ORIGINAL ARTICLE

A CLINICAL STUDY ON EXTRA CRANIAL COMPLICATIONS OF CHRONIC SUPPURATIVE OTITIS MEDIA

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ABSTRACT: OBJECTIVES: The Objective is to study the risk of extra-cranial complications in 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 who attended to the Dept. of E. N. T Srivenkateswara Government General Hospital, Tirupathi. An analysis was made regarding the demographic profile, clinical features, surgical techniques, operative findings, and the outcome of the study. **RESULTS:** In this study of 60 cases, the most common extracranial complication of CSOM is Postauralabscess. These extra cranial complications are associated with 15% of intracranial complications of which Meningitis is most common. The complications are more commonly seen in the younger population in second to third decades of life with Male predominance. The duration of ear discharge is not associated with the increasing number of complications. Cholesteatoma is commonly responsible for the development of Extracranial complications of CSOM. Pseudomonas aeruginosa is the commonest organism found in the complications. Canal wall down surgery is the main mode of treatment in this category of patients. The Facial canal dehiscence is associated with a poor outcome in the cases of Facial nerve paralysis. **CONCLUSION:** The extra-cranial complications of CSOM pose a great challenge to the Developing countries despite its declining incidence. It is in this situation that early diagnosis and prompt surgical intervention are most important for the decreased morbidity and mortality of patients.

KEYWORDS: Otitis Media, Suppurative, Complications.

INTRODUCTION: Chronic Suppurative Otitis media has been traditionally described as a chronic inflammation of part or all of the tympanomastoid compartment comprising of eustachian tube, the tympanic cavity, the mastoid antrum and all the pneumatized spaces of temporal bone associated with perforation of the tympanic membrane and otorrhoea. The proximity of the middle ear cleft, the mastoid air cells to temporal and the intracranial compartments, places structures located in these areas at increased risk of infectious complications.[1]

The development of complications in Chronic Suppurative Otitis Media is attributed to the bone eroding properties of Cholesteatoma and granulation tissue, normal anatomical openings and natural dehiscences in temporal bone, virulence of organisms, biofilm formation, patient related factors like age, immune status e.t.c. The development and appropriate use of antibiotics have led to a decrease in 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]

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 the appropriate treatment modalities.

MATERIALS AND METHODS: In this series 60 cases with extracranial complications secondary to CSOM who attended the ENT outpatient department of SVRRGGH, TIRUPATHI were selected.

1. A thorough history, clinical examination and investigations were carried out.
2. The patients who were presented with complications like postaural abscess, postaural fistulae, polyps were treated for a minimum period of 7 days before the surgery.
3. Neurosurgeon's opinion was taken if there is an associated intracranial complication, if required neurosurgical intervention was done by the neurosurgeon.

Inclusion Criteria:

1. Patients of all age groups and both sexes were included.
2. All patients with extracranial complications who were diagnosed clinically or by CT scan were included.
3. Patients with multiple extracranial complications or associated intracranial complications were included.

Exclusion Criteria: Cases with exclusive intracranial complications were excluded.

RESULTS: A Prospective clinical study with 60 patients is undertaken.

1. **Age and sex distribution:** The most common age group with complications was 21-30 years. There were 31(51.7%) male and 29(48.3%) female patients.
2. **Socioeconomic status:** Most of the patients 33(55%) are from low socioeconomic status.
3. **Duration of ear discharge:** Maximum number of cases i. e., 26(43.3%) with complications had discharge from ear since childhood.

Duration of Ear Discharge	No. of patients	%
1-5 Years	19	31.7%
5-10 Years	11	18.3%
11-20 Years	04	6.7%
From childhood	26	43.3%
Total	**60**	**100%**

Table 1

4. **Distribution of symptoms:** Maximum number of cases i.e., 29(48.3%) presented with Postaural swelling.

SYMPTOMS	No. of Patients	%
Otalgia	26	43.3%
Discharge behind ear	11	18.3%
Swelling behind ear	29	48.3%
Swelling in neck	01	1.7%
Headache	24	40%
Facial weakness	13	21.7%
Fever	11	18.3%
Vomiting	03	5%
Giddiness	09	15%
Diplopia	01	1.7%

Table 2

5. **Findings of External auditory canal:** Most common clinical observation noted is presence of discharge.

