International Journal of Otorhinolaryngology and Head and Neck Surgery
Borgohain R et al. Int J Otorhinolaryngol Head Neck Surg. 2022 Dec;8(12):971-976
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937

DOI: https://dx.doi.org/10.18203/issn.2454-5929.ijohns20223046

Original Research Article

Complications of squamosal type of chronic otitis media- its management in a tertiary care centre

Rupam Borgohain, Asha Saikia*

Department of ENT and Head and Neck Surgery, Assam Medical College and Hospital, Dibrugarh, Assam, India

Received: 24 September 2022
Revised: 16 November 2022
Accepted: 19 November 2022

***Correspondence:**
Dr. Asha Saikia,
E-mail: ashasaikia23.as@gmail.com

ABSTRACT

Background: Chronic otitis media of squamosal type is inflammation of the middle ear cleft presenting with recurrent ear discharge through a tympanic membrane perforation. The disease spectrum ranges from mild to severe forms of complications. The aim is to find the incidence of complications of unsafe CSOM, its management and the demographic profile associated with it.
Methods: This hospital-based observational study was carried out on 25 patients admitted in the ENT department of a tertiary care centre during a period of 1 year. Diagnosis was made by taking a thorough history, clinical, audiological and radiological investigations. The data collected were tabulated in Microsoft excel worksheet and the variables were summarized as percentages and proportions.
Results: Out of 25 patients, 9 patients had complications and the most common extracranial and intracranial complications were mastoid abscess and brain abscess respectively. Complications were more common in the age group of 11-20 years. In all the patients, multiple intravenous antibiotics were given covering gram positive, gram negative and anaerobic organisms. The intracranial complications were managed by neurosurgery or neurology followed by mastoidectomy to eradicate the disease at source.
Conclusions: Significant decrease has been seen in the incidence of complications and mortality due to availability of newer and effective antibiotics along with early diagnosis and intervention. However, they are still prevalent among the lower socio-economic strata, poor hygiene and overcrowding communities. This study was aimed at creating awareness among the population to avail medical treatment at the earliest possible to avoid complications.

Keywords: Chronic otitis media, Mastoid abscess, Meningitis, Facial nerve palsy, Labyrinthitis

INTRODUCTION

Chronic otitis media is inflammation of the middle ear cleft marked by persistent discharge and perforation of tympanic membrane. It is previously classified as safe and unsafe. Now-a-days it is renamed as mucosal and squamosal.

Chronic otitis media of squamosal type is inflammation of the middle ear cleft which can occur as a sequelae of acute otitis media or eustachian tube dysfunction and retraction pocket formation in the attic, the pathogenesis of which may begin in childhood as a spontaneous tympanic membrane perforation.[1]

Cholesteatoma is one of the leading causes of occurrence of complications of unsafe CSOM. It consists of a sac of keratin debris lined by keratinizing squamous epithelium. There are four theories of cholesteatoma, given by Wittmack, Habermann, Lange and Ruedi and Wendt and Sade. Wittmack's theory of invagination states that deepening of the retraction pocket due to negative middle ear pressure and repeated inflammation prevents clearance of the desquamated keratin from the recess,

resulting in cholesteatoma. Habermann gave the theory of migration, wich states that keratinizing squamous epithelium of tympanic membrane or deep canal wall migrates into the middle ear through a pre-existing tympanic membrane perforation, leading to secondary acquired cholesteatoma. Basal cell hyperplasia theory was given by Lange and Ruedi and it explains that disruption of the basal lamina allows invasion of epithelial cones into the subepithelial connective tissue and forms micro-cholesteatomas, which enlarge, perforate the tympanic membrane and forms primary cholesteatoma. And, lastly, the Squamous metaplasia theory by Wendt and Sade states that metaplasia of the middle ear mucosa into squamous epithelium due to repeated infection through a pre-existing perforation causes secondary acquired cholesteatoma.[2]

An extensive form of the disease can be seen ranging from mild otorrhea to severe life-threatening complications which are due to progressive erosion of bone, retrograde thrombophlebitis of veins, periarteriolar space of Virchow and Robin, preformed pathways and hematogenous spread.[2]

Complications of chronic otitis media can be broadly classified into intracranial and extracranial. Intracranial ones are extradural abscess, subdural abscess, brain abscess, lateral sinus thrombophlebitis, meningitis and otitic hydrocephalus.[3] Extracranial complications can further be classified into intra-temporal and extra-temporal. Intra-temporal complications are mastoiditis, petrositis, labyrinthitis and facial nerve paralysis; while extratemporal are post aural abscess, zygomatic abscess, Bezold's abscess, Luc's abscess, Citelli's abscess, para-pharyngeal and retro-pharyngeal abscesses.

