

Correlation between Computed Tomography Scan Findings and Middle Meatal Antrostomy Findings in Cases of Maxillary Sinusitis – A Study on 50 Cases

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Abstract

Background: Sinusitis is a leading health-care problem believed to be increasing in both incidence and prevalence. Among chronic rhinosinusitis (CRS), maxillary sinusitis is more commonly seen due to the peculiar anatomical nature of the maxillary sinus and its close relation with other sinuses. Specific diagnosis is by computed tomography (CT) scan of paranasal sinuses (PNS). Controversy exists whether the CT scan findings are reliable with the surgical findings in middle meatal antrostomy (MMA) or not. Hence, estimation of the accuracy of CT PNS scan in maxillary sinusitis cases is quite reasonable. Prevalence and incidence in India are 15% of the total population. Air pollution, fumes from the industries, allergic factors, etc., are the risk factors for the increase in incidence.

Aim: This study aims to study the clinical presentation of maxillary sinusitis by history, to know the supportive or misleading role of CT scan while dealing with the sinus pathology by surgery, and to identify the causative organism by microbiological study.

Materials and Methods: Patients attending to ENT OP with clinical features of maxillary sinusitis such as headache and nasal discharge preferably >3 months above 15 years of age were randomly selected and admitted for CT scan and included in the study, posted for endoscopic sinus surgery and CT scan findings were compared.

Results: CT scan findings were compared with MMA findings and MMA specimens were sent for culture sensitivity. The most common symptoms were nasal obstruction (70%) and headache (56%). In the CT scan, 38% antra showed haziness, 24% showed mucosal thickening, and 19% showed clear antra. After surgery MMA, radiologically hazy antra showed 81.57% positive results and polypoidal change antra showed 100% positive results.

Conclusion: Highest incidence of maxillary sinusitis is in the 3rd decade, male population is affected more 66%, the most common symptom is nasal obstruction. Radiologically opaque, hazy antra gave reliable (90.9%) MMA findings, sensitivity is 100% with CT scan examination, and specificity is 56.25%.

Key words: Chronic rhinosinusitis, Computed tomography scan, Culture sensitivity, Middle meatal antrostomy, Paranasal sinuses

INTRODUCTION

Maxillary sinusitis is the most common among the other sinus infections and a leading health problem. Due to its peculiar anatomical nature, maxillary sinus is more prone to infections. First clear existence of paranasal sinuses

(PNS) was provided by Beranger Del Carpi, anatomist at Bologna in early 16th century. Messerklinger (1984) and Stammberger (1985) opened the antral cavity if indicated by individual radiological findings. First modern and accurate descriptions of PNS can be dated back to the works of the 19th century Austrian anatomist Emil Zuckerkandl. Rhinosinusitis refers to a group of diseases mainly the inflammation and infection which affects the mucosa of nose and PNS. Impairment in the mucociliary clearance pathway leads to obstruction and sinusitis which is due to host and environmental factors. Both prevalence and incidence account to 31 million people in the USA, In India, it is seen in 15% of population. Chronic

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rhinosinusitis (CRS) is a multifactorial disease, the most common include nasal obstruction, headache, and nasal discharge. There is a role of anatomical abnormalities, infections, superantigens, biofilms, fungi, and allergy in CRS. Other causes are trauma, dental extraction, and cystic fibrosis. Cells and inflammatory markers which play a role in CRS are eosinophils, neutrophils, mast cells, T and B cells, interleukins (ILs), tumor necrosis factor, mean blood pressure, etc. The most common bacteria isolated from culture are *Staphylococcus* 55% and *Streptococcus* 30.43%. First radiological description of maxillary sinuses was done by Leonardo da Vinci (1489). While doing the computed tomography (CT) scan PNS, typically axial and coronal sections are obtained, important parameters being prone position, angulation. In axial scan, CT scanner is perpendicular to patient's hard palate, field view – 14 cm, slice thickness – 3 mm, contiguous, 125 Kvp, and 80–160 ma/s. Lund Mackay staging system for CRS for maxillary sinus disease S1 -mucosal thickening, S2-less than 50% sinus opacification, S3-greater than 50% sinus opacification, S4-complete sinus opacification. In pre-antibiotic era, the main aim of sinus surgery was removal of pus from sinuses as a life-saving measure. In modern method, Messerklinger and Stammberger described the basic endoscopic sinus surgery (ESS), the role of removal of disease from the ostiomeatal complex (OMC) was popularized by Kennedy. Middle meatal antrostomy (MMA) is performed by Messerklinger method. A->P approach, uncinectomy was first done, followed by MMA. Enlargement of ostium, collection of specimens for culture sensitivity (C/S) to detect the causative organism, and the CT scan findings are compared with MMA findings. C/S reports are also compared in tabulated forms.

