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PAEDIATRIC CHOLESTEATOMA – A CLINICORADIOLOGICAL AND HISTOPATHOLOGICAL STUDY WITH SURGICAL OUTCOMES

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ABSTRACT

Objective- To study the varying presentations of 10 cases diagnosed with Paediatric Cholesteatoma in a Tertiary Care Hospital

Study Design- A prospective study of 10 patients from January 2025 to January 2026

Subject And Methods- Patients who presented to the ENT OPD of our hospital were admitted and examined in detail. Patients were then planned for Canal Wall Up or Canal Wall down mastoidectomy. Histopathological Diagnosis was used to confirm Cholesteatoma and then the patients were studied based on age, sex, presenting chief complaints, examination and radiological findings.

Results- In our study done over a period of 1 year, we diagnosed and managed 10 cases of cholesteatoma in paediatric age group (<18 years). 60% of the patients were male. Most of the patients were belonging to the age group of 6-8 years and were having hailing from a rural residential area. The commonest chief complaint was foul smelling ear discharge and the most common otological finding was the presence of retraction pocket. The diagnosis was done clinically and radiologically with the help of High Resolution CT of Temporal Bone and the patients underwent Canal wall up or Canal wall down mastoidectomy. Histopathological confirmation of the diagnosis was done and patients were followed up for any recurrence.

Conclusion- This study, done in a tertiary care hospital helps to analyse the patients who presented to ENT OPD in order to facilitate the establishment of a diagnosis based on clinical signs and symptoms and also to understand any underlying eustachian tube and palatal dysfunctions which likely contribute to the elevated risk of developing Cholesteatoma in a paediatric age group. Additionally, cholesteatoma in this population was diagnosed and required surgical intervention at a younger age, which may suggest a more aggressive disease course. Providers should maintain a high degree of suspicion for cholesteatoma in this complex population.

Keywords: Paediatric Cholesteatoma, Aural Polyp, Granulations, Mastoidectomy.

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INTRODUCTION

Cholesteatoma is a benign but often locally destructive lesion composed of keratinizing squamous epithelium within the pneumatized regions of the temporal bone. If left untreated, growth may lead to complications such as hearing loss, intracranial invasion and infection, facial weakness, and thrombophlebitis. Particularly in children, associated hearing loss may have significant effects on language development and learning [1].

Congenital cholesteatoma may be defined as an epidermal inclusion cyst behind an intact tympanic membrane. The pediatric patient has a shorter, more horizontal, less rigid eustachian tubes that places them at high risk of middle ear disease, such as chronic otitis media with effusion and cholesteatoma [2].

Cholesteatoma in children is considered to be more aggressive than in adults as it tends to be more extensive, causes greater ossicular chain pathology, has higher recurrence rates and is more difficult to eradicate. Successful management requires eradication of disease, rehabilitation of hearing, and creating a dry ear[3].

Established risk factors include conditions that may predispose a patient to abnormal epithelial pathology within the middle ear, such as chronic middle ear disease, injury (iatrogenic or traumatic), and congenital anomalies and syndromes[1].

The incidence of cholesteatoma in children is difficult to determine, with estimates indicating an annual rate of 3–6 per 100,000 people[4].

SUBJECTS AND METHOD

A prospective descriptive type of study was conducted in a tertiary care hospital to identify the incidence and occurrence of cholesteatoma in the paediatric age group over a period of one year from January 2025 to January 2026.

In our Study, out of the patients who presented to the ENT OPD of Saraswati Institute of Medical Sciences, Hapur, 10 patients were chosen to be included in the study

Inclusion Criteria

-Age <18 years

-Patient diagnosed clinically and radiologically as Chronic Otitis Media, Squamosal

-No prior Ear Surgery

Exclusion Criteria

-Age<3yrs or >18years

-Prior Ear Surgery

All the patients who presented to the ENT OPD were identified. After proper necessary consents, a detailed history was taken and a thorough examination was conducted. Patients were grouped based on different parameters including age, sex, presenting chief complaints. The diagnosis was made based on clinical examination and radiological evidence including -presence of soft tissue in Prussack's Space, Erosion of Scutum, Erosion of Ossicles among the others. They were then planned for surgical intervention after relevant consents, pre operative evaluation. They were grouped into two categories including Canal Wall Up and Canal Wall down Mastoidectomy. Histological Evidence was used to confirm the diagnosis as Cholesteatoma .The patients were then followed up for up to a period of 6 months to look for any recurrence or complications.

Case 1

A 7 year-old child presented with complaints of left ear discharge since 2 years with on and off episodes, decreased hearing since 1 year and swelling behind the left ear for 15 days. The ear discharge was foul-smelling, continuous, and purulent. The patient also complained of dull aching pain in the left ear and fever. There was no history of vertigo, facial asymmetry, or headache.

On Otoscopic Examination of Left ear a reddish, friable mass (aural polyp) was seen completely occluding the external auditory canal. Also swelling in the post auricular region with associated redness was present **[FIGURE 1]**. Tympanic membrane was not visualized. Right Ear findings were within normal limits. Rinnes test was negative on the left side and Weber was lateralized to left ear. Pure tone audiometry showed moderate conductive hearing loss.