External auditory canal	No. of ears n=120	%
Normal	46	38.3%
Abnormal	74	61.7%
a) Discharge	50	41.7%
b) Aural polyp	11	9.2%
c) Granulations	04	3.3%
d) Posterosuperior wall sagging	09	7.5%

Table 3

6. **Findings of the Tympanic membrane:**

Tympanic membrane	No. of ears n=120	%
Normal	42	35%
Abnormal	78	65%
1. Central perforation	12	10%
2. Attic perforation	11	9.2%
3. Posterosuperior quadrant Perforation	14	11.7%
4. Retraction pocket	18	15%
5. Notvisible (Due to polyp granulations, postero superior wall sagging)	23	19.2%

Table 4

7. **Pus for culture:** Pseudomonas aeruginosa was the organism responsible for the development of complications in most of the cases i.e. in 25(41.7%) cases.

Pus for culture	No. of patients N=60	%
Negative	6	10%
Positive	54	90%
Pseudomonas	25	41.7%
Staph. aureus	15	25%
H. influenzae	4	6.7%
Gram negative organisms	9	15%
Anaerobic organisms	1	1.7%

Table 5

8. **Type of C. S. O. M:** Complications were commonly associated with squamosal type of CSOM.

Type of chronic Suppurative Otitis media	No. of ears n=120	%
Normal	42	35%
Disease Present	78	65%
MUCOSAL	15	12.5%
SQUAMOSAL	63	52.5%

Table 6

9. **Complications:** Most common extracranial complication observed was post aural abscess i. e. in 48.3% cases and commonest associated intracranial complication was meningitis seen in 8.3% cases.

Complications	No. of Patients (n=60)	%
EXTRACRANIAL		
Post aural abscess	29	48.3%
Post aural fistula	11	18.3%
Mastoiditis	27	45%
Bezolds abscess	01	1.7%
Zygomatic abscess	03	5%
Labyrinthine fistula	09	15%
Petrositis	01	1.7%
Facialnerve paralysis	13	21.7%

INTRACRANIAL		
Nil	51	85%
Lateralsinus thrombosis	01	1.7%
Temporallobe abscess	O3	5%
Meningitis	05	8.3%
Subdural empyema	01	1.7%
Cerebellar abscess	01	1.7%

Table 7

10. Extracranial complications: Most of the cases i. e 33(55%) presented with multiple extracranial complications.

Extracranial Complication	No. of patients (n=60)	%
Single	27	45%
Multiple	33	55%

Table 8

11. Surgery: Surgery was not done in 2 patients because of associated cardiac illness. They were given conservative treatment.

Modified radical mastoidectomy was the commonly performed surgical procedure in most cases i.e. 81.7% cases.

Surgery	No. of Patients (n=60)	%
Modified radical mastoidectomy	49	81.7%
Radical mastoidectomy	01	1.7%
Cortical mastoidectomy	08	13.3%
No surgery	02	3.3%

Table 9

12. Operative Findings:

Intra operative Findings	No. of patient (n=58)	%
1) Mastoid Aircell System		
-Pneumatised	11	18.97%
-Sclerosed	47	81.03%
2) Facial canal Dehiscence		
-Absent	44	75.9%
-Present	14	24.1%

3) Ossicles		
-Eroded	43	74.1%
-Removed	15	25.9%
4) labyrinthine fistula		
-Absent	49	84.5%
-Present	09	15.5%

Table 10

13. Distribution of facialcanal dehiscence:

Facial canal dehiscence	No. of patients n=14	%
1) Tympanic part	09	64.3%
2) Second genu	03	21.4%
3) Mastoid part	02	14.3%

Table 11

14. Distribution of labyrinthine fistula:

Labyrinthine fistula	No. of patient (n=9)	%
1) Lateral semicircular canal	08	88.9%
2) Posterior semicircular canal	01	11.1%
3) Superior semicircular canal	0	0

Table 12

15. Pathology:

Pathology	No. of patients (n=58)	%
Cholesteatoma only	21	36.21%
Granulation only	18	31.03%
Both	19	32.76%