With the advent of antibiotic era, a significant decrease in the number of complications is seen, but they are still prevalent among the lower socio-economic strata, poor hygiene and overcrowding communities.[4]

The aim of this study was to record the incidence, clinical presentations and management of complications of chronic otitis media of squamosal variety.

METHODS

This is a hospital-based prospective observational study. A total of 25 (n) patients with chronic otitis media of atticoantral type were admitted in the department of otorhinolaryngology and head and neck surgery in AMCH, a tertiary care centre, who underwent HRCT temporal bone followed by surgical intervention from January 2021 to December 2021 and were included in the study. Study approved by institutional ethics committee.

Inclusion criteria patients of any age and gender diagnosed with unsafe variety of chronic otitis media with or without complications and patients giving consent to participate in the study; and exclusion criteria are those with congenital ear disease, malignant ear pathology, safe CSOM and not giving consent to participate in study.

Statistical analysis

The data collected were tabulated in Microsoft Excel Worksheet. The categorical variables were summarised as proportions and percentages.

Methodology used

The study was carried out by taking a thorough history from the patients who were admitted in the department of ENT and Head and Neck surgery, AMCH to determine the duration and type of discharge, hearing loss or any other complain. The demographic profile of the patients were analysed and general examination done. Otoendoscopy was done along with nose and throat examination. Systemic examination was done with emphasis on CNS examination. Routine investigations required for surgery and HRCT temporal bone were performed in all the patients. On the basis of history, clinical, audiological and radiological examination, a diagnosis of unsafe CSOM was made. Clinically, we come across three types of perforation of tympanic membrane, namely, central, attic and posterosuperior marginal perforation. Attic and posterosuperior marginal perforations are also called unsafe perforation as they are found to be associated with cholesteatoma.

In cases with signs of intracranial complications, fundoscopy was done to rule out papilloedema and CT brain done. MRI brain done where indicated. Intra-cranial complications, except sigmoid sinus thrombosis, were managed initially by neuro-surgeons and neurologists and then patients underwent mastoid exploration for complete eradication of disease. Under all aseptic and antiseptic precautions, mastoid surgery was performed under general anaesthesia. Twenty patients were approached by classical post-auricular approach to mastoidectomy, while 5 patients approached endo-scopically. Cases followed up after 6 weeks, 12 weeks and after 6 months.

RESULTS

All patients of unsafe variety of chronic otitis media attending otorhinolaryngology department during the study period who fulfil inclusion criteria were included in study. There was total of 25 patients during this study period. Most of the cases were found in age group of 11 to 30 years (Table 1). The number of cases were higher in males with 60% cases in comparison to females which was 40% cases. Male to female ratio was 1.5:1 (Table 2).

Figure 1 shows the various clinical presentations of patients with the most common being otorrhea.

Nine out of 25 patients showed various complications numbering upto 13 with few patients having more than one complication (Table 3).

Majority of the patients showing complications were in the age group of 11-20 years (Table 4). Intraoperatively, either cholesteatoma or granulation tissue or both were found with highest incidence of cholesteatoma alone (Table 5).

Table 1: Age distribution of patients.

Age (Years)	Number of patients	Percentage (%)	Mean ± SD
0-10	3	12	20.64±9.66
11-20	10	40	
21-30	10	40	
31-40	1	4	
41-50	0	0	
51-60	1	4	
Total	25	100	

Table 2: Gender distribution of patients.

