopia

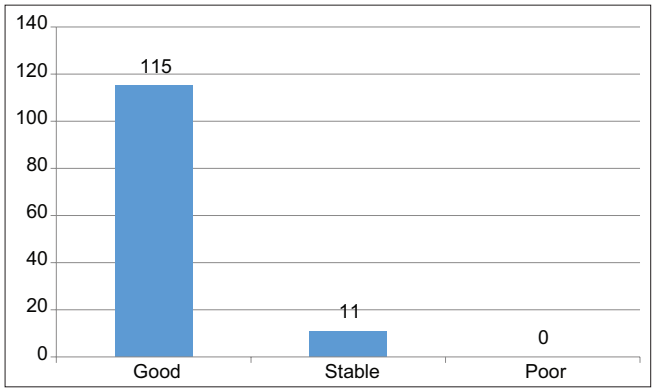

Figure 2: Vision improvement

894 patients in seven centers. In this retrospective study, 48% of the patients achieved a visual acuity of 0.7 or better.[9] Hiscox *et al.* reported the visual outcome of 368 patients and 37% of their patients achieved a visual acuity of 0.7 or better.[9] Beardsell *et al.* reported a better success rate (73%).[10] In a literature review, Flynn *et al.* evaluated the results of 23 studies published between 1965 and 1998.[11] In this study, success was defined as visual acuity of 20/40 or better at the end of the treatment and 85.8% of the patients achieved this. A study by Newsham reported compliance which was found to be an important factor associated with a successful outcome of occlusion therapy.[12] In our retrospective study, we evaluated adherence to therapy using parental daily diaries and we included only the patients who came to the appointments and who did occlusion therapy.

CONCLUSION

Occlusion treatment (full time, part time, or minimal) is an effective method for strabismic, strabismic-anisometropic, and anisometropic therapy amblyopia; the level of initial visual acuity, age at initiation of treatment, and type of occlusion predict the final visual outcome. The initial visual acuity is the most significant factor determining the success of treatment in amblyopia.

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How to cite this article: Anandan H, Raj L, Ali JM, Dhanisha JL, Abraham J. Effect of Occlusion Therapy in Amblyopia Patients – A Prospective Study. Int J Sci Stud 2021;8(11):140-142.

Source of Support: Nil, **Conflicts of Interest:** None declared.

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Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Clinical and Endoscopic Study of Dysphagia: A Prospective Study at a Tertiary Care Centre

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Abstract

Introduction: Swallowing is a complex motor reflex requiring coordination among the neurologic system, the oropharynx, and the esophagus. Several disorders, both benign and malignant, interfere with the swallowing process and cause dysphagia.

Aim: The aim of the study was to study the clinical and endoscopic evaluation of various pathological conditions leading to dysphagia.

Materials and Methods: Patients presenting with a history of dysphagia to the Outpatient Department of Medical Gastroenterology, Thoothukudi Medical College, Thoothukudi, were included in the study. The study was conducted from August 2019 to July 2020, during which period 210 cases of dysphagia were evaluated.

Results: A total of 210 patients were subjected to the upper GI endoscopy. There were 130 males and 80 females. The final diagnosis was carcinoma esophagus in 78, Carcinoma gastroesophageal junction in 9, Carcinoma pharynx in 7, Benign stricture in 33, Cricopharyngeal web in 20, Candida esophagitis in 14, and Achalasia cardia in 12 and 32 with normal findings.

Conclusion: Upper gastrointestinal (GI) endoscopy is a safe and effective way to evaluate dysphagia and has diagnostic and therapeutic value. The evaluation of dysphagia remains incomplete without upper GI endoscopy, which should be considered earliest, especially in the elderly having dysphagia.

Key words: Dysphagia, Swallowing, Upper gastrointestinal endoscopy

INTRODUCTION

Swallowing is a complex motor reflex requiring coordination among the neurologic system, the oropharynx, and the esophagus. Several disorders, both benign and malignant, interfere with the swallowing process, and cause dysphagia.