Table 13

16. Outcome:

Outcome	No. of patients (n=58)	%
Recovery	47	81.03%
Not recovered	11	18.97%
1. Facial nerve paralysis grade-1	07	12.1%
2. Facial nerve paralysis grade-2	02	3.4%
3. Facial nerve paralysis grade-3	01	1.7%
4. Postaural fistula	01	1.7%

Table 14

17. Mastoid cavity:

Mastoid Cavity	No. of Patients (n=58)	%
Dry	45	77.6%
Discharging	13	22.4%

Table 15

18. Correlation of duration of ear discharge with number of extracranial complications:

Duration of discharge	Extracranial Complications			
	Single		Multiple	
	No.	%	No.	%
1-5 years	06	22.2%	13	39.4%
5-10 years	04	14.8%	07	21.2%
10-20 years	03	11.1%	01	3%
From childhood	14	51.9%	12	36.4%
Total	**27**	**100%**	**33**	**100%**
Inference	Duration of ear discharge is not statistically associated with number of extra-cranial complications with P=0.26.			

Table 16

19. Correlation of pathology with number of extracranial complications

Pathology	Extracranial Complications			
	Single		Multiple	
	No.	%	No.	%
Cholesteatoma only	8	33.3%	13	38.2%
Granulation only	7	29.2%	11	32.4%
Both	9	37.5%	10	29.4%
Total	**24**	**100%**	**34**	**100%**
Inference	Type of pathology is not statistically associated with number of complications with P=0.81			

Table 17

20. Correlation of facial canal dehiscence with outcome.

Facial canal dehiscence	No. of patients n=58	Outcome				
		Recovered	Facial nerve paralysis grade-1	Facial nerve paralysis grade-2	Facial nerve paralysis grade-3	Postural Fistula
Absent	44	43(97.7%)	0	0	0	1(2.3%)
Present	14	4(28.6%)	7(50%)	2(14.3%)	1(7.1%)	0
1) Tympanic Part	9	3(33.3%)	4(44.4%)	1(11.1%)	1(11.1%)	0
2) Second Genu	3	1(33.3%)	1(33.3%)	1(33.3%)	0	0
3) Mastoid Part	2	0	2(100%)	0	0	0
Inference	Presence of Facial canal dehiscence is significantly associated with bad outcome (Facialnerve palsy) with P<0.03*					

Table 18

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: Complications of chronic Suppurative Otitis media has decreased worldwide with the exception of developing world, where prevalence is still high 6.7%-7.6% (Kangsnarak et al 1993, Sriyanon et al 1984). Cholesteatoma due to its properties of eating away bone can erode and damage dura, sinus, seventhnerve and bony labyrinth if not checked in time (Sheehy JL 1997) so there is a need for early diagnosis and early intervention. A prospective clinical study done on 60 patients with extracranial complications of chronic Suppurative Otitis media.

The complications were seen most commonly in first three decades of life in the present study as well in other Studies like Moustafa et al (2009), Dubey et al (2007), Agrawal et al (2005) and Shamboul et al (1992).[3,2,4] Males had higher preponderance for complications, when compared to females. Prominence of males (51.7%) seen in our study was also supported by Kangsanarak et al (1993), Singh and Maharaj (1993) and Sriyanon et al (1984). However Shamboul Km (1992) reported predominance of females. However all the authors supported our view that the complications are common during the second and third decades of life, probably due to more active life and longer duration of cholesteatoma for which it remains active insitu before culminating into complications (Sheehy et al 1977), or more aggressiveness of cholesteatoma in younger age (Sade and Fusch 1994, Shenoy and Kakkar 1987). The complications were commonly seen in low and middle socioeconomic groups in our study. 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.[3]

In our study the most common extra cranial complication is Post aural abscess (48.3% cases) which was also seen in the study of Dubey et al. According to the study by Moustafa et al, Grewal et al (1994), Singh and Maharaj (1993) and Samuel et al (1986) the most frequent compication was mastoiditis. In our series Mastoiditis was seen in 45% of cases. However Kangsnarak et al (1993) reported that Facial palsy is the commonest extra cranial complication, though in our study it was seen in 21.7% cases.