Gender	N	Percentage (%)
Male	15	60
Female	10	40
Total	25	100

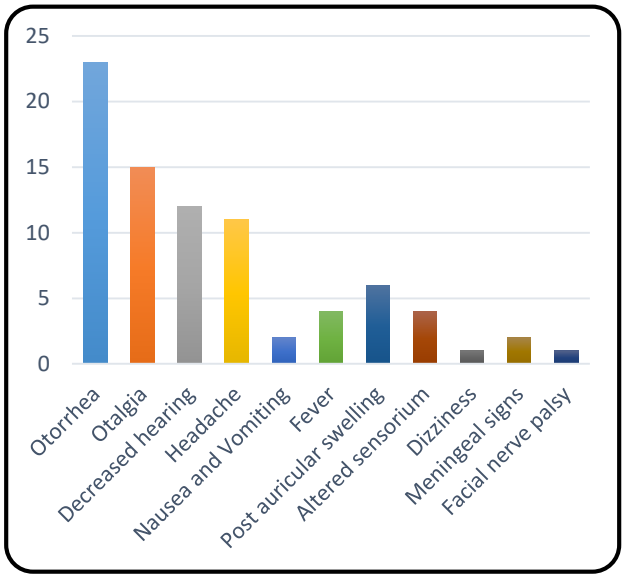

Figure 1: Histogram showing clinical presentations.

Table 3: occurence of complications

Complications	N	Percentage (%)
Postauricular abscess	6	24
Facial nerve palsy	1	4
Labyrinthitis	1	4
Meningitis	1	4
Extradural abscess	1	4
Subdural abscess	1	4
Brain abscess	2	8
Total number of complications	13	52

Table 4: Age distribution of patients with complications.

Complications	Age group (Years)					
	0-10	11-20	21-30	31-40	41-50	51-60
Mastoid abscess	2	2	2			
Facial nerve palsy			1			
Labyrinthitis		1				
Meningitis		1				
Extradural abscess		1				
Subdural abscess		1				
Brain abscess	1		1			

Table 5: intraoperative findings with respect to pathology.

Pathology	N	Percentage (%)
Cholesteatoma	14	56
Granulation	4	16
Both	7	28

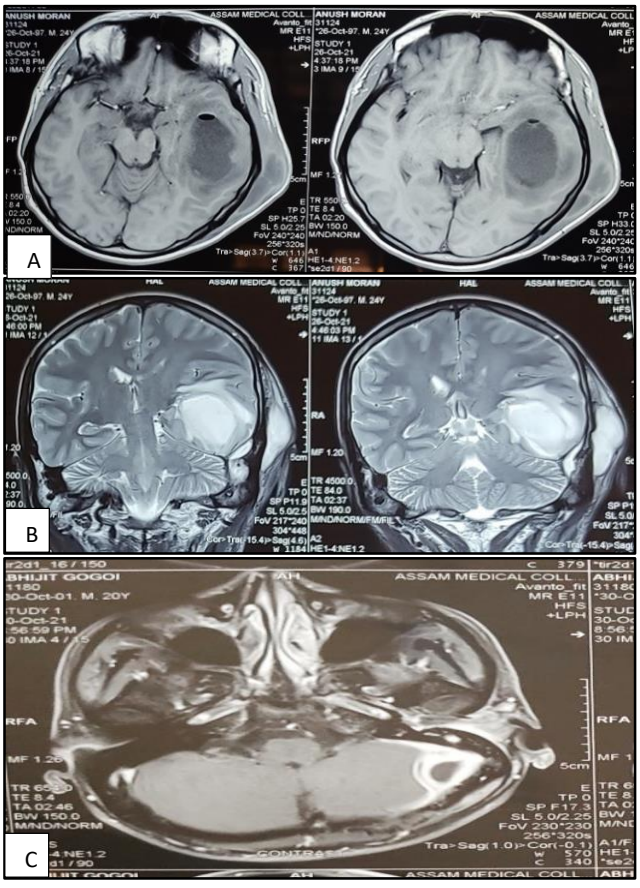

Figure 2 (A-C): MRI brain of left temporoparietal abscess (Axial cut) and left temporoparietal abscess (Coronal Cut) and left extradural cerebellar abscess (Axial cut).

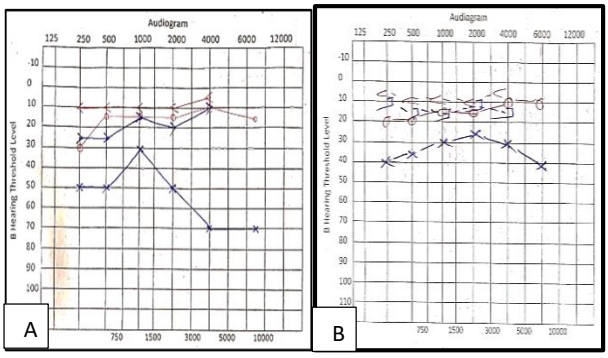

Figure 3 (A and B): Pre-op and post-op audiogram of a patient who had cholesteatoma bridging ossicular chain. Disease eroded the lenticular process of the incus and supra-structure of stapes.