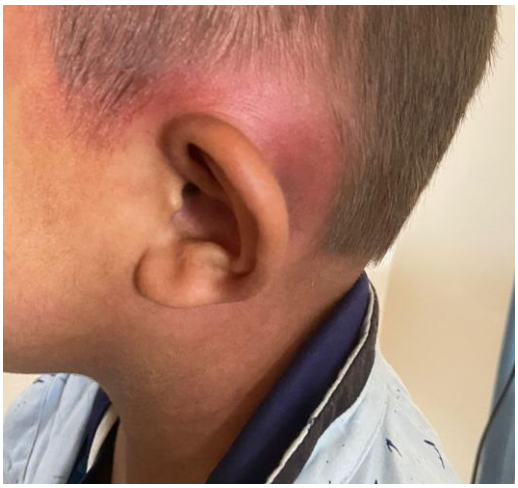


Figure 1 .Case 1. Preoperative Image of Left Csom with Post Aural Swelling with Aural Polyp

HRCT temporal bone was done and the findings came out to be soft tissue density in the middle ear cavity and mastoid antrum and surrounding bony erosions [FIGURE 2].

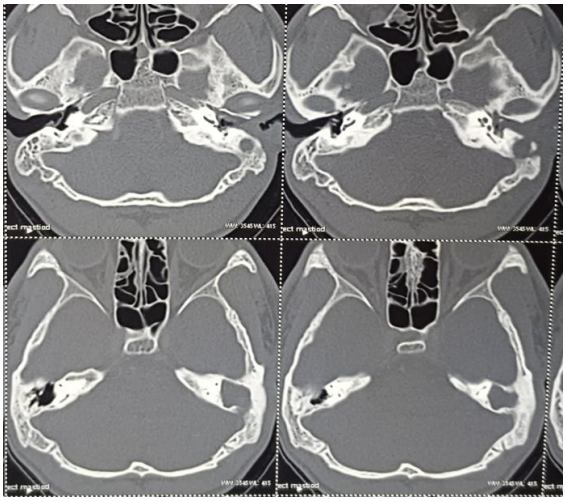


Figure 2. Case 1: Hrct Scan Temporal Bone Showing Soft Tissue Density in the Left Middle Ear Cavity and Mastoid Antrum with Blunting Of Scutum and Erosion of Tegmen Tympani.

Patient had undergone canal wall down mastoidectomy with type 3 tympanoplasty [FIGURE 3 (A, B, C)]

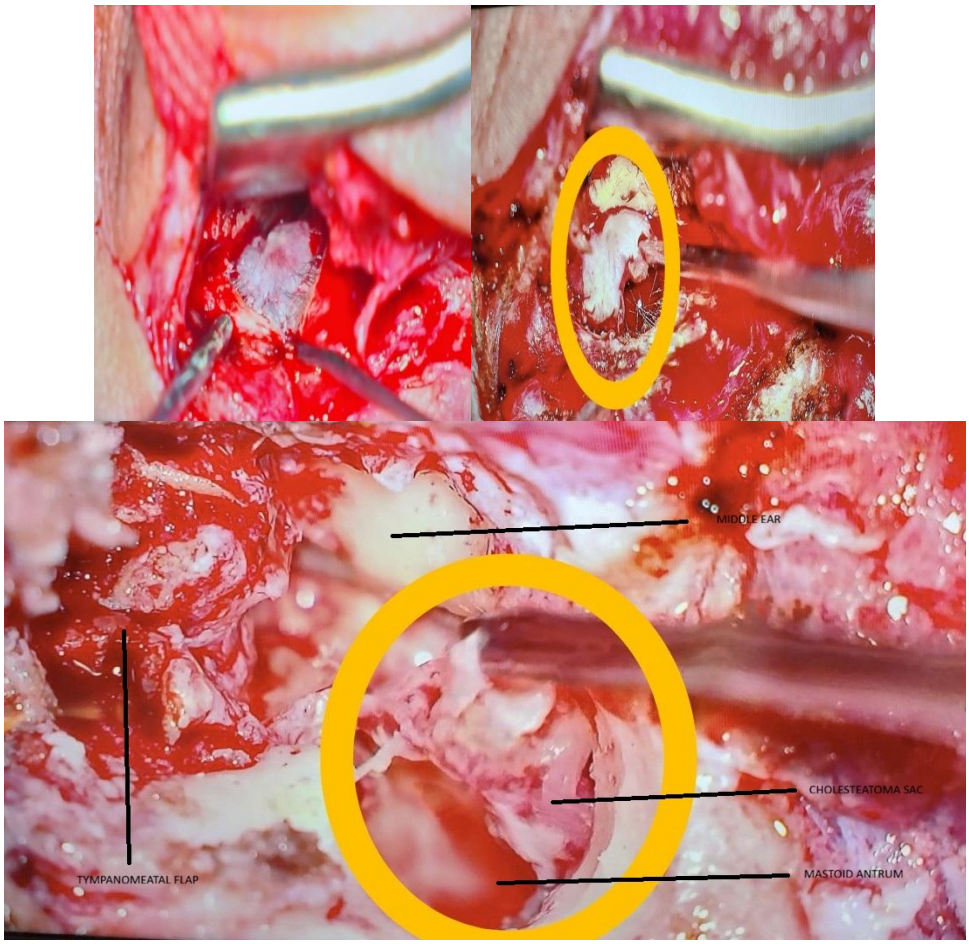


Figure 3 (A, B, C). Case 1: Intraoperative Picture Showing Aural Polyp and Cholesteatoma Debris

The aural polyp tissue was sent for HPE in which it came out to be squamous epithelium covered tissue

with moderate to marked chronic inflammation as well as foreign body giant cell in subepithelial fibrocollagenous connective tissues [FIGURE 4].

