

A Clinical Study of Extra-Cranial Complications of Chronic Suppurative Otitis Media

Gopal Kumar Jha¹, Prashant Kumar²

¹Senior Resident, Department of ENT, GMCH Purnea

²Senior Resident, Department of ENT, GMCH Purnea

Received: 17-01-2023 / Revised: 01-02-2023 / Accepted: 28-03-2023

Corresponding author: Dr. Prashant Kumar

Conflict of interest: Nil

Abstract

Background and Objective: The Objective is to study the risk of extra-cranial complications in treated and untreated cases of CSOM and to study the common extra-cranial complications of CSOM with respect to age, sex and socio-economic status.

Methods: The present study comprises of 60 patients with extra-cranial complications secondary to chronic suppurative otitis media in ENT at GMCH Purnea.

Results: In this study of 60 cases, the extra-cranial complications were associated with 16.66% of intra-cranial complications. The commonly encountered extra-cranial complications of CSOM were post-aural abscess (50%), mastoiditis (41.7%), facial nerve paralysis (23.3%), post-aural fistula (16.7%), labyrinthine fistula (15%), zygomatic abscess (6.7%), Bezold's abscess (1.7%) and petrositis (1.7%). Complications were commonly found in squamosal type of CSOM.

Conclusion: The extra-cranial complications of CSOM pose a great challenge to the developing countries despite its declining incidence. This can be attributed to the lack of public health awareness and inadequate health care delivery system. It is in this situation that early diagnosis and prompt surgical intervention are most important for the decreased morbidity and mortality of these patients.

Keywords: Otitis Media; Suppurative; Complications; Facial Paralysis; LabyrinthineFistula; Mastoiditis; Cholesteatoma; Mastoidectomy.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Chronic Suppurative Otitis media is one of the most common disease entities encountered in otolaryngology practice. Chronic Suppurative Otitis media has been traditionally described as a chronic inflammation of the middle ear cleft associated with perforation of the tympanic membrane and otorrhoea. The proximity of the middle ear cleft and the mastoid air cells to temporal and the intracranial compartments places structures located in these areas at increased risk of infectious

complications [1]. Spread by bone erosion: It is the most common route of spread of infection. Bone erosion can be caused by Cholesteatoma, granulation tissue and less often by chronic osteomyelitis. Spread through the normal anatomical opening in the bony wall such as the oval or round window, internal auditory canal, cochlear aqueduct, endolymphatic duct and sac. Spread through the developmental dehiscences such as patent suture or a dehiscent floor of the hypotympanum or the

dehiscent canal of the facial nerve Spread through the preformed pathways as a result of previous skull fracture or surgery, Spread through perilymph fistula, either congenital or acquired Spread through the venous route by progressive retrograde thrombophlebitis of the mastoid emissary veins, Patient related factors: Reduced immunological resistance in children, old, debilitated patients and patients with diseases like diabetes mellitus and other chronic diseases plays role in rapid spread of infection. Poor hygiene and poor socio-economic status also have role to play in poor health. Failure to take appropriate antibiotics also leads to spread of infection to cause complications. Bacteriology related factors: The greater the virulence of the infecting organisms the greater the risk of developing complications. Also the increasing resistance of the organisms towards antibiotics plays a role. Efficacy of the treatment: The anti-microbial therapy should be directed towards the causative organisms in appropriate dosage forms and for adequate duration. Multi-drug therapy is required to cover the range of infecting organisms. Tissue-delivery of the antimicrobials is compromised due to the presence of granulation tissue and fluid in the mastoid cavity. Alteration in the metabolic state of the organisms, antagonism by the other drugs and unusual barriers of drug penetration during anti-microbial therapy lead to increased risk for complications. The development and appropriate use of antibiotics have led to a decrease in these potentially devastating complications. However, they continue to occur, and clinical vigilance is required for early detection and treatment. Furthermore, with the continued development of multi-drug resistant pathogens, these complications may again become more prevalent as our current antibiotics become less effective [2].

These complications of chronic suppurative otitis media can be lethal if they are not identified and treated properly. The present

clinical study highlights on the various clinical presentations of these complications, the importance of early clinical detection and diagnosis through various imaging techniques and the appropriate treatment modalities in the form of medical therapy and surgery.

