

## Original Research Article

# A systematic review of complications of attico-antral type of chronic suppurative otitis media in our region

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**Received:** 24 August 2021

**Accepted:** 14 September 2021

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### ABSTRACT

**Background:** Chronic suppurative otitis media (CSOM) is a very common disease that should be carefully treated, as severe complications can develop. Despite the significantly decrease incidence of CSOM-related complications since the introduction of antibiotics, this clinical problem has not been eliminated.

**Methods:** This was an observational study conducted including 60 cases of attico-antral type of CSOM and its complications. Detailed study of determinants of attico-antral type of CSOM and its complications were studied. The various options in the management of disease and its complications with their outcomes were studied.

**Results:** Majority of study participants belonged to lower socio-economic group. Intra-temporal complications were most common complications and most of the patients required canal wall down surgery. Majority patients had complete recovery of the disease without recurrence during 3 months of follow-up.

**Conclusions:** Our study concluded majority of the patients belonged to the low socioeconomic status. It was also clear from the study that timely intervention in the form of early diagnosis and administration of proper treatment resulted in complete recovery of majority of patients.

**Keywords:** CSOM, Attico-antral, Complications

### INTRODUCTION

Chronic suppurative otitis media (CSOM) is a very common disease that should be carefully treated, as severe complications can develop. Despite the significantly decrease incidence of CSOM-related complications since the introduction of antibiotics, this clinical problem has not been eliminated.<sup>1</sup>

CSOM remains a serious concern, particularly in developing countries and socioeconomically poor regions.<sup>2</sup> There continue to be reports of CSOM-related complications as life-threatening.<sup>3,4</sup>

CSOM has been classified into tubo-tympanic and attico-antral disease. Tubo tympanic type of CSOM is

characterized by a perforation of pars tensa, while marginal and attic perforations are pathognomonic of attico-antral variety. The latter category is usually associated with the presence of cholesteatoma.<sup>5</sup> The middle ear cholesteatoma, most often acquired than congenital, occurs from the ingrowth of keratinising squamous epithelium from external auditory canal skin to middle ear, through the tympanic membrane.<sup>6</sup>

Complications of CSOM can be classified as intra-temporal and intracranial (IC). Intra-temporal complications include mastoid abscess, petrositis, labyrinthitis, Facial nerve paralysis (FNP), and Bezold's abscess. IC comprise intracranial abscess, including extradural, epidural, subdural, peri sigmoid sinus, and

brain abscesses; lateral sinus thrombophlebitis (LST), meningitis and otitic hydrocephalus.<sup>7</sup>

Prior to antibiotic era, IC 1 (IC) occurred in 2.3-4% cases.<sup>8</sup> With the use of antibiotics and new surgical techniques, the complications have been greatly reduced to 0.15-0.04%. Mortality decreased from 25 to 8%. Despite of an overall decline in the incidence of complications of otitis media, life threatening complications still exists.<sup>9</sup>

The aim of the study was to determine various socio-demographic profile of attico-antral type of chronic suppurative otitis media, its complications and various modalities of treatment of CSOM and its complications.

## **METHODS**

This was an observational study conducted, in a tertiary care centre, including 60 cases with attico-antral type chronic suppurative otitis media and its complications. Patients with malignancy of temporal bone, tuberculosis otitis media, acute otitis media, tubo-tympanic CSOM were excluded from the study.

After including in the study, thorough history was taken regarding age, gender, residential status, socio-economic status. Detailed history regarding CSOM like onset, nature, duration, progress, relieving and aggravating factors of chief symptoms such as ear discharge, decreased hearing, earache, tinnitus was taken. Special attention was paid regarding symptoms of complications of attico antral chronic suppurative otitis media such as giddiness, swaying, fever, vomiting, facial weakness, visual disturbances, seizure, altered sensorium, and post aural swelling/discharge. Past history regarding any comorbidities, previous ear surgeries, history of any other medical or surgical treatment was asked.