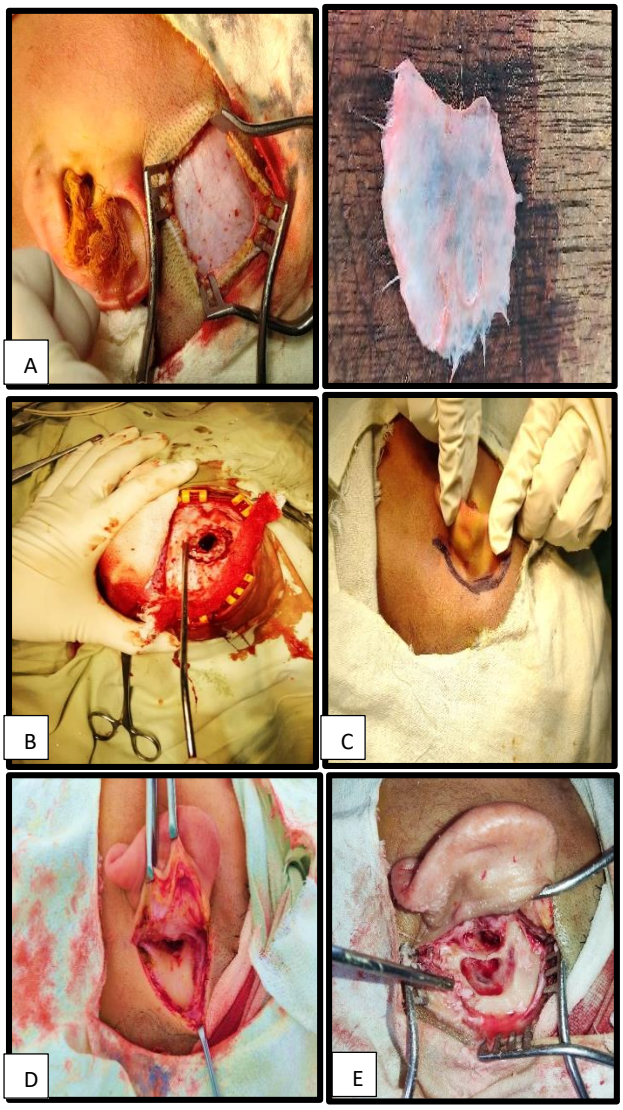

Figure 4 (A-E): Various steps of surgery-harvesting of temporalis fascia graft. Burr hole aspiration of subdural abscess, post-auricular (Wilde's) incision left ear and retraction of subcutaneous tissue, exposure of left mastoid and left cortical mastoidectomy.

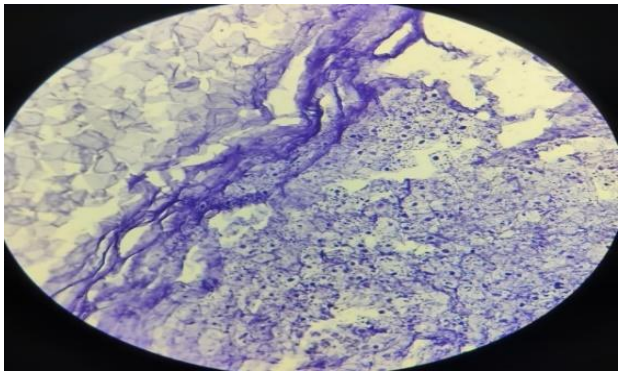

Figure 5: Hematoxylin and eosin-stained slide of cholesteatoma with 40x magnification.