Objectives

To study the risk of extracranial complications in treated and untreated cases of CSOM.

To study the common extracranial complications of CSOM with respect to age, sex and socio-economic status.

Material and Method

The present study comprises of 60 patients with extracranial complications secondary to chronic suppurative otitis media who attended at Government medical college and Hospital purnea, Bihar. Study duration of Two years.

Inclusion Criteria

All patients with extra-cranial complications CSOM who were clinically diagnosed or diagnosed by CT scan were included.

- Patients of all age groups and both sexes were included.
- Both cholesteatomatous and non-cholesteatomatous ears were included

Exclusion Criteria

Cases with exclusive intra-cranial complications of CSOM were excluded.

The cases were studied as per the proforma. The proforma for recording history, pre-operative examination, investigations and management is given in Annexure.

Detailed history of the patient was carefully recorded. The aural symptoms like ear discharge with attention on duration, side, nature of discharge and associated symptoms like otalgia were inquired. The symptoms like swelling or discharge behind the ear, swelling in the neck, diplopia,

vertigo, asymmetry of face or any facial muscle weakness were inquired.

The onset, duration and progression of the symptoms were also inquired. Other symptoms like fever, headache, vomiting, altered sensorium, convulsion which are neuro-otological symptoms were also inquired. A past history of any previous ENT illness and systemic illness like tuberculosis, diabetes, hypertension was inquired. A special inquiry of any medical or surgical treatment for aural discharge had been inquired. The patient was started on parenteral broad-spectrum antibiotics to cover gram positive, gram negative and anaerobic bacteria. Regimen with third generation Cephalosporins, Gentamycin and metronidazole were preferred. Further antibiotic therapy was guided by bacteriological culture and sensitivity.

Neuro-surgeon's opinion was taken during an associated intra-cranial complications management. Neurosurgical intervention was done by the neuro-surgeon if required. The sub-periosteal abscesses were incised and drained immediately following clinical diagnosis. Mastoid exploration was done in all cases that were fit and willing for surgery. It was carried out under local anaesthesia in majority of cases. General anaesthesia was preferred in children. Radical or modified radical mastoidectomy was preferred in cholesteatomatous ears. Operative findings like presence of cholesteatoma, granulations, facial canal dehiscence, and erosion of semi-circular canals, sinus plate, tegmen plate and ossicular chain noted.

Results

Table 1: Age distribution of patients studied

Age in years	No of patients	%
1-10	5	8.3
11-20	17	28.3
21-30	18	30.0
31-40	4	6.7
41-50	10	16.7
51-60	2	3.3
61-70	2	3.3
71-80	2	3.3
Total	60	100.0

Mean \pm SD: 29.72 \pm 17.05

Table 2: Gender distribution of patients studied

Gender distribution of patients studied	No of patients	%
Male	46	76.7
Female	14	23.3
Total	60	100.0

Table 3: Socio-economic status

SES	No of patients	%
Low	29	48.3
Middle	31	51.7
Upper	0	0.0
Total	60	100.0

Table 4: Findings of External Auditory canal

External Auditory canal	No of ears (n=120)	%
Normal	44	36.7
Abnormal	76	63.3
Discharge	48	40.0
Aural polyp	16	13.3
Granulations	3	2.5
Postero- superior wall sagging	9	7.5

Table 5: Pus for culture

Pus for culture	No of patients (n=60)	%
Negative	9	15.0
Positive	51	85.0
Pseudomonas	26	43.3
staphylococcus aureus	10	16.7
Proteus	4	6.7
Streptococcus	3	5.0
E.coli	2	3.3
Klebseilla	4	6.7
Staphylococcus sp.	1	1.7
Strep- peptococcus	1	1.7

Table 6: Type of Chronic Suppurative Otitis Media

Type of Chronic Suppurative Otitis Media	No of ears (n=120)	%	95% CI
Nil	40	33.3	25.53-42.17
Present	80	66.7	57.83-74.47
MUCOSAL	20	16.7	11.06-24.35
SQUOMOSAL	60	50.0	41.19-58.81

Table 7 Extra-cranial complications (Single or multiple)

Extra-cranial complications	No of patients (n=60)	%	95% CI
Single	26	43.3	31.57-55.90
Multiple	34	56.7	44.10-68.43

Surgery was not done in 3 patients; 1 patient had absconded, 2 patients were not fit for surgery, one due to uncontrolled Diabetes and the other due to presence of pyothorax. They were given conservative treatment in the form of antibiotics and drainage of abscess, if any.