A proper general examination and systemic examination was done followed by detailed otorhinolaryngological examination. External ear examination was done to find out any congenital deformities, post aural discharge or swelling and mastoid tenderness. Otoscope examination was done to assess the status of ear canal, discharge, presence of mass/polyp and assess the tympanic membrane. Tympanic membrane is examined carefully to look for retraction, perforation, granulation tissue and cholesteatoma flakes. Tuning fork tests were performed with 256 Hz, 512 Hz and 1024 Hz to assess the nature of hearing loss, severity and also the worse ear. Examination of all cranial nerves are done in detail with special emphasis to facial nerve to find out any weakness. Cerebellar and vestibular tests are done to detect any disequilibrium and incoordination. Motor, sensory and reflex assessments done.

Fistula and caloric test are done to rule out any labyrinthine dysfunction. Ear swab was sent for all patients for bacteriological assessment. Otomicroscopic examination of affected ear is done to confirm the otoscopic findings

and for finding out the tympanic membrane perforation, margins, attic retraction, attic destruction and also to assess the presence of granulation, cholesteatoma flakes and polyps.

Pure tone audiometry was carried out to assess the nature, severity and type of hearing loss both pre and postoperatively and classified into different grades depending on the following table. X-ray mastoid Schuller's view was taken in all patients to assess the pneumatization of mastoid air cell system, position of dural and sinus plate, extent of disease and presence of cholesteatoma. High resolution CT scan of temporal bone done were done in patients with impending complications, previously operated for atticoantral disease and those with obvious complications. Contrast enhanced CT, angiography and MRI are done on patients with suspicious sinus thrombosis, and other intracranial complications. All preoperative routine workup done such as CBC, ESR, BT/CT, RFT, LFT HIV, HBSAG AND ECG evaluation.

Patients were posted for surgery after pre-anaesthetic evaluation and after taking informed consent. Surgeries were done according to requirement based on the status of CSOM and its complications.

Patients were followed up for 3 months. First follow up was after 7 days post-op, second follow up after 1 months and 3rd follow up at the end of 3 months. During follow ups patients were assessed for epithelisation, infection, collection, hearing improvement, cosmetic results, meatoplasty, pinna position and cavity status, peri aural numbness and recurrence of disease.

## **RESULTS**

This was an observational study conducted including 60 cases with atticoantral type CSOM and its complications. Mean age of study participants was 27.05 years with standard deviation±14 (Figure 1). Among the study participants, 50% male participants and 50% were females (Figure 3). Most of the patients were belonged to lower middle class and lower class of socioeconomic status classified by BG Prasad scale (Figure 2).

Most of the patients (53.33%) had atticoantral chronic suppurative otitis media on left side, followed by right side (26.66%) and followed by bilateral (20%). Table 1 shows about the distribution of study participants according to clinical presentation. The most common clinical presentation for attico-antral CSOM was hearing loss (100%) and otorrhea (100%), followed by otalgia (36.66%) and least common presentation was post aural discharge (3.33%). Majority of the patients (75%) presented with moderate degree of hearing loss, followed by severe degree (16.66%) and mild degree (8.33%). The most of the patients (63.79%) presented with foul smelling scanty discharge, followed by foul smelling purulent discharge (13.79%). Table 2 shows about the distribution of study participants according to examination findings.

Among 25% patients EAC was clear. In 63.33% patients discharge present in EAC. Among 13.33% patients, mastoid bone tenderness was present. posterosuperior retraction as the most common otoscopic finding (45%) followed by attic perforation (30%), granulations (30%) and cholesteatoma (13%). Most of the patients were having multiple otoscopic findings. Facial nerve weakness was present among 8.33% patients.

Table 3 shows about findings of various investigations done among patients with CSOM. Most of the patients (65%) presented with moderate CHL, followed by mild CHL. In 5% of patients mixed hearing loss was observed. Pseudomonas was the most common organism (35%) followed by staphylococcus (16.66%) found on bacteriological examination. Ossicular erosion (38.33%) was the commonest finding followed by facial canal erosion, tegmen erosion, mastoid cortex erosion and the least common was brain abscess (1.66%).

