

MANAGEMENT OF PEDIATRIC MASTOID ABSCESS: A SHORT COMMUNICATION**Dr. Anisha Ganguly*¹ and Dr. Kalpana Sharma²**¹Post Graduate Trainee, Department of Otorhinolaryngology and Head and Neck Surgery, Gauhati Medical College, Guwahati).²Professor and HOD, Department of Otorhinolaryngology and Head and Neck Surgery, Gauhati Medical College, Guwahati).***Corresponding Author: Dr. Anisha Ganguly**

Post Graduate Trainee, Department of Otorhinolaryngology and Head and Neck Surgery, Gauhati Medical College, Guwahati).

Article Received on 09/03/2020

Article Revised on 29/03/2020

Article Accepted on 18/04/2020

ABSTRACT

Mastoid abscess remains a recognised complication of otitis media despite the advent of antibiotics. Today, no uniformly accepted diagnostic or treatment protocols exist. Imaging studies for all patients and mastoidectomy plus myringotomy, traditionally constitute the gold-standard of treatment methods. However, more conservative approaches viewed as safe and reliable alternative options for the clinician have recently gained popularity. The objective of this review was to study the characteristics of pediatric patients who may have a higher risk of developing mastoid abscess following acute or chronic otitis media (COM).

KEYWORDS: Pediatric mastoid abscess, cholesteatoma, mastoidectomy.**INTRODUCTION**

Sub periosteal mastoid abscess is one of the most common complication of acute mastoiditis, in the spectrum of intratemporal complications of acute otitis media. Sub periosteal abscess can also be seen in cases of chronic otitis media. The classic sequence of sub periosteal abscess formation is the extrusion of pus beneath the periosteum through infectious erosion of the outer cortical bone at the mastoid protuberance or through pre-existing anatomical pathways, such as vascular channels and the tympano-mastoid suture.^[1,2]

The mastoid process is absent or rudimentary in neonatal skull. It forms postnatally as the sternocleidomastoid muscle develops and pulls on the bone. This development continues till puberty when it reaches the adult size. Thus mastoid abscess as a complication of Acute or chronic otitis media (AOM /COM) is an unusual presentation.

In the era of antibiotics, though the incidence of mastoid abscess has decreased as a complication of otitis media, there are still a number of patients who develop mastoid abscess, which requires prompt diagnosis and management.

MATERIALS AND METHODS

This is a case analysis of patients who underwent mastoidectomy for mastoid abscess in Dept of ENT and head and neck surgery, Gauhati Medical college between August 2019 to March 2020. A total of 11 patients were

included in this study in the age group of 5-14 years of age.

These patients were further divided as those presenting with subperiosteal mastoid abscess with acute otitis media (Group1) and those presenting with subperiosteal abscess as a complication of chronic otitis media (Group 2).

The presenting symptoms, pre-existing complaints along with disease progression were recorded in detail.

Acute otitis media was defined as purulent discharge and other synchronous symptoms persisting for 12 weeks (3 months) or less whereas chronic otitis media was defined as symptoms persisting for 12 weeks or more.

Group 1: Patients diagnosed with AOM with mastoid abscess

There were 4 patients categorised into Group 1 (Table 1). These patients had aural symptoms between 11 and 40 days prior to presentation. Post-auricular swelling was present in all 4 patients, mastoid pain was present in 4 patients, and otorrhoea was present in 2 patients. Otoloscopic examination revealed perforated tympanic membrane in 2 patients. There were 2 out of 4 patients who had other associated complications. There were 3 out of 4 patients with antecedent conditions predisposing to development of AOM. Cholesteatoma, however, was not noted in any of these patients.