Dysphagia, or impaired swallowing, becomes more common as the population ages.[1] Evidence suggests that about 10% of the general population aged 50 years or older have swallowing problems,.[1] Still, the prevalence may be as high as 40% among patients residing in homes for the aged[2] and 64% of older people in short-term care.[3] Persons with dysphagia have an increased risk of developing other medical conditions and becoming socially isolated,[4] which impacts the quality of life and contributes to health-care costs.[5] Therefore, early identification and treatment of persons at risk for complications due to dysphagia are of paramount importance.

The diagnosis and subsequent treatment of dysphagia is important because of the associated morbidity and mortality. Untreated dysphagia can lead to dehydration, malnutrition, respiratory infections, and death. The elderly with dysphagia symptoms is at increased risk of dysphagia complications, including aspiration pneumonia. Several studies have identified the elderly as being at risk for the development of dysphagia.[6,7]

Classifying dysphagia as oropharyngeal or esophageal and obstructive or neuromuscular symptom complexes leads to a successful diagnosis in 80–85% of patients. Based on the patient history and physical examination, barium esophagogram and gastroesophageal endoscopy

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Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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can confirm the diagnosis. Special studies and consultation with subspecialists can confirm difficult diagnosis and help guide treatment strategies.

Fiber optic endoscopic evaluation of swallowing is well tolerated. It is easy to perform. It is, nevertheless, an endoscopic examination that can result in easily controlled complications such as discomfort, gagging, vomiting, vasovagal syncope, anterior or posterior epistaxis or even dramatic, though rare, and complications such as laryngospasm.[8]

Aim

The aim of the study was to study the clinical and endoscopic evaluation of various pathological conditions leading to dysphagia.

MATERIALS AND METHODS

Patients presenting with a history of dysphagia to the Outpatient Department of medical gastroenterology, Thoothukudi Medical College, Thoothukudi, were included in the study. The study was conducted from August 2019 to July 2020, during which period 210 cases of dysphagia were evaluated. Informed consent was obtained from all the patients. Those patients who were not willing for informed consent and upper gastrointestinal (GI) scopy were excluded from this study. Patients were evaluated for dysphagia with history, clinical examination, and upper GI endoscopy. Barium swallow study and endoscopic biopsy with the histopathological study were done when required. Esophageal manometry was performed in suspected cases of motility disorders of the esophagus. All the data were analyzed using simple statistical mean, average, percentage, and standard deviation.

RESULTS

Out of 210 consecutive patients, 120 (57.14%) were male, and 90 (42.85%) were female with a male:female ratio of 1.3:1. The mean age of patients was 56.4 ± 14.4 years. The detailed demographic characteristics of the patients are given in Table 1. The highest number of cases (44.28%) was seen in the 61–80 years age group, followed by 41–60 age groups (28.59%). Clinically significant weight loss was seen in 67.61% of patients.

Among the total patients evaluated, 45% (94 patients) had a malignant etiology, and 55% (116 patients) had a benign etiology for dysphagia. Carcinoma esophagus was the most common cause of dysphagia in our study, accounting for 37.14% (78), followed by functional dysphagia, corrosive stricture, and the least common cause is an esophageal ring and pill esophagitis [Table 2].

Table 1: Clinical characteristics

Clinical characteristics	Frequency (%)
Age in years	
0–20	6.19
21–40	19.52
41–60	28.59
61–80	44.28
81–100	1.43
Gender	
Male	57.14
Female	42.85
Clinical characteristics	
Mean duration of symptoms in months	3
Dysphagia to solids	43.8
Dysphagia to both solids and liquids	56.2
Nasal regurgitation	5.71
Weight loss	67.61
H/O corrosive ingestion	13.33

Based on site majority had carcinoma in the lower one-third of the esophagus (18.09), followed by middle (11.42) and upper (7.61). Nine patients had OG junction growth, and seven patients had in the pharynx [Table 3].

Based on the etiology of stricture, 28 patients had corrosive stricture, three patients had peptic stricture, and two patients had pill esophagitis [Table 4].