Table 4 shows about the distribution of study participants according to site of complications. Out of 60 patients of atticoantral disease 19 patients developed some kind of complications. Intra temporal complications were the most common to occur out of which mastoid abscess was the

most common (47.3%), facial nerve involvement was the second most common (26.31%). IC were the least common out of which LSTP and meningitis contributed 10.5% each.

Around 70% patients undergone for canal wall down mastoidectomy followed by endoscopic mastoidectomy and 8.33% patients underwent canal wall up mastoidectomy.

Table 5 shows about intra-operative findings. Around 66.6% of patients were having cholesteatoma and granulation in their middle ear cleft followed by ossicular erosion in 38.3% of patients.

Table 6 shows about findings during follow up visits. At the end of 1<sup>st</sup> week, 85% patients presented with healthy wound. At the end of 1<sup>st</sup> month follow up, 40% patients presented with well epithelised, graft intact and with improvement in hearing. After 3 months of follow up 61.66% study participants had mild hearing loss and 16.66% had moderate hearing loss. Most of the patients (91.6%) had complete recovery. Table 7 shows about the surgeries done according to presence of complications.

**Table 1: Distribution of study participants according to clinical presentation.**

Clinical characteristics	Number	Percentage (%)
<b>Presenting complaints</b>		
Hearing loss	60	100
Otorrhea	60	100
Otalgia	22	36.66
Tinnitus	17	28.33
Post-aural swelling	8	13.33
Giddiness	8	13.33
Symptoms of intra-cranial involvement	6	10
Post-aural discharge	2	3.33
Facial weakness	5	8.33
<b>Grades of hearing loss</b>		
Mild	5	8.33
Moderate	45	75
Severe	10	16.66
<b>Characteristics of otorrhea</b>		
Foul smelling, scanty discharge	37	63.79
Foul smelling, purulent discharge	8	13.79
Blood stained, scanty discharge	7	11.66
Blood stained, foul smelling, scanty discharge	6	10.34
Blood stained, foul smelling, purulent discharge	1	1.72
Scanty discharge	1	1.72

**Table 2: Distribution of study participants according to examination findings.**

Examination findings	Number	Percentage (%)
<b>Findings on examination of EAC</b>		
Discharge present	38	63.33
Clear EAC	15	25
Polyp present	7	11.66
<b>Examination of mastoid bone</b>		
Tenderness present	8	13.33

Continued.

Examination findings	Number	Percentage (%)
Tenderness absent	52	86.66
<b>Findings on examination of tympanic membrane</b>		
Posterior superior retraction	11	18.33
Posterior superior retraction+granulation	10	16.66
Attic perforation+cholesteatoma	8	13.33
Attic perforation	6	10
Granulations	5	8.33
Attic retraction+granulations	5	8.33
Attic retraction	4	6.66
Attic perforation+granulations	3	5
Posterior superior retraction+polyp	3	5
Posterior superior retraction+attic retraction	1	1.66
Posterior superior retraction+attic perforation	1	1.66
Posterior superior retraction+attic destruction	1	1.66
Polyp	1	1.66
Not visualized	1	1.66
<b>Facial nerve examination</b>		
Facial nerve weakness present	5	8.33
Facial nerve weakness absent	55	91.66

**Table 3: Distribution of study participants according to findings on different investigations.**

Investigations	Number	Percentage (%)
<b>Bacteriological report</b>		
Pseudomonas	21	35
Staphylococcus	10	16.66
Acinetobacter	6	10
Citrobacter	6	10
Streptococcus	4	6.66
Mixed	4	6.66
No organism	6	10
<b>CT scan findings</b>		
Ossicular erosion	23	38.33
Facial canal erosion	11	18.33
Tegmen erosion	10	16.66
Mastoid bone erosion	10	16.66
Sinus plate erosion	6	10
Petrositis	2	3.33
Cerebral oedema	2	3.33
Sigmoid sinus filling defect	2	3.33
Brain abscess	1	1.66
Epidural abscess	1	1.66
<b>Pure tone audiometry findings</b>		
Normal	00	00
Mild CHL	7	11.66
Moderate CHL	39	65
Moderately severe CHL	4	6.66
Severe CHL	7	11.66
Profound CHL	00	00
Mixed CHL	3	5