Patient Name	Age (in years)	Duration of symptoms	Other complications	Management
1. R.D.	5	2 weeks	Nil	Incision and Drainage of Abscess Cortical Mastoidectomy
2. F.K.	11	1 month	Bezold's Abscess	Incision and drainage of abscess Modified Radical Mastoidectomy
3. A. R.	7	11 days	Nil	Incision and drainage of abscess Cortical Mastoidectomy
4. J.S.	10	1 month 10 days	Bezold's Abscess	Incision and drainage of abscess Cortical Mastoidectomy

Group 2: Patients diagnosed with mastoid abscess and underlying COM

There were 7 patients categorised into Group 2 (Table 2). In this group, the patients had chronic aural symptoms for 4 months to 12 years and acute (new) symptoms for 2 to 6 weeks prior to presentation. Post-auricular swelling was present in 6 patients, mastoid pain was present in 5

patients, and otorrhoea was present in all 7 patients. Otosopic examination revealed that all patients had a perforated tympanic membrane. It was noted that only 4 out of the 7 patients had other associated complications. 3 patients had underlying cholesteatoma, but none of these patients had any pre-morbid illnesses.

Patient's Name	Age (in years)	Duration of acute symptoms	Other Complications	Management
1. H. A	14	10 days	Citelli's Abscess	Incision and drainage of abscess Modified radical Mastoidectomy
2. A.B.	8	3 weeks	Nil	Incision and drainage of abscess Modified Radical Mastoidectomy
3. S.R.	7	1 month	Bezold's Abscess	Incision and drainage of abscess Modified Radical Mastoidectomy
4. P.K.	9	2 months	Temporoparietal Abscess	Incision and drainage of abscess Modified radical mastoidectomy
5. T.I.	6	10 days	Nil	I & D Modified Radical Mastoidectomy
6. D.B.	14	1.5 months	Cerebellar abscess with meningitis	I & D Radical Mastoidectomy
7.S.G.	5	7 days	Nil	I & D Modified Radical Mastoidectomy

Associated complications of otitis media

Out of 11 patients, 6 (54.5%) had complications of mastoiditis. These were mainly extracranial complications, in 5 out of 6 patients: Bezold's abscess, in 3 patients (Figure 1), Citelli's abscess in 1 patient and

temporoparietal abscess in 1 patient. (Figure 2). In this series, only 1 patient had an associated intracranial complication of cerebellar abscess and meningitis.



Preoperative images

Management and follow-up

All patients presenting in the Out patient department and emergency services were admitted and started on broad-spectrum intravenous antibiotics.

Intravenous ceftriaxone was chosen because of its good blood-brain barrier penetration. Ceftriaxone was administered at a age and weight appropriate dosage in two divided doses daily, unless patients had intracranial complications, which required a higher dose. Before starting with an intravenous antibiotic, pus for culture and sensitivity was sent for all patients. The type of antibiotics was modified according to the culture results. The mean duration of hospitalization was 14 days. Following discharge from the hospital, the children were routinely prescribed oral antibiotic for an additional period of 7 days (amoxicillin–clavulanic acid 70%; third

generation cephalosporin 30%. Antipyretics and analgesics were given on an individual basis in all patients. The bacteria isolated from patients' pus culture were *Staphylococcus aureus* in 3 patients, *Klebsiella pneumoniae* in 2 patients and *Pseudomonas aeruginosa* in 1 patient. The other 5 patients had no growth on operative specimen or swab culture.

All of the patients in this series underwent abscess drainage, intravenous antibiotic administration followed by mastoid exploration and eradication of diseased mastoid air cells. Modified radical mastoidectomy was performed in almost half of the patients (7 of 11 patients). Cortical mastoidectomy was performed in 3 patients who had AOM. Radical mastoidectomy was only performed in 1 patient.



Pre operative image CT Scan showing erosion of tegmen plate Post operative image

DISCUSSION

The complications of otitis media are broadly categorised into extracranial and intracranial complications. Extracranial complications (such as mastoiditis, subperiosteal abscess, facial paralysis, and labyrinthitis) and intracranial complications (such as cerebral or extradural abscess, meningitis, focal encephalitis, lateral sinus thrombosis, and otic hydrocephalus) are more likely to be associated with AOM than COM.^[3-5]

Since the introduction of antibiotics in the 1940s, the incidence of acute mastoiditis and surgical intervention

has declined. Recent publications, however, have noted an increase in the incidence of acute mastoiditis following AOM in children.^[6,7] Conversely, there has been a reduced incidence of COM since the 1990s in developed nations. This however has not been the case in developing nations where despite the advent of antibiotics cases of AOM and COM have remained constant as established risk factors associated with COM include low socioeconomic class, malnutrition, and congested living condition.^[8]

Mastoiditis has often been recognised as an extracranial complication of otitis media when patients develop tender post-auricular swelling. Mastoid abscess may develop as a complication of mastoiditis following both AOM and COM.^[2,10-11] It occurs when purulent material collection accumulates within the middle ear and mastoid air cells, and it is often accompanied by granulation tissue. Surgical intervention is still the most common treatment for mastoid abscess.