DISCUSSION

Age and gender distribution

In our study, the patients were in the range of 8-53 years with a mean age of (20.64±9.66) years and the male to female ratio was 1.5:1, which were similar to a study by Basak et al where the average age was estimated to be (25.87±12.29) years and the male: female ratio was 1.46.[1] It was also in accordance to a study by Verma et al.[2]

Clinical presentations

The most common symptoms of the patients were otorrhoea (92%), followed by earache (60%) and decreased hearing (48%). However, patients with complications also presented with headache (44%), fever (16%), dizziness (4%), nausea and vomiting (8%). Postauricular swelling was seen in 6 (24%) cases of postauricular abscess. Altered sensorium (16%) was seen in 2 cases of temporoparietal abscess and 1 case of subdural abscess and meningitis each. Neck rigidity, Kernig's sign and Brudzinski sign (8%) were seen in 1 case of meningitis and temporoparietal abscess each. Deviation of angle of mouth and incomplete eye closure was seen in the case of lower motor neuron facial nerve palsy (4%). In the case of labyrinthitis, patient presented with fever, sensorineural hearing loss, dizziness and nystagmus and fistula test was found to be positive. Per operatively, fistula was seen in the ampullary end of lateral semi-circular canal.

Complications

The 25 cases were taken in our study of which 9 had complications and 16 were without any complications.

Nine of 25 patients presented with complications of chronic otitis media. We have encountered multiple complications (both intracranial and extracranial) numbering to 13, in those 9 patients. 2 patients had only intracranial and 3 had only extracranial complications. Remaining patients presented with more than 1 complications. Four patients presented with multiple

complications in the form of either multiple extracranial complications or a combination of extracranial and intracranial complications respectively. However, none of the above patients had more than 1 type of intracranial complication.

The incidence of complications was 0.36. In a study done by Parmar et al 36 out of 250 patients showed complications in a period of 3 years and extracranial complications were more common than the intracranial ones as per our study.[3]

The majority of patients showing complications were in the age group of 11-20 years, which was similar to the study by Parmar et al.[3] However, Neeta Sharma et al in their study found majority of the patients to be in the age group of 5-10 years, followed by 11-20 years.[5]

Brain abscess and mastoid abscess were the most common intracranial and extracranial complications in our study respectively (Table 3). In the study by Parmar et al meningitis and postauricular abscess were the most common intracranial and extracranial complications respectively.[3] While in the study of Sharma et al brain abscess was the most common intracranial complication and subperiosteal abscess, the most common extracranial complication, which is in accordance to our study.[5] Gupta et al also found in their study that mastoid abscess and brain abscess were the most common extracranial and intracranial complications of chronic otitis media respectively.[6]

All these patients had preoperative evaluation of hearing status by pure tone audiometry. Majority of these patients had moderate to moderately severe conductive or mixed loss. The 3 patients had mild conductive loss preoperatively, but intraoperatively it was found that the cholesteatoma has eroded the incus and the suprastructure of stapes and has bridged the disrupted ossicular chain. This phenomenon is called cholesteatoma hearer (Figure 3).

Management

We have followed the classical protocol for treatment, that is, starting with broad coverage of antibiotics; secondly, treatment of intracranial complications by concerned departments like medicine, neurology and neurosurgery; and lastly, mastoid exploration. All the patients were treated with multiple high dose parenteral antibiotics covering gram positive, gram negative and anaerobic organisms, such as ceftriaxone at a dose of 50-75 mg/kg/day 12 hourly, aminoglycosides like amikacin at a dose of 7.5 mg/kg/day 12 hourly and metronidazole 500 mg 8 hourly/day before surgery. However, based on culture and sensitivity of aural swab, other antibiotics were used like amoxicillin-clavulanic acid, piperacillin-tazobactum, ciprofloxacin, meropenem etc.

Mastoid abscess was the only extratemporal complication and was seen in 6 cases with or without other complications. Incision and drainage was done to drain out the mastoid abscess. 2 of these cases also had temporoparietal abscess, where temporoparietal burr hole aspiration was done (Figure 4 B). 1 case had cerebellar extradural abscess, which did not have any cerebellar signs and was managed conservatively.

One case had labyrinthitis where, after removal of cholesteatoma and at the completion of modified radical mastoidectomy, the fistula was denuded and a graft was placed over the fistula.

Five of these cases were followed by canal wall down mastoidectomy and only in 1 case of mastoid abscess, cortical mastoidectomy was done.

No signs of focal neurological deficit was seen in the case of subdural abscess and drainage was done via burr hole, followed by canal wall down mastoidectomy.

Lumbar puncture and CSF fluid analysis were done to confirm the diagnosis of meningitis and was managed conservatively followed by atticoantrostomy due to the presence of limited disease in the middle ear.

