

A Clinical Study on the Management of Chronic Mastoiditis and Mastoid Abscess - A Hospital-based Study

A Siva Kumar

Professor and Head, Department of ENT, Kannur Medical College, Anjarakandy, Kannur, Kerala

Abstract

Background: In spite of the advent of antibiotics, the incidence of mastoiditis and mastoid abscess is not uncommon in the ENT practice. The pathogenesis is due to virulence of organism, insufficient antibiotics use, and ineffective antibiotics. Treatment consists of simple incision drainage to modified radical mastoidectomy. However, there seems to be no unanimous agreement on the best management strategy for this problem. The present study presents the outcome of patients undergoing treatment and also presents a protocol followed in a tertiary teaching hospital of North Kerala and its prognostic value.

Aim of the Study: The aim of this study is to review the available management protocols for treatment of mastoiditis and mastoid abscess and formulate our own hospital-based guidelines and protocol.

Materials and Methods: A study was conducted on 53 patients aged between 11 and 60 years, who presented with mastoiditis or mastoid abscess. All the patients were treated according to surgical protocols available. Demographic data, history, and otoscopy findings were recorded. Patients with mastoiditis were treated with mastoidectomy. Patients with mastoiditis were treated with mastoidectomy, and the patients with mastoid abscess were treated initially with incision and drainage and after 2 weeks with mastoidectomy. Laboratory investigations such as audiometry, culture, and sensitivity of pus from the ears were done. All the patients were followed for 6 months.

Observations and Results: A total of 53 patients were enrolled in this study. Mean age was 25.45 ± 2.35 in males and 23.76 ± 1.85 in females who presented with mastoiditis. Similarly, the mean age was 23.76 ± 1.85 and 20.46 ± 2.10 years for patients of mastoid abscess. There were 39/53 (73.58%) males and 14/53 (26.41%) females. Audiometry could be done in 32/37 (86.48%) patients with mastoiditis and 8/16 (50%) patients with mastoid abscess. These 40/56 (71.42%) patients had conductive deafness with a mean pure tone average of 32.45 dB. There were no post-operative complications reported during follow-up of 6 months.

Conclusions: A definitive management protocol is a must for every hospital to avoid delay and complications before and after surgical treatment in mastoiditis and mastoid abscess. Treatment guidelines should be followed meticulously in the diagnosis, laboratory investigations, and decision-making of definitive surgical procedure to be adopted in mastoiditis and mastoid abscess.

Key words: Chronic suppurative otitis media, Mastoid abscess, Mastoiditis, Otitis media

INTRODUCTION

Mastoiditis is an inflammatory process of the mastoid air cells in the temporal bone.^[1] Chronic mastoiditis is generally a result of chronic suppurative otitis media

(CSOM); it is rarely a result of failure of the treatment of acute mastoiditis.^[2] CSOM is persistent inflammation of the middle ear or mastoid cavity with permanent changes in the tympanic membrane in the form of perforation. Synonyms include “chronic otitis media (without effusion),” chronic mastoiditis, and chronic tympanomastoiditis. CSOM is characterized by recurrent or persistent ear discharge (otorrhea) over 2–6 weeks through a perforation of the tympanic membrane.^[3] Two types of mastoiditis are associated with bone destruction: Acute coalescent mastoiditis and chronic mastoiditis with osteitis. Acute coalescent mastoiditis generally follows a severe bout of acute suppurative otitis media (ASOM).^[4]

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Corresponding Author: Dr. A. Siva Kumar, Department of ENT, Kannur Medical College, Anjarakandy, Kannur, Kerala.
Phone: +91-9443042018. E-mail: drsivakumar63@gmail.com