DISCUSSION

Good clinical and endoscopy information is a fundamental part of "adequacy," which strongly affects how a biopsy should be read. However, the precise diagnosis becomes more certain on histopathological examination. The most common indications for gastric biopsy are detecting various gastritis and evidence of *Helicobacter pylori* status, gastric ulcers, and different tumors.[9]

Malignant tumors of the upper GI tract (esophagus and stomach) account for 13,300 deaths and approximately 16,600 new cases each year in the UK.[10] These tumors usually have a long natural history and may present at a fairly advanced stage. Nevertheless, patients with these tumors exhibit important alarm symptoms, for example, dysphagia, dyspepsia, chronic GI bleeding, progressive unintentional weight loss, progressive difficulty in swallowing, persistent vomiting, iron deficiency anemia or epigastric mass that warrant further clinical investigations.

From our data, it was observed that the carcinoma cases were more in males than females. Many earlier studies have stated that esophageal cancer is 4 times more common and slightly more lethal in men than in women.[11] Puhakka and Aitsalo, Malik *et al.*, reported a high ratio of males for this cancer as compared to females.[12,13]

Table 2: Etiology of dysphagia

Etiology of dysphagia	No. of pts (%)
Ca esophagus	78 (37.14)
Functional dysphagia	32 (15.23)
Corrosive stricture	28 (13.33)
Cricopharyngeal web	20 (9.52)
Candidal esophagitis	14 (6.66)
Achalasia cardia	12 (5.71)
OG junction growth	9 (4.28)
Ca pharynx	7 (3.33)
Peptic stricture	3 (1.42)
FB esophagus	3 (1.42)
Esophageal ring	2 (0.95)
Pill esophagitis	2 (0.95)

Table 3: Profile of malignant lesions

Site of cancer	No. of pts (%)
Ca esophagus	78 (37.14)
Upper1/3	16 (7.61)
Middle 1/3	24 (11.42)
Lower 1/3	38 (18.09)
OG junction growth	9 (4.28)
Ca pharynx	7 (3.33)
Oropharynx	2 (2,38)
Hypopharynx	5 (2.38)

Table 4: Profile of benign stricture

Etiology of stricture	No. of pts (%)
Corrosive stricture	28 (13.33)
Acid	20 (9.52)
Alkali	8 (3.80)
Peptic stricture	3 (1.42)
Pill esophagitis	2 (0.95)

In our study group, the patients in the age group 61–80 showed the maximum carcinoma incidence.

Shil *et al*.[14] observed that esophageal carcinoma was seen in the sixth (51–60 years) decade of life followed by the seventh and fifth decades. Population-based data reveal that the esophageal cancer incidence peaks in the sixth decade as in most parts of the world.

In our study group, the majority had squamous cell carcinoma (SCC) of the esophagus. SCC is the predominant histologic type of esophageal cancer worldwide.[15] Cherian *et al*., 2007, also stated in their study that SCC was the most common malignancy, seen in 912 (92%) patients.[16]

In a study by Nagai *et al*., 2014, the accuracy of endoscopic diagnosis and biopsy diagnosis was 91.0% (101/111) and 85.6% (95/111) in case of esophageal carcinoma.[17]

Patients with malignant tumors of the upper GI tract tumors exhibit important alarm symptoms such as dysphagia that warrant clinical investigations. In our study subjects, 43.8% were having difficulty swallowing solid foods, while 56.2% were having solid and liquid swallowing difficulty. No cases with dysphagia to liquids alone were noted in our study. Dysphagia that occurs equally with solids and liquids often involves an esophageal motility problem. In the study by Wilkins *et al*., of the patients who reported dysphagia, 49.0% reported problems swallowing with solids only, 6.3% with liquids only, and 44.7% with both solids and liquids.[18]

CONCLUSION

Dysphagia may be associated with serious underlying disorders such as esophageal or gastric carcinoma. The evaluation of dysphagia remains incomplete without upper GI endoscopy, which should be considered earliest, especially in the elderly having dysphagia of medium to long-term duration to diagnose the treatable conditions such as reflux esophagitis or esophageal carcinoma at an early stage. Upper GI endoscopy is a safe and effective way to evaluate dysphagia and has diagnostic and therapeutic value.