Table 8: Distribution of Facial Canal Dehiscence

Facial Canal Dehiscence	No of patients (n=12)	%
Tympanic Part	7	58.3
Second Genu	3	25.0
Mastoid Part	2	16.7

Table 9: Distribution of Labyrinthine Fistula

Labyrinthine Fistula	No of patients (n=9)	%
Lateral Semi-Circular Canal	8	88.9
Posterior Semi-Circular Canal	1	11.1

Table 10: Mastoid cavity

Mastoid cavity	No of patients (n=57)	%
DRY	45	78.9
Discharging	12	21.1

Table 11: Correlation of Facial Canal Dehiscence with outcome

Facial Canal Dehiscence	No of patients (n=57)	Outcome				
		Recovered	FNP Gr I	FNP Gr II	FNP Gr. III	PAF
Absent	45	44(97.8%)	0	0	0	1(2.2%)
Present	12	3(25.0%)	6(50.0%)	2(25.0%)	1(8.3%)	0
Tympanicpart	7	3(42.9%)	1(14.3%)	2(28.6%)	1(14.3%)	0
SecondGenu	3	0	3(100.0%)	0	0	0
MastoidPart	2	0	2(100.0%)	0	0	0
Inference	FCD is significantly associated with bad Outcome(presence of FNP) with P<0.001**					

Significant figures

+ Suggestive significance (P value: 0.05<P<0.10)

* Moderately significant (P value: 0.01<P ≤ 0.05)

* Strongly significant (P value: P ≤ 0.01)

Discussion

The extra-cranial complications were associated with 16.33% of intra-cranial complications in our study, amongst which temporal lobe abscess was the most frequent followed by lateral sinus thrombosis. However, according to Dubey's study meningitis was more common and in Moustafa et al study, lateral sinus thrombosis was more common [3,4]. Kangsanarak et al (1993) also reported 17.6% patients with both extra-cranial and intra-cranial complications [5,6]. The present study correlates with this study. In this study, 43.3% cases had single complication and 56.7% had multiple complications. However, in the study done by Dubey et al, 67% had single complication and 33% had multiple complications. The most common age group with complications was 21-30 years. The complications were seen more commonly in the first three decades of life in the present study as well as in others. Males had a higher preponderance for complications as compared to females. The complications were more commonly seen in low and middle socio-economic groups.

According to Moustafa et al (2009), patients in the first three decades of life from low socio-economic group were more commonly associated with complications, but there was no sex preponderance [4]. According to different studies like Dubey et al (2007), Agrawal et al (2005) and Shamboul et al (1992), reported the same age distribution [4,2,6]. These early signs and symptoms should raise a high index of suspicion for diagnosing impending complications of CSOM [7]. The Facial nerve paralysis was seen in 23.3% of patients in this study but its incidence is variable. The facial nerve paralysis as a result of chronic otitis media is most commonly associated with dehiscence or destruction of the bony facial canal by cholesteatoma. In this study, the tympanic segment of the facial nerve was most commonly involved, as also observed in the studies done by Ikeda et al (2006) and Chu and Jackler (1988) [8]. The usual mechanism of palsy due to cholesteatoma includes direct pressure on the nerve and impaired circulation in the nerves [9]. Djeric and Savic (1990) reported histopathological changes of the facial canal and the nerve due to CSOM and