Inadequate treatment of acute otitis media (AOM) may result in a clearing of the middle ear portion of the infection, with persistence of infection somewhere within the adjoining pneumatized spaces in the mastoid. This “masked mastoiditis” occurred in 15% of CSOM cases in the early antibiotic era^[5] and, although uncommon, still occurs today.^[6] The illness is common in resource-poor countries and those with poor socioeconomic status.^[3] The effective control of AOM has reduced the number of cases of acute coalescent mastoiditis, but the incidence of chronic mastoiditis caused by cholesteatoma has not been decreased with antibiotic usage.^[7] The occurrence rate of mastoiditis was found to be higher in countries with restricted antibiotic use.^[8] Few cases of acute mastoiditis develop into chronic ones, whereas few cases of AOM results in CSOM. Acute mastoiditis may spread through the periosteum and induce periostitis, which may cause bone destruction (acute coalescence mastoiditis). The infection may progress through adjacent bones or through emissary veins beyond the mastoid air cells and may present as a subperiosteal abscess or an intracranial complication. Acute mastoiditis involves the formation of pus and only occurs in cellular mastoids. Chronic mastoiditis is a slow penetration of acellular bone by granulations accompanied by hyperemic decalcification of the bone. In most cases, otitis media is concurrent either acute or chronic. Some patients may present with a postauricular fistula which may be spontaneous or iatrogenic. It may persist to become a chronic fistula. With the advent of broad-spectrum antibiotics, the clinical course of middle ear disease has been altered. One result has been the occasional suppression of the presenting signs and symptoms of mastoiditis. The course may be so insidious that the first awareness of mastoiditis may be following the presentation of an intracranial complication such as meningitis, lateral sinus thrombosis, or brain abscess. Furthermore, mastoidectomy is rarely indicated for chronic mastoiditis as a treatment option, which was mandatory for included cases in the present work. There is a traditional view that chronic otitis media and chronic mastoiditis must exist in the presence of tympanic membrane perforation.^[9] CSOM involves a cycle of inflammation, ulceration, granulation, and infection in the middle ear. There is conductive hearing loss and often inflammation of the mastoid cavity. Complications include hearing loss, mastoiditis, cholesteatoma, facial nerve paralysis, meningitis, brain abscess, and sigmoid sinus thrombosis.^[10] Anaerobic bacteria are important pathogens in head and neck infections such as chronic otitis media, chronic sinusitis, chronic mastoiditis, head and neck abscesses, cervical adenitis, parotitis, and post-operative infection.^[11]

Type of Study

This was a cross-sectional prospective study.

Period of Study

The study duration was from December 2016 to April 2018.

Institute of Study

This study was conducted at Kannur Medical College, Anjarakandy, Kannur, Kerala.

MATERIALS AND METHODS

The present study was conducted on 53 patients who presented with mastoiditis or mastoid abscess to the ENT Department of a tertiary teaching hospital of Northern Kerala. The Institutional Ethical Committee clearance was obtained for the study.

Inclusion Criteria

(1) Patients aged above 11 years and below 60 years were included. (2) Patients with ASOM or CSOM complicating either with mastoiditis or mastoid abscess were included. (3) Patients with discharge from the ear were included. (4) Patients not responding to antibiotics were included for surgery. (5) Patients with cholesteatoma were included in this study.

Exclusion Criteria

(1) Patients below 11 years and above 60 years were excluded. (2) Patients with prior surgery on the mastoid in the form of mastoidectomy were excluded from the study. All the patients with ASOM or CSOM included in the study as per the inclusion criteria were thoroughly elicited of history, demographic data, and clinical examination including otoscopy. Examination under microscope was done to confirm the diagnosis. Radiological investigations like X-ray both mastoids, CT scan temporal bone were performed wherever required. Bacteriological examination of the pus was done. Audiological evaluation was done with the help of pure tone audiometry. For patients with acute or chronic mastoiditis, initially intravenous antibiotics, ceftriaxone 1 g twice daily was started for 1 week. Oral decongestants such as phenylpropanolamine were used in all patients. Ofloxacin ear drops were started after the admission. Patients with mastoiditis not responding to the treatment were subjected to cortical mastoidectomy or modified radical mastoidectomy depending on the intraoperative findings. Patients with mastoid abscess were subjected to incision drainage. Post-operatively, all the patients were given IV antibiotics, NSAIDs, and other supportive treatment. Post-operative evaluation was done at 1st, 3rd, and 6th month's intervals. For patients with mastoid abscess, medical treatment protocol was the same, but the patient was subjected to incision and drainage of the abscess and mastoidectomy was undertaken only after 2 weeks interval.

OBSERVATIONS AND RESULTS

There were 53 patients who were enrolled in this study. The mean age was 25.45 ± 2.35 in males and 23.76 ± 1.85 in females who presented with mastoiditis. Similarly, the mean age was 23.76 ± 1.85 and 20.46 ± 2.10 years in males and females who presented with mastoid abscess, respectively. There were 39/53 (73.58%) males and 14/53 (26.41%) females. There were 37/53 (69.81%) patients who presented with mastoiditis and 16/53 (30.18%) patients with mastoid abscess. The demographic data and type of inflammatory disease in the study are shown in Table 1.