Complications	Present study (in %)	Dubey's study (in %)
Mastoidits	45%	37%
Post aural fistula	18.3%	24%
Post aural abscess	48.3%	37%
Bezolds abscess	1.7%	7%
Zygomatic abscess	5%	0%
Labyrinthine fistula	11.7%	3%
Petrositis	1.7%	3%
Facial nerve paralysis	21.7%	14%
Luc's abscess	0%	1%

Table 19: Distribution of extracranial complications in different study

The extra cranial complications were associated with 15% of Intra cranial complications in our study, amongst which Meningitis was the most frequent followed by Temporal lobe abscess. Predominance of Meningitis was also documented by Samuel et al (1986), Kangsnarak et al (1993), Grewal et al (1994) and Dubey et al (2007). However in the study conducted by Moustafa et al (2009), Lateral sinus thrombosis was more common.[5,3] Kangsnarak et al (1993) also reported 17.6% patients with both extracranial and intracranial complications. In this study, 43.3% cases had single complication and 56.7% had multiple complications.

Complications	Kangsanarak et al (In %)	Dubey et al (In%)	Our series
Single	43.3%	67%	45%
Multiple	56.7%	33%	55%

Table 20: Extra cranial complications (Single or Multiple) in different study

Our study correlates with the study by Kangsanarak et al (1993).

The most common symptom was a long standing or frequently recurring ear discharge which was seen in all cases in our study also seen in other studies like Dobey et al (2007), Kangsnarak et al (1993), Schwaber et al (1989). Statistically the duration of ear discharge is not associated with the number of complications. The symptoms suggestive of extracranial

complications were swelling behind the ear (48.3%), discharge behind the ear (18.3%), facial weakness (21.7%), giddiness (15%) and diplopia (1.7%). The other early symptoms of complications of csom were fever (18.3%), headache (40%), vomiting (5%) and otalgia (43.3%) which was also seen in the above mentioned studies. The examination of external auditory canal revealed discharge in 41. 7 % cases, aural polyp in 9.2% cases, granulations in 3.3% cases and posterosuperior wall sagging in 7.5% cases. The common otoscopic findings of the tympanic membrane were retraction pocket (15%), posterosuperior quadrant perforation (11.7%), attic perforation (9.2%). In 19.2% of the ears, tympanic membrane was not seen due to the presence of the aural polyps, granulations and sagging of the posterosuperior meatal wall. These early symptoms and signs should raise a high index of suspicion for diagnosing impending complications of chronic Suppurative Otitis Media.

The common organisms isolated from the ears having complications were Pseudomonas aeruginosa (41.7%) and staph aureus (25%). Our study correlates with the Mathew study[6,7] The Facial nerve paralysis was seen in 21.7% 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] 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 (8patients) followed by the posterior semi-circular canal (1 patient). The study by Ikeda et al has also reported the same.[9] According to our study cholesteatoma is the most frequently noticed pathology on exploration of the mastoid. Our study correlates with the study of Dubey et al (2007). It is shown statistically that the type of pathology is not associated with increased number of complications.

Pathology	Present study (in %)	Dubey et al (in %)
Cholesteatoma	36.21%	44%
Granulations	31.03%	23%
Both	32.76%	31%

Table 21: Pathology in different study

Intraoperatively the mastoid air cell system was found to be Sclerosed in 81.03% cases and Pneumatized in 18.97% cases. Ossicular erosion is seen in 74.1% cases. In our study most of the patients underwent Modified radical mastoidectomy i. e., in 81.7% cases. Canal wall up procedure was undertaken in 13.3% 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.[2,5,3]

Facial nerve paralysis	Present study (n=11)	Dubey et al (n=9)
Recovered	4	0
Grade 1 palsy	7	6
Grade 2 palsy	2	0
Grade 3 palsy	1	3

Table 22: Outcome of facial palsy in different study

According to the above table, both the studies have a similar outcome in relation to the facial nerve paralysis.[5] During the study the presence of facial canal dehiscence was statistically associated with bad outcome. According to a study by Ikeda 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.[11]

CONCLUSION: Complications of Suppurative Otitis media arise when infection spreads from the middle ear cleft to structures from which it is normally separated by bone. The extracranial complications of Chronic Suppurative Otitis media pose a great challenge to the Otorhinolaryngologist despite its declining incidence. Thus, early diagnosis and prompt surgical intervention are most important for the decreased morbidity and mortality of these patients.

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Fig. 1: A case of post aural abscess

Fig. 2: A case of right facial palsy

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