The most common clinical presentation of mastoid abscess in this series was a tender, fluctuant post-auricular swelling, which was similar to other cases in the literature.^[11,12] Otorrhoea was common, and facial asymmetry, neck swelling, and meningism were rare. All of the patients with cholesteatoma had a history of chronic otorrhoea since childhood. Complications following COM were more prevalent in subjects with cholesteatoma.^[13] Therefore, it is important to distinguish mastoid abscess from uncomplicated mastoiditis and manage patients accordingly.

3 out of 11 patients presented with mild conductive hearing loss which was restored to within normal limits in the post operative period. 8 out of 11 patients presented with moderate to moderately severe hearing loss. 7 of these patients had mild to moderate conductive hearing loss post operatively whereas one patient who underwent radical mastoidectomy has profound hearing loss postoperatively.

Mustafa et al. showed that 15% of patients with COM had associated cholesteatoma, and one-third of them presented with complications. In COM without cholesteatoma, only 6.7% presented with complications. In the current series, the numbers were too small to make any significant comparison; however, 3 out of 7 patients with mastoid abscess following COM had cholesteatoma.

Interestingly, the incidence of multiple complications can occur between 11% and 58% of cases and appears to be more prevalent in patients with intracranial complications.^[13-15] Not surprisingly, the complication rate following COM has been reported to be higher than that following AOM^[14,15], but caution should be exercised in young children with AOM because intracranial complications may occur relatively rapidly in the course of the disease.^[16] In this series, there was only 1 patient with cerebellar abscess and meningitis as a complication of mastoid abscess.

In our centre, patients with suspected mastoid abscess following mastoiditis were promptly admitted and commenced on broad-spectrum intravenous antibiotics. A high-resolution CT of the temporal bone were also performed in all patients. All patients were managed by abscess drainage followed by mastoid exploration supported by clinical and radiological evidence. The predominant organisms cultured in this series were *Staphylococcus aureus* and *Klebsiella pneumoniae*;

however, there was no single predominant organism in AOM or COM. There were 5 (45%) patients' samples that exhibited no growth on routine cultures. Previous antibiotic treatment may have resulted in the absence of bacterial growth.^[6] Studies have revealed that the most frequent isolate in CSOM patients was *Pseudomonas Aeruginosa* (24%) and *Staphylococcus aureus* (19%) whereas in patients with chronic rhinosinusitis and CSOM, *Staphylococcus aureus* was 45% and *Pseudomonas aeruginosa* was 20%.^[9] In addition, tests for anaerobic cultures were not routinely performed in our institution. Previous studies have shown that common organisms in AOM include *Streptococcus pneumoniae* and *Haemophilus spp.* whereas common organisms in COM include *Proteus mirabilis*, *Enterococcus spp.*, and *Pseudomonas aeruginosa*.^[5,13-15,17]

The cultures that were isolated were tested for sensitivity against various drugs like cephalosporins (ceftriaxone, cefazolin, cefotaxime and cefepime), fluoroquinolones like ciprofloxacin, ofloxacin and aminoglycosides like gentamicin and amikacin. In our study while *Staphylococcus aureus* was sensitive to all of the above mentioned antibiotics, 1 Patient with *Pseudomonas aeruginosa* showed resistance to cefazolin.

Mastoidectomy was performed expediently once the patient's medical condition was stabilised, and the decision to bring down the posterior canal wall or to perform radical mastoidectomy was depended on the intra-operative findings. Generally, intra-operative findings of intact ossicles with no cholesteatoma indicated cortical mastoidectomy. In this series, intra-operative findings of ossicular erosion, including erosion of the stapes suprastructure, led to radical mastoidectomy in one patient.