**Table 4: Site of complications.**

Site of complications	Type of complications	No. of patients	Percentage (%)
<b>Intratemporal</b>	Mastoid abscess	9	47.36
	Mastoid fistula	2	10.52
	Facial nerve palsy	5	26.31

Continued.

Site of complications	Type of complications	No. of patients	Percentage (%)
Intracranial	Petrositis	2	10.52
	Labyrinthitis	1	5.26
	LSC-fistula	1	5.26
	LSTP	2	10.52
	Meningitis	2	10.52
	Temporal lobe abscess	1	5.26
	Epidural abscess	1	5.26

**Table 5: Distribution of study participants according to intra-operative findings.**

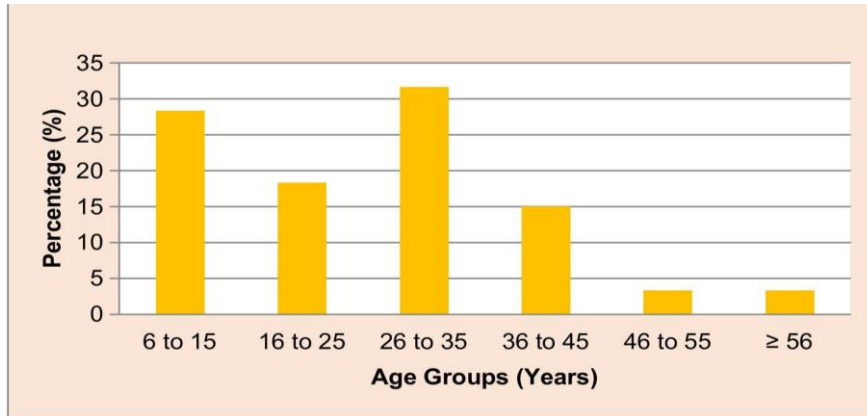
Intra-operative findings	Number	Percentage (%)
<b>Mastoid fistula</b>	2	3.33
<b>Cholesteatoma</b>	11	18.33
<b>Granulations</b>	9	15
<b>Both cholesteatoma and granulation</b>	40	66.66
<b>Facial canal erosion</b>	11	18.33
<b>Dural abscess</b>	1	1.66
<b>Petrous apex erosion</b>	2	3.33
<b>Mastoid bone erosion</b>	10	16.66
<b>LSC fistula</b>	1	1.66
<b>Ossicular erosion</b>	23	38.33
<b>Tegmen erosion</b>	10	16.66
<b>Sinus plate erosion</b>	6	10
<b>Lateral sinus erosion</b>	2	3.33