Aim

This study aims to know the authenticity of CT scan in dealing with the sinus pathology by surgery, to study the clinical presentation of maxillary sinusitis by history, and to identify the causative organism by microbiological study.

Inclusion Criteria

1. Patients attending to the outpatient department of Gandhi Hospital for a period of 2 years selected
2. Patients with symptoms of headache, nasal obstruction, and nasal discharge preferably >3 months were selected
3. Selected patients were sent for radiological examination CT scan PNS
4. Patients admitted for performing surgery (MMA).

Exclusion Criteria

1. Patients in acute stage <3 months were excluded
2. Patients <15 years age group were excluded
3. Patients with risk factors (chronic illness) excluded.

All the 50 patients are examined clinically, plain CT PNS findings are considered positive (abnormal) if maxillary sinus shows (1) complete opacity, (2) haziness, (3) mucosal thickening, and (4) polypoidal change and surgery was performed. MMA findings are considered positive (abnormal) if purulent or mucopurulent discharge obtained as aspirate.

MATERIALS AND METHODS

Patients attending the outpatient department of Gandhi Hospital with symptoms of chronic sinusitis, >15 years were randomly selected, and radiological examination (CT PNS) was done. Surgery (MMA) was done, and results were compared. Total no. of patients studied – 50, total no. of maxillary antra examined radiologically and surgically – 100.

OBSERVATION AND RESULTS

From the patients attending to the ENT Department, Gandhi Hospital, Secunderabad, patients above 15 years age group with clinical features suggestive of maxillary sinusitis were chosen [Tables 1-8]. They were subjected to CT PNS scan, 50 patients with positive CT scan findings were taken into study and admitted and posted for MMA, the findings were compared, and observations are tabulated as follows:^[1-5]

Table 1: Age incidence

| Group | Age in years | No. of patients | Percentage |
|-------|--------------|-----------------|------------|
| I | 16–19 | 7 | 14 |
| II | 20–29 | 22 | 44 |
| III | 30–39 | 9 | 18 |
| IV | 40–49 | 9 | 18 |
| V | >50 | 3 | 6 |

Table 2: Sex incidence

| Sex | No. of patients | Percentage |
|--------|-----------------|------------|
| Male | 33 | 66 |
| Female | 17 | 34 |

Table 3: Symptomatology index

| Symptoms | No. of patients | Percentage |
|-------------------------|-----------------|------------|
| Nasal obstruction | 35 | 70 |
| Headache | 28 | 56 |
| Sore throat | 13 | 26 |
| Hyposmia | 10 | 20 |
| Nasal discharge | 7 | 14 |
| Sneezing | 6 | 12 |
| Ear complaints | 3 | 6 |
| Epistaxis | 2 | 4 |
| Dental complaints | 2 | 4 |
| Difficulty in breathing | 1 | 2 |
| Watering from eyes | 1 | 2 |

DISCUSSION

A total of 100 antra belonging to 50 patients were subjected to radiological examination (CT scan), MMA surgery done. Results of the present study are compared with the

Table 4: ENT examination

| Signs | No. of patients | Percentage |
|----------------------------------|-----------------|------------|
| Deviated nasal septum | 37 | 74 |
| Hypertrophied inferior turbinate | 29 | 58 |
| Congested nasal mucosa | 16 | 32 |
| Pale nasal mucosa | 15 | 30 |
| Pharyngitis | 12 | 24 |
| Retracted tympanic membrane | 8 | 16 |
| Postnasal drip | 7 | 14 |
| Tonsillitis | 6 | 12 |
| Central perforation | 5 | 10 |
| Concha bullosa | 3 | 6 |
| Hypertrophied middle turbinate | 2 | 4 |
| External deviation of nose | 1 | 2 |
| Discharge in middle meatus | 1 | 2 |
| Paradoxical middle turbinate | 1 | 2 |

Table 5: CT appearance of antra

| Group | CT scan appearance | Number of antra | Percentage |
|-------|--------------------|-----------------|------------|
| I | Clear | 19 | 19 |
| II | Opaque | 11 | 11 |
| III | Hazy | 38 | 38 |
| IV | Mucosal thickening | 24 | 24 |
| V | Polypoidal change | 8 | 8 |