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How to cite this article: Sekaran RS, Reddy RKC. Clinical and Endoscopic Study of Dysphagia: A Prospective Study at a Tertiary Care Centre. Int J Sci Stud 2021;8(11):143-146.

Source of Support: Nil; **Conflicts of Interest:** None.

Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Study of Clinical Profile of Coronavirus Disease-19 Infected Patients in South Tamil Nadu: A Retrospective Study

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Abstract

Introduction: The disease has imposed a huge burden on health resources. The World Health Organization declared Coronavirus disease 2019 (COVID-19) a global pandemic on March 11, 2020. Illness ranges in severity from asymptomatic or mild-to-severe; a significant proportion of patients with clinically evident infection develop severe disease.

Aim: This study aimed to analyze the clinical profile of COVID patients.

Materials and Methods: A total of 100 consecutive patients with confirmed COVID-19 infection admitted to the hospital were enrolled. The diagnosis of severe acute respiratory syndrome coronavirus 2 infection was confirmed by reverse transcription-polymerase chain reaction on the throat and nasopharyngeal swabs. Oral consent was obtained from patients. Results were analyzed statistically and discussed below.

Results: Out of 100 patients, 69 were male, and 31 were female. Based on age group, nine patients were age below 40 years, 18 were between 41 and 50 years, 29 were between 51 and 60 years, 27 patients were between 61 and 70 years, and 17 patients had age above 70 years. The majority of the patients had systolic blood pressure >120, and 70 patients had diastolic blood pressure between 71 and 80 mm/hg. Fifty-four patients had heart rate between 61 and 100 rates/min, 51 patients had spo2 >96. C-reactive protein and lactate dehydrogenase values are abnormal for 98 patients. Sixty-eight patients did not need oxygen therapy, and 78 patients did not need ventilation.

Conclusions: In our study, the main clinical presentation was cough, fever, and breathlessness. The most common associated comorbidity was diabetes mellitus, followed by hypertension.

Key words: Clinical profile, Coronavirus disease 2019, Mortality

INTRODUCTION

In December 2019, a case of pneumonia of unknown origin was reported in Hubei Province, China.[1] The causative pathogen, isolated from human airway epithelial cells, was found to be a novel enveloped betacoronavirus,[2] now known as severe acute respiratory syndrome corona virus-2 (SARS-CoV2). The disease was named Coronavirus disease 2019 (COVID-19). Although it shares phylogenetic similarity with SARS-CoV, it is the seventh member of the family of Coronaviridae to infect humans.[3] Given the rapid spread of COVID-19 and the steep rise in morbidity and mortality it caused, the World Health Organization declared it as a pandemic on March 11, 2020.[1,4-6]

The etiological agent, the SARS-CoV, is believed to be an animal virus that crossed the species barrier to humans recently when ecological changes or changes in human behaviour increased opportunities for human exposure to the virus and virus adaptation, enabling human-to-human transmission.

The clinical features of COVID-19 are varied, ranging from an asymptomatic state to acute respiratory distress syndrome (ARDS) and multi-organ dysfunction. The common clinical features include fever (not in all), cough, sore throat, headache,

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www.ijss-sn.com

Month of Submission : 12-2020
Month of Peer Review : 12-2020
Month of Acceptance : 01-2021
Month of Publishing : 02-2021

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fatigue, headache, myalgia, and breathlessness. Conjunctivitis has also been described. Thus, they are indistinguishable from other respiratory infections. In a subset of patients, by the end of the 1st week, the disease can progress to pneumonia, respiratory failure, and death. This progression is associated with an extreme rise in inflammatory cytokines including Interleukin (IL2), IL7, IL10, Granulocyte colony-stimulating factor, IP10, MCP1, MIP1A, and Tumor necrosis factor α.[5]

The median time from onset of symptoms to dyspnea was 5 days, hospitalization 7 days, and ARDS 8 days. The need for intensive care admission was in 25–30% of affected patients in published series. Complications witnessed included acute lung injury, ARDS, shock, and acute kidney injury. Recovery started in the 2nd or 3rd week. The median duration of hospital stays in those who recovered was 10 days. Adverse outcomes and death are common in the elderly and those with underlying comorbidities (50–75% of fatal cases). The fatality rate in hospitalized adult patients ranged from 4% to 11%. The overall case fatality rate is estimated to range between 2% and 3%.[7]

Aim

This study aimed to analyze the clinical profile of COVID patients.