Factors that have been shown to influence the spread of infection include the type and virulence of the infecting organism, host resistance, and the adequacy of treatment.^[15]

CONCLUSION

Despite this being the era of antibiotics, mastoid abscess as a complication of both AOM and COM is still a harsh reality especially in developing countries. In our case series of 11 children 7 children with COM and 4 with AOM were examined and managed with an uneventful and recurrence free post operative follow up.

REFERENCES

1. Budenz C, El-Kashlan H, Shelton C, Aygun N, Niparko J (2015) Complications of Temporal Bone Infections. Cummings Otolaryngology Head and Neck Surgery 6th edn. Philadelphia: Saunders-Elsevier, 2156-2176.
2. Migirov L, Yakirevitch A, Kronenberg J (2005) Mastoid subperiosteal abscess: a review of 51 cases. Int J Pediatr Otorhinolaryngol, 69: 1529-1533.

3. Verhoeff M, van der Veen EL, Rovers MM, Sanders EA, Schilder AG. Chronic suppurative otitis media: A review. *Int J Paediatr Otorhinolaryngol*, 2006; 70(1): 1–12.
4. Leskinen K. Complications of acute otitis media in children. *Curr Allergy Asthma Rep.*, 2005; 5(4).
5. Leskinen K, Jero J. Acute complications of otitis media in adults. *Clin Otolaryngol*, 2005; 30(6).
6. Benito MB, Gorricho BP. Acute mastoiditis: Increase in the incidence and complications. *Int Paediatric Otorhinolaryngol*, 2007; 71(7): 1007–1011.
7. Luntz M, Brodsky A, Nusem S, Kronenberg J, Keren G, Migirov L, et al. Acute mastoiditis—the antibiotic era: A multicenter study. *Int J Paediatr Otorhinolaryngology*, 2001; 57(1): 1–9.
8. Lasisi AO, Olaniyan FA, Muibi SA, Azeez IA, Abdulwasiu KG, Lasisi TJ, et al. Clinical and demographic risk factors associated with chronic suppurative otitis media. *Int J Paediatr Otorhinolaryngol*, 2007; 71(10): 1549–1554.
9. J. Madhavi, M. Santoshi, K.R. Meghanadh, A. Jyothi Prevalance and Antibiotic Sensitivity of *Staphylococcus Aureus* and *Pseudomonas Aeruginosa* in middle ear fluids of Chronic suppurative otitis media and chronic rhinosinusitisoatients undergoing ear surgery, *Int. Journal of infectious diseases*, 2016; 45, supp 1: 101-102.
10. Bauer PW, Brown KR, Jones DT. Mastoid subperiosteal abscess management in children. *Int J Paediatr Otorhinolaryngol*, 2002; 63(3): 185–188.
11. Al-Serhani AM. Mastoid abscess: Underlying disease and management. *Am J Otol.*, 1996; 17(5): 694–696.
12. Pang HYL, Barakate MS, Havas T. Mastoiditis in a paediatric population: A review of 11 years experience in management. *Int J Pediatr Otorhinolaryngol*, 2009; 73(11): 1520–1524.
13. Mustafa A, Heta A, Kastrati B, Dreshaj Sh. Complications of chronic otitis media with cholesteatoma during a 10-year period in Kosovo. *Eur Arch Otorhinolaryngol*, 2008; 265(12): 1477–1482.
14. Penido Nde O, Borin A, Iha LCN, Suguri VM, Onishi E, Fukuda Y, et al. Intracranial complications of otitis media: 15 years experience in 33 patients. *Otolaryngol Head Neck Surg.*, 2005; 132(1): 37–42.
15. Kangsanarak J, Navacharoen N, Foonant S, Ruckphaopunt K. Intracranial complications of suppurative otitis media: 13 years' experience. *Am J Otol.*, 1995; 16(1): 104–109.
16. Dhooge IJM, Albers FWJ, Van Cauwenberge PB. Intratemporal and intracranial complications of acute suppurative otitis media in children: Renewed interest. *Int J Paediatr Otorhinolaryngol*, 1999; 49 Suppl 1: S109–S114.
17. Vergison A. Microbiology of otitis media: A moving target. *Vaccine*, 2008; 26 Suppl 7: G5–G10.