The audiological evaluation was done by calculating the pure tone average (PTA) in the frequencies of 500, 1000, 1500, and 2000 KHZ by air conduction and bone conduction. Audiometry could be done in 32/37 (86.48%) of the patients with mastoiditis and 8/16 (50%) of the patients with mastoid abscess. These 40/56 (71.42%) patients had conductive deafness with a mean PTA of 32.45dB. The mean air-bone gap (a-b gap) calculated was 15dB. *Staphylococci*, *Haemophilus influenza*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Enterobacteriaceae* were the predominant isolates that were recovered from the pus sent for culture and sensitivity from patients with mastoiditis and mastoid abscess with CSOM. *Streptococcus pneumoniae* and *Streptococcus pyogenes* were the most common organisms recovered in mastoiditis and mastoid abscess with ASOM. The most sensitive antibiotic was cefotaxime, followed by ceftriaxone, kanamycin, and ciprofloxacin [Table 2].

Among the mastoiditis patients, 23/39 patients had tubotympanic type of CSOM and 16/39 had atticofacial type of CSOM. All these patients underwent definitive surgery; the former were subjected to cortical mastoidectomy with tympanoplasty and the latter modified radical mastoidectomy with tympanoplasty. All the patients were followed up for 6 months at an interval of 1st, 3rd, and 6th months. During follow-up, mastoid wound dressing was done and suction clearance of the external auditory canal done after 1 month under the operating microscope. The status of the graft, secondary infection, and hearing improvement were the parameters observed during this period. There was no post-operative complication in any of the patients undergoing definitive surgery. Among the 16 patients presenting with mastoid abscess, 9/16 presented with tubotympanic type of CSOM and 7/16 of them with atticofacial type of CSOM. All the patients with mastoid abscess were subjected to initial incision drainage, and after 2 weeks, definitive surgery was undertaken. There were no post-operative complications in this group either of this study. All the data were analyzed using standard statistical methods.

Table 1: The demographic data of the study (n=53)

Observation	Mastoiditis (n=37)	Mastoid abscess (n=16)
Age		
11-20	6	3
21-30	14	6
31-40	10	5
41-50	5	1
51-60	2	1
Mean age		
Males	25.45±2.35	23.76±1.85
Females	21.41±2.62	20.46±2.10
Economic status		
Low	21	7
Middle	11	7
High	6	2
Gender		
Male	39	9
Female	14	7
ASOM	8	5
CSOM		
Tubotympanic	23	9
Atticofacial with cholesteatoma	16	7

ASOM: Acute suppurative otitis media, CSOM: Chronic suppurative otitis media

Table 2: The investigations in the study (n=53)

Observation	Mastoiditis (n=37)	Mastoid abscess (n=16)
Mean PTA-dB	30.46±2.90	28.64±2.08
a-b gap	17.40±1.50	14.60±2.10
Bacteriology		
<i>Staphylococci</i>	46.35%	06.37%
<i>Haemophilus influenza</i>	17.48%	07.19%
<i>Escherichia coli</i>	14.50%	04.25%
<i>Pseudomonas aeruginosa</i>	10.43%	03.32%
<i>Enterobacteriaceae</i>	06.13%	01.73%
<i>Streptococcus pneumoniae</i>	03.40%	55.15%
<i>Streptococcus pyogenes</i>	01.71%	16.88%

PTA: Pure tone average

DISCUSSION

The incidence of acute mastoiditis in patients with AOM has dropped from 50% at the turn of the 20th century to 6% in 1955 and to 0.4% in 1959, and by 1993, only 0.24% of patients with AOM developed acute mastoiditis.^[12] Petersen *et al.* reported a decline in the incidence of acute mastoiditis from 20% in 1938 to 2.5% in 1945.^[13] The incidence of mastoiditis and mastoid abscess though rare nowadays it is, however, uncertain whether this is directly associated with the unscrupulous use of antibiotics or if an altered nature of the disease/microorganisms and/or the state of health is involved.^[13] The increase in the incidence of these two complications may be due to the phenomenon of increasing antibiotic resistance of microorganisms like *Streptococcus* to penicillin.^[14] S.