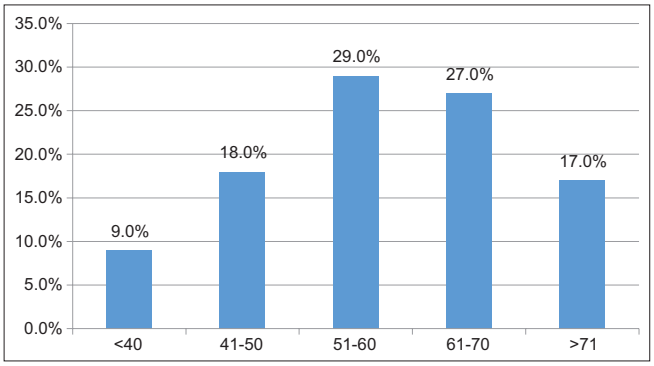

Figure 1: Age distribution

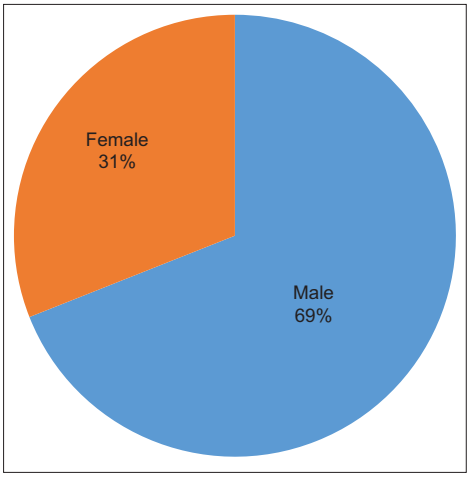

Figure 2: Gender distribution

MATERIALS AND METHODS

A total of 100 consecutive patients with confirmed COVID-19 infection admitted to the hospital were enrolled. The diagnosis of SARS-CoV-2 infection was confirmed by Reverse transcription-polymerase chain reaction on the throat and nasopharyngeal swabs. Oral consent was obtained from patients. Various factors such as demographics, presenting symptoms, comorbidities, intensive care unit admission, oxygen requirement, and ventilator therapy were studied. The signs and symptoms included those seen in influenza-like illness,[8] pneumonia (chest pain, dyspnea, wheezing, lower chest wall indrawing, history of tuberculosis), gastroenteritis (nausea, vomiting, abdominal pain, and diarrhea), ear pain, altered consciousness, and seizures. The comorbidities included hypertension (HTN), diabetes with and without complications, obesity, chronic kidney disease, moderate or severe liver disease, asthma, chronic pulmonary disease other than asthma, and chronic cardiac disease including congenital anomalies but excluding HTN.

The information recorded included demographic data, medical history, exposure history, underlying comorbidities, symptoms, signs, laboratory findings, chest computed tomographic (CT) scans, and treatment measures (antiviral therapy, anti-retroviral therapy, antimalarial therapy, and