found degenerative and inflammatory changes in the affected part of the nerve, suggesting that this paralysis occurs when the inflammatory process specifically involves the trunk. With a marked inflammation rare cases of transection of the facial nerve by cholesteatoma may develop [10]. In this study, one case of facial nerve transection was seen due to cholesteatoma which was repaired using graft from the greater auricular nerve. Some cases required just decompression of the facial nerve. The Labyrinthine fistula occurred in 15% of the cases in this study. The most common site of fistula was found to be the Lateral semi-circular canal (9 patients) followed by the posterior semi-circular canal (1 patient). The study by Ikeda et al has also reported the same. The most common modality of treatment is surgery. Adjuvant antibiotic therapy is also required. In this study, most of the patients underwent a canal wall down procedure: Modified radical mastoidectomy in 63.3% and Radical Mastoidectomy in 30% cases. In the studies by Agrawal et al (2005), Dubey et al (2007) and Moustafa et al (2009), most of the patients underwent canal wall down surgery. According to the above table, both the study had a similar outcome in relation to the facial nerve paralysis. During the study, the presence of facial canal dehiscence was statistically associated with bad outcome in the study of extra-cranial complications of CSOM. According to a study by Ikeda M et al, the outcome of facial nerve paralysis due to middle ear cholesteatoma was poor in cases with petrosal cholesteatoma and in those who underwent surgery after 2 months of onset of paralysis [9]. The different organisms found in culture of the ear discharge in different studies are given in the table below. The common organisms in all the studies were *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Our study correlates with the Mathew study [11,12,13,14].

Conclusion

The most common extra-cranial complication of CSOM is post-aural abscess. These extra-cranial complications are associated with 16.33 % of intra-cranial complications, of which temporal lobe abscess is the most common. The complications are more commonly seen in the younger population with male predominance. The duration of the ear discharge is not associated with the increasing number of complications.

References

1. Osma U, Cureoglu S, Hosoglu S: The complication of Chronic Otitis Media: Report of 93 cases. *J Laryngol Otol.* 2000; 114: 97-100.
2. Agrawal S, Husein M, Mac Rae D: Complications of otitis media: an evolving state. *J Otolaryngol.* 2005; 34: S33-9
3. Dubey SP, Larawin V: Complication of Chronic Suppurative Otitis Media and their management. *The Laryngoscope.* 2007; 117: 264-267.
4. Moustafa BE, El Fiky, El Sharnousy MM: Complications of Suppurative Otitis Media: Still a problem in 21st century. *J Otorhinolaryngol Head Neck Surg.* 2009; 71: 87-92.
5. Kangsnararak J, Foonant S, Ruckphaopunt K, Navacharoen N, Teotrakul S: Extracranial and intracranial complications of suppurative otitis media: report of 102 cases. *J Laryngol Otol.* 1993; 107: 999-1004.
6. Shamboul KM: An unusual prevalence of complications of CSOM in young adults. *J Otolaryngol.* 1992; 106: 874-877.
7. Schwaber et al: The early signs and symptoms of neurologic complication of Chronic Suppurative Otitis Media. *The Laryngoscope.* 1989; 99: 373-375.
8. Chu FW, Jackler RK: Anterior epitympanic cholesteatoma with facial paralysis: A characteristic growth pattern. *Laryngoscope.* 1988; 98: 274-8.

9. Ikeda M, Nakazato H, Onoda K, Hirai R, Kida A: Facial nerve paralysis caused by middle ear cholesteatoma and effects of surgical intervention. *Acta Otolaryngologica*. 2006; 126: 95-100.
10. Savic DL, Djeric DR: Facial paralysis in Chronic Suppurative Otitis Media. *ClinOtolaryngol*. 1989; 14: 515-517.
11. Grewal DS: Otogenic abscess- our experience. *Indian J Otolaryngol Head Neck Surg*. 1995; 47(2): 106-112.
12. Mathews TJ, Marus G: Otogenic intracranial complications: A review of 37 patients. *J otol Laryngol*. 1988; 102: 121-124.
13. M S., Ibrahima C., Nouhoum G., Gounon S., Brainima C., Adama G., Abdoulaye N., & Fatoumata S. La rétinopathie de Valsalva et le travail d'accouchement au CHU-IOTA. *Journal of Medical Research and Health Sciences*, 2021;4(8): 1428–1431.
14. HW C., CS C., GA Y., G S., & J.A. de S. The Systemic Exclusion of Native Americans from Cancer Clinical Trials. *Journal of Medical Research and Health Sciences*, 2021; 4(8): 1396–1404.