We had encountered 1 case of lower motor neuron facial nerve palsy (Grade IV House-Brackmann classification), where intraoperative cholesteatoma was seen in posterosuperior part with erosion of the second genu. It was managed by decompression via endoscopic tympanotomy and atticotomy.

Among the 16 cases without complications, 5 cases underwent endoscopic atticotomy with tympanoplasty, 8 underwent canal wall down mastoidectomy and 3 cases canal wall up mastoidectomy.

Cholesteatoma versus granulation tissue

In our study, cholesteatoma was found intraoperatively in 56% cases, while granulation tissue was found in 16% cases only. In 28% cases, both cholesteatoma and granulation tissue were noted (Table 5).

This is in contrast to a study by Solanki et al where the incidence of granulations was more than twice of that of both cholesteatoma alone and granulations and cholesteatoma combined.[7] However, HRCT temporomastoid done preoperatively showed presence of soft tissue density in all the cases, but could not distinguish between cholesteatoma and granulations. A study by Jadia et al found 19.2% cases of granulation, 21.2% cases of cholesteatoma, 57.7% cases with both cholesteatoma and granulation and 1.9% with glue intra-operatively, which could not be distinguished by CT scan.[8]

No mortality was seen in the study. However, 3 patients developed immediate postoperative facial nerve palsy, which recovered with medical management by 6 weeks.

Limitation

The main limitation in the study is that majority of the population belongs to rural areas and seek medical help only after development of complications. Those with history of long duration of ear discharge take on and off medications at the peripheral health centres without proper follow up. So, incidence pattern of occurrence of complications could not be applied for a larger section of population.

CONCLUSION

Significant decrease has been seen in the incidence of complications of unsafe CSOM due to the advent of antibiotics. Also, newer methods of diagnosis like HRCT temporomastoid and early intervention has helped in reduction of mortality. However, problems like poor economic status, negligence and reluctance to attend health care facility should be addressed and awareness among this population is of utmost need to avail medical treatment at the earliest possible to avoid complications.

ACKNOWLEDGEMENTS

Author would like to thanks to principal-cum-chief Superintendent, AMCH, dr. Dhrubajyoti Kurmi, faculty, department of neurosurgery, AMCH.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Basak B, Biswas KD, Choudhary A, Biswas S. Socio-demographic and clinico- pathological correlates of chronic otitis media: a tertiary care govt. Hospital based epidemiological study in eastern India. J Med Sci Clin Res. 2019;7(6):124-32.
2. Verma K, Srivastava A, Rahman A, Sinha ON, Mohan C. Pattern of Otogenic Complications in a tertiary care teaching Hospital: A one year Experience. Int J Health Clin Res. 2020;3(7):57-61.
3. Parmar BD, Jha S, Sinha V, Chaudhury N, Dave G. A study of complications of chronic suppurative otitis media at tertiary care hospital. Int J Otorhinolaryngol Head Neck Surg. 2020;6(2):330-35.
4. Dongol K, Rayamajhi P, Gurung U. Complications of Acute and Chronic Otitis Media in a Tertiary Referral Centre in Nepal. Turk Arch Otorhinolaryngol. 2020; 58(4):234-40.
5. Sharma N, Jaiswal AA, Banerjee PK, Garg AK. Complications of chronic suppurative otitis media and their management: a single institution 12 years-experience. Ind J Otolaryngol Head Neck Surg. 2015;67(4):353-60.
6. Gupta MK, Gupta R. Complications of chronic suppurative otitis media: A study in Azamgarh district Uttar Pradesh. Int J Heal Clin Res. 2021;4(8):226-8.
7. Solanki B, Sharma S. Cholesteatoma Versus Granulations: Changing Incidence Trends and Association with Age and Complications. Ind J Otolaryngol Head Neck Surg. 2020;72(2):208-13.
8. Jadia S, Qureshi S, Sharma S, Mishra K. Correlation of Preoperative 'HRCT Temporal Bone' Findings with 'Surgical Findings' in Unsafe CSOM. Ind J Otolaryngol Head Neck Surg. 2021;73(1):33-40.

Cite this article as: Borgohain R, Saikia A. Complications of squamosal type of chronic otitis media-its management in a tertiary care centre. Int J Otorhinolaryngol Head Neck Surg 2022;8:971-6.