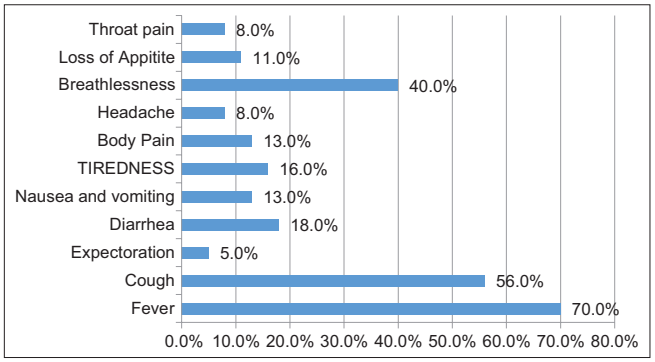

Figure 3: Symptoms

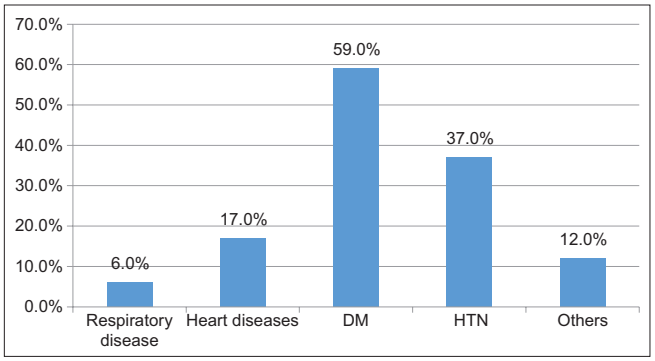

Figure 4: Comorbidities

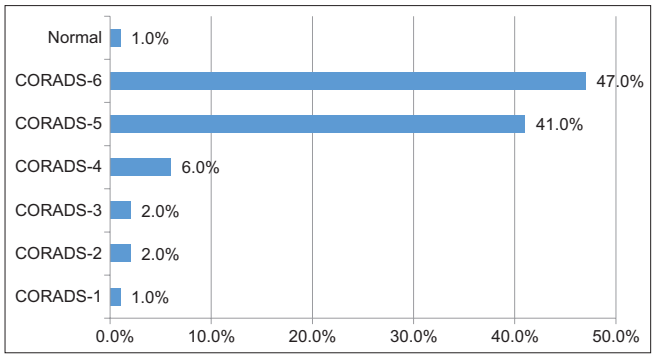

Figure 5: Computed tomography findings

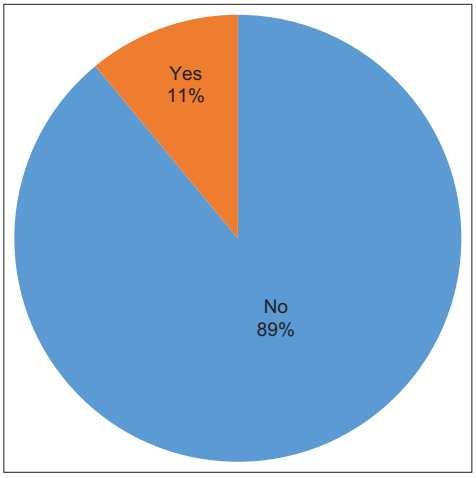

Figure 6: Mortality

respiratory support). Results were analyzed statistically and discussed below.

RESULTS

Out of 100 patients based on age group, nine patients were aged below 40 years, 18 were between 41 and 50 years, 29 were between 51 and 60 years, 27 patients were between 61 and 70 years, and 17 patients had to age above 70 years. Out of 100 patients, 69 were male, and 31 were female Figures 1 and 2.

The majority of the patients had systolic blood pressure >120, and 70 patients had diastolic blood pressure between 71 and 80 mm/hg. Fifty-four patients had heart rate between 61 and 100 rates/min, 51 patients had spo2 >96. C-reactive protein (CRP) and lactate dehydrogenase (LDH) values are abnormal for 98 patients. Sixty-eight patients did not need oxygen therapy, and 78 patients did not need ventilation Table 1.