CT: Computed tomography

Table 6: MMA findings

| Group | MMA finding | No. of antra | Percentage |
|-------|-----------------------------------|--------------|------------|
| I | Clear antra | 32 | 32 |
| II | Purulent discharge | 26 | 26 |
| III | Polypoidal change of sinus mucosa | 16 | 16 |
| IV | Mucopurulent discharge | 14 | 14 |
| V | Thickening of sinus mucosa | 12 | 12 |

MMA: Middle meatal antrostomy

Table 7: Comparison of CT scan findings with MMA findings

| Group | CT scan appearance of antra | No. of maxillary antra | No. of antra showing positive MMA findings | Percentage |
|-------|-----------------------------|------------------------|--|------------|
| I | Clear | 19 | 0 | 0 |
| II | Opaque | 11 | 10 | 90.9 |
| III | Hazy | 38 | 31 | 81.57 |
| IV | Mucosal thickening | 24 | 14 | 58.33 |
| V | Polypoidal change | 8 | 8 | 100 |

MMA: Middle meatal antrostomy

Table 8: Sensitivity and specificity

| CT scan findings | Abnormal MMA findings | Normal MMA findings | Total |
|------------------|-----------------------|---------------------|-------|
| CT scan abnormal | 65 (a) | 17 (b) | 82 |
| CT scan normal | 0 (c) | 18 (d) | 18 |
| Total | 65 | 35 | 100 |

MMA: Middle meatal antrostomy

findings of previous studies. In the present study, highest incidence of age was found to be the 3rd decade followed by the 4th and 5th decade. Similar results were seen in a study conducted by Manuseth and Patil (2005), maximum age of incidence was 3rd decade. In a study conducted by Shrestha *et al.* (2010), maximum incidence was in the 3rd decade; male: female ratio 66%:34%. Symptomatology wise nasal obstruction 70%, headache 56%, sore throat 26%. In a study of Zojaji *et al.*, 2008, common complaint was nasal obstruction. DNS was the most common presenting sign (74%) and hypertrophied inferior turbinate (58%). In the study of Manuseth and Patil (2005); hypertrophied inferior turbinate 34% was the most common presenting sign. In the study of Shrestha *et al.*, 2016, pus in the middle meatus (88%) was the common sign. On comparison of CT appearance with MMA findings in the present study, hazy antra showed positive MMA findings in CT 81.57%, mucosal thickening of antra showed positive MMA findings in 58.35%, and polypoidal changes in antra showed positive MMA findings in 100% of patients. In a study conducted by Zojaji *et al.*, 2008, 29 patients with mucosal thickening showed positive results un-ESS and all the patients with polyps in CT scan showed positive findings in ESS. According to the study conducted by Manuseth and Patil (2005), CT scan showed highest sensitivity for maxillary sinus 92% with operative findings. Results of C/S of MMA specimen in the present study, 28% of patients showed no growth, frequent organisms isolated were staphylococci (16%) and *Klebsiella* (8%). In the study of Gokhale and Suligavi (2010), *Staphylococcus aureus* (24%) was the most common organism in 48 patients. Probably, *Staphylococcus* may be a commensal.^[6-10]

CONCLUSION

This study was conducted in the ENT outpatient and inpatient department in Gandhi Hospital, Secunderabad,

for a period of 2 years in 50 patients with clinical features of nasal obstruction, headache, facial pain, and nasal discharge for >3 months by random selection and was subjected to CT PNS scan, patients with positive CT findings were admitted and posted for MMA, specimens collected from MMA sent for C/S, and results are compared.

Highest age incidence of maxillary sinusitis was found to be in the 3rd decade, males are affected more 66% in the present study, the most common symptoms are nasal obstruction 70% and headache 50%, DNS is the common clinical finding in 74% of patients, hypertrophied inferior turbinate in 58% of patients, and pharyngitis in 24%. Out of 50 radiologically abnormal CT PNS scans, 19% maxillary antra were clear, 11% were opaque, 38% were hazy, 24% revealed mucosal thickening, and 8% showed polypoidal changes. In comparison of CT scan with operative findings (MMA), out of 11 radiologically opaque antra, 10 showed positive MMA findings, accuracy is 81.57%, only 14 antra showed positive MMA findings out of 24 antra which had mucosal thickening radiologically; polypoidal change in CT scan showed 100% positive MMA findings. C/S of MMA specimen showed 28% yield organism staphylococci, 28% no organism was detected. Hence, we concluded that radiologically clear, opaque, hazy, and polypoidal antra

showed reliable MMA findings and antra with mucosal thickening showed less reliability. Hence, we concluded that sensitivity of CT scan was found to be 100% and specificity was found to be 56.25%.

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