**Table 6: Distribution of study participants according to findings on follow up visits.**

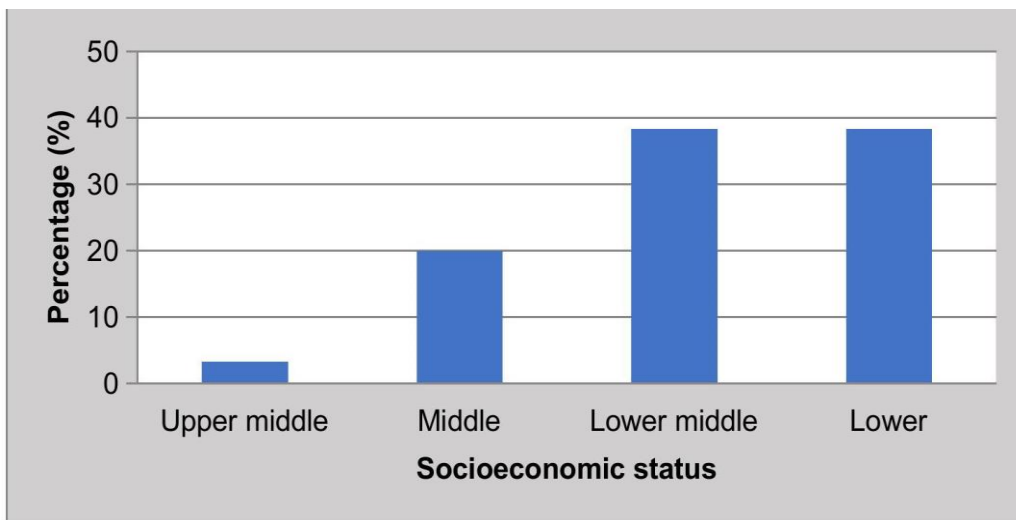
Duration of follow-up	Number	Percentage (%)
<b>1 week follow up findings</b>		
Healthy wound	51	85
Gaped wound	5	8.33
Infected wound	4	6.66
<b>1 month follow up findings</b>		
Well epithelized+graft in situ+hearing improved	24	40
Graft in situ+hearing improved	16	26.66
Partial epithelized+graft in situ+hearing improved	10	16.66
Graft perforation+hearing not improved	9	15
Well epithelized+graft inset+hearing not improved	1	1.66
<b>3 months of follow-up</b>		
Complete recovery	55	91.66
Recurrence	5	8.34

**Table 7: Distribution of study participants according to the surgeries done for specific complications.**

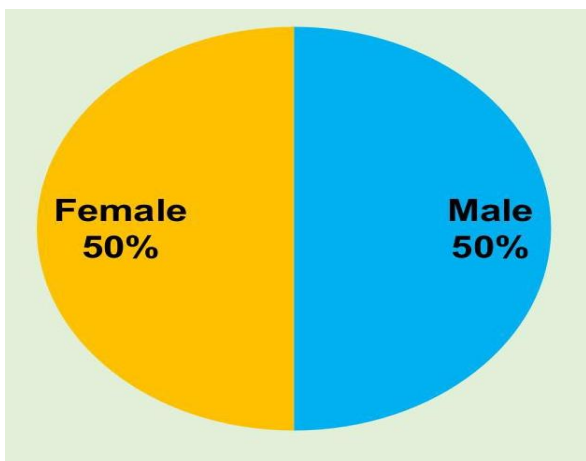
Type of surgeries for complications	Number	Percentage (%)
<b>Mastoid abscess drainage</b>	09	15
<b>Facial nerve decompression</b>	05	8.33
<b>Mastoid fistula excision</b>	02	3.33
<b>Petrus apical clearance</b>	02	3.33
<b>Lateral sinus thrombosis clearance</b>	02	3.33
<b>Epidural abscess drainage</b>	01	1.66
<b>LSC fistula repair</b>	01	1.66



**Figure 1: Age wise distribution of patients (n=60).**



**Figure 2: Distribution of patients according to socio-economic status (n=60).**



**Figure 3: Sex wise distribution of patients (n=60).**

**DISCUSSION**

CSOM is a disease condition characterized by persistent development of complications depends on high virulence of organism, poor resistance of patients, inadequate antibiotic treatment of acute middle ear and mastoid

infection, presence of chronic systemic disease and resistance of organisms to antibiotics which is becoming common these days. Lack of awareness and ignorance further increases the chances of developing either extra cranial or intracranial complications. Thus, this single centre, observational study was conducted in ENT OPD and IPD to study complications of attico-antral type of chronic suppurative otitis media in tertiary care centre.