In this study, four patients are asymptomatic, seventy patients had a fever, 56 patients had a cough, 18 patients had diarrhea, 13 patients had nausea and vomiting, five

Table 1: Diseases parameters

Parameters	Normal values	Frequency	Percentage
SBP	100	6	6.0
	101–120	38	38.0
	>120	56	56.0
DBP	70	23	23.0
	71–90	70	70.0
	>90	7	7.0
HR	<60	2	2.0
	61–100	54	54.0
	>101	44	44.0
SPO2	<95	49	49.0
	>96	51	51.0
Liver function test	Normal	85	85.0
	Abnormal	15	15.0
PT/INR	Normal	76	76.0
	Abnormal	24	24.0
D-Dimer	Normal	49	49.0
	Abnormal	51	51.0
CRP	Normal	2	2.0
	Abnormal	98	98.0
LDH	Normal	2	2.0
	Abnormal	98	98.0
Oxygen therapy	Yes	39	39.0
	No	61	61.0
Ventilation	Yes	22	22.0
	No	78	78.0

CRP: C-reactive protein, LDH: lactate dehydrogenase, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, SPO_2: Oxygen saturation

patients had expectoration, 16 patients had tiredness, 13 patients had body pain, eight patients had a headache, 40 patients had breathlessness, 11 patients had a loss of appetite, and eight patients had throat pain Figure 3.

In this study, six patients had respiratory diseases, 17 patients had heart diseases, 59 patients had diabetes mellitus, 37 patients had HTN, and 12 patients had other diseases Figure 4.

In CT findings, 47% of patients were in COVID-19 reporting and data system (CO-RADS) 6, 41% were in CO-RADS 5 and 1% showed normal. The total duration of hospital stay was 8.25 days. 11% of mortality was observed in this study Figures 5 and 6.

DISCUSSION

In our study, fever was the most common symptom present in our patients, followed by a cough, which was similar to that reported in Huang *et al.*[1] and Wang *et al.*,[6] where the fever was the most common symptom found (91.7%) and Guan *et al.*[7] (87.9%). Seven of our patients (33.33%) were asymptomatic at the time of presentation.

Guan *et al.* published a report on 1099 patients with laboratory-confirmed COVID-19 from 552 hospitals in

30 provinces, autonomous regions, and municipalities in mainland China through January 29, 2020. The most common symptoms reported were fever (43.8% on admission and 88.7% during hospitalization), and cough (67.8%), diarrhea (3.8%) was uncommon. A severe form of the disease was reported in the elderly and patients with comorbidities. Overall reported cases of death in this study were 15 (1.4%).[9]

Most of the patients having COVID-19 were male, which was similar to that reported by Huang *et al.*[1] Wang *et al.*[6] and Chen *et al.*,[5] which show 73.0% male predominance. In Rajasthan, a study conducted by Bhandari *et al.* was found that male patients constituted 66.66% of total patients, and the majority of the patients (80.90%) were below 60 years of age.[10] In India, a study conducted by Gupta *et al.* was found that the mean age of participants was 40.3 years (range 16–73 years). There was a male preponderance (66.7%).[11]

Zhang *et al.* was found that overall median age of 57.0 years. All patients were community acquired cases. Fever (91.7%), cough (75.0%), fatigue (75.0%), and gastrointestinal symptoms (39.6%) were the most common clinical manifestations, whereas HTN (30.0%) and diabetes mellitus (12.1%) were the most common comorbidities.[12]

Richardson *et al.* conducted a case series of patients with COVID-19 admitted to 12 hospitals in New York City, Long Island, and Westchester County, New York, within the North well Health system. The study included all sequentially hospitalized patients between March 1, 2020, and April 4, 2020. A total of 5700 patients were included (median age, 63 years [interquartile range (IQR), 52–75; range, 0–107 years]; 39.7% female). The most common comorbidities were HTN (3026; 56.6%), obesity (1737; 41.7%), and diabetes (1808; 33.8%).[13]

CONCLUSION

In our study, the main clinical presentation was cough, fever, and breathlessness. The most common associated comorbidity was diabetes mellitus, followed by HTN. 11% of mortality was noted in the COVID patients geriatrics age group. 90% of mortality patients were on the ventilator.

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How to cite this article: Arafath MM, Viswanathan R. Study of Clinical Profile of Coronavirus Disease-19 Infected Patients in South Tamil Nadu: A Retrospective Study. Int J Sci Stud 2021;8(11):147-150.

Source of Support: Nil, **Conflicts of Interest:** None declared.