pneumoniae, *S. pyogenes*, *Staphylococcus aureus*, and *H. influenza* are the most common organisms recovered in acute mastoiditis. *P. aeruginosa*, *Enterobacteriaceae*, and *S. aureus* are the predominant isolates that have been recovered from chronically inflamed mastoids.^[15] In the present study, the incidence of organism such as *Staphylococci*, *H. influenza*, *E. coli*, *P. aeruginosa*, *Enterobacteriaceae*, *S. pneumoniae*, and *S. pyogenes* in the pus for culture sensitivity test in the patients with mastoiditis was 46.35%, 17.48%, 14.50%, 10.43%, 6.13%, 03.40%, and 01.71%, respectively [Table 2]. In this study, all cases with mastoid abscess required some sort of surgical intervention, either by incision and drainage or by definitive surgery (cortical or radical mastoidectomy). Tarantino *et al.*^[14] stressed the need for surgical drainage of a subperiosteal abscess to prevent the spread of suppuration to vital areas. Reported mastoidectomy rates in clinical studies have shown large variations, ranging from 12% to 98%.^[7] The large variability suggests that the decision for or against mastoidectomy is not only a question of preferred conservative treatment or immediate surgical intervention but also to a large extent based on subjective surgical criteria.^[16] Mastoidectomy (cortical or modified radical Mastoidectomy) is an effective surgical treatment for mastoiditis associated with one of the followings: Subperiosteal abscess or exteriorization, cholesteatoma, intracranial complications, and otorrhea persisting for more than 2 weeks despite adequate antibiotic treatment or in children. No detectable recurrence of mastoiditis or mastoid abscess or any complication was recorded during follow-up of 6 months in this study. In this study, all patients with mastoid abscess were managed by incision and drainage.

CONCLUSIONS

A definitive management protocol is a must for every hospital to avoid delay and complications before and after

surgical treatment in mastoiditis and mastoid abscess. Treatment guidelines should be followed meticulously in the diagnosis, laboratory investigations, and decision-making of definitive surgical procedure to be adopted in mastoiditis and mastoid abscess.

REFERENCES

- Glynn F, Osman L, Coleavy M, Rowley H, Dwyer TP, Blayney A. Acute mastoiditis in children: Presentation and long term consequences. *J Laryngol Otol* 2008;122:233-7.
- Brook I, Burke P. The management of acute, serous and chronic otitis media: The role of anaerobic bacteria. *J Hosp Infect* 1992;22 Suppl. A:75-87.
- Acuin J. Chronic suppurative otitis media. *BMJ Clin Evid* 2007;2007:pii: 0507.
- Myer CM 3rd. The diagnosis and management of mastoiditis in children. *Pediatr Ann* 1991;20:622-6.
- Smeraldi R. Atypical mastoiditis from a clinical diagnostic point of view. *Gazz Sanit* 1947;18:58.
- Yorgancilar E, Yildirim M, Gun R, Bakir S, Tekin R, Gocmez C, *et al.* Complications of chronic suppurative otitis media: A retrospective review. *Eur Arch Otorhinolaryngol* 2013;270:69-76.
- Parisier SC. Management of cholesteatoma. *Otolaryngol Clin North Am* 1989;22:927-40.
- Van Zuijlen DA, Schilder AG, Van Balen FA, Hoes AW. National differences in incidence of acute mastoiditis: Relationship to prescribing patterns of antibiotics for acute otitis media? *Pediatr Infect Dis J* 2001;20:140-4.
- Paparella MM, Shea D, Meyerhoff WL, Goycoolea MV. Silent otitis media. *Laryngoscope* 1980;90:1089-98.
- Benson J, Mwanri L. Chronic suppurative otitis media and cholesteatoma in Australia's refugee population. *Aust Fam Physician* 2012;41:978-80.
- Brook I. Diagnosis and management of anaerobic infections of the head and neck. *Ann Otol Rhinol Laryngol Suppl* 1992;155:9-15.
- Dudkiewicz M, Livni G, Kornreich L, Nageris B, Ulanovski D, Raveh E. Acute mastoiditis and osteomyelitis of the temporal bone. *Int J Pediatr Otorhinolaryngol* 2005;69:1399-405.
- Petersen CG, Ovesen T, Pedersen CB. Acute mastoidectomy in a Danish county from 1977 to 1996 with focus on the bacteriology. *Int J Pediatr Otorhinolaryngol* 1998;45:21-9.
- Tarantino V, D'Agostino R, Taborelli G, Melagrana A, Porcu A, Stura M. Acute Mastoiditis: A 10 year retrospective study. *Int J Pediatr Otorhinolaryngol* 2002;66:143-8.
- Brook I. The role of anaerobic bacteria in acute and chronic mastoiditis. *Anaerobe* 2005;11:252-7.
- Khafif A, Halperin D, Hochman I, Poria I, Shindel D, Marshak G. Acute mastoiditis: A 10-year review. *Am J Otolaryngol* 1998;19:170-3.

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