The mean age of study subjects in our study is higher than study conducted by Sangeetha et al whereas its comparable to the study conducted by Kaur et al.<sup>10,11</sup> In this study most of the patients (53.33%) had attico-antral CSOM on left side, followed by right side (26.66%) and then bilateral (20%). Sangeetha S et al conducted a study in which most of the patients had CSOM on bilateral side, followed by left side and right side.<sup>11</sup> In a study conducted by Gaurav et al, 76% patients were having unilateral disease and 24% bilateral disease which coincides with our study which showed 80% unilaterality and 20% bilateral disease.<sup>12</sup> In our study the most common clinical chronic suppurative otitis media was hearing presentation of atticoantral loss (100%) and otorrhea (100%), followed by otalgia (36.66%) and least common presentation was post aural



discharge (3.33%). In a study conducted by Osma et al commonest clinical presentations were otorrhea (100%), hearing impairment (61.2%), and otalgia (31%) which correlated well with our study.<sup>13</sup> Also, in studies conducted by Patil et al these presentations were most commonly observed.<sup>14</sup>

In a study conducted by Mahajan et al most common bacteria isolated was pseudomonas aeruginosa (27.1%), followed by staphylococcus aureus (23.3%) and streptococcus species (6.5%) which is also in accordance with our study.<sup>15</sup> In another study conducted by Shetty et al was also pseudomonas aeruginosa (37.8%), staph aureus (30.49), streptococcus species (3.6%) which also correlates with our study.<sup>16</sup> These are similar to findings of our study. In this study most common finding on CT imaging was ossicular erosion (38.33%), followed by facial canal erosion (18.33%), followed by tegmen erosion (16.33%) and mastoid cortex erosion (16.33%). The other findings are sinus plate erosion (10%), sigmoid sinus filling defect (3.33%), petrositis (3.33%) cerebral oedema, brain abscess etc (Table 3).

In a study conducted by Reddy et al CT findings showed ossicular erosion (52%) facial canal erosion (16%), mastoid cortex erosion (12%) and sinus plate erosion (4%) which is in line with our study results.<sup>17</sup> In another study conducted by Shaik et al similar findings were observed.<sup>18</sup>

Out of all the complications our study showed that mastoid abscess was the most common complication which accounts for 47.36%, followed by facial nerve palsy (26.31%), mastoid fistula (10.5%), petrositis (10.5%), lateral sinus thrombophlebitis (10.5%), and meningitis (10.5%). The least common of these were brain abscess, epidural abscess and lateral semi-circular canal fistula (5.26% each).

Yorgancılar et al conducted a study in which extracranial complications accounted for 47.1% and intra cranial accounted for 30.6% and 22.3% showed multiple complications. Mastoid abscess (29.6%) was most common complication followed by lateral sinus thrombophlebitis (19.6) %.<sup>19</sup> In a study conducted by Dubey et al mastoid abscess was most common (37%), followed by mastoid fistula (24%), meningitis (19%), facial nerve palsy (14%), lateral sinus thrombophlebitis (14%) and brain abscess (9%).<sup>20</sup>

All the patients in our study underwent one of the 3 types of mastoidectomies and most common intra operative finding was both granulation and cholesteatoma (66.66%) followed by granulations alone (18.33%) and cholesteatoma alone (15%).

In a study conducted by Akhtar et al most common findings were granulations and cholesteatoma alone which was in contrary to our study.<sup>21</sup>

However, in a study by Shrestha et al both cholesteatoma and granulations were seen in 72% and these findings matches well with our study.<sup>22</sup>

## CONCLUSION

The present study concluded that among patients with attico antral type of CSOM, majority of the patients belonged to the low socioeconomic status, which is due to lack of proper sanitation, overcrowding, poor living conditions, shortage of safe water supply and lack of awareness. It is also clear from the study that timely intervention in the form of early diagnosis and administration of proper treatment resulted in complete recovery of majority of patients. Hence, public measures to prevent morbidity and mortality of patients with CSOM should aim at improving the basic living conditions of the patient, health education to increase the level of awareness among population and improved provision of healthcare services to the rural population.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Khadkekar S, Benny LM, Gujrathi AB, Gadpayale N, Paikrao Y. A systematic review of complications of attico-antral type of chronic suppurative otitis media in our region. *Int J Otorhinolaryngol Head Neck Surg* 2021;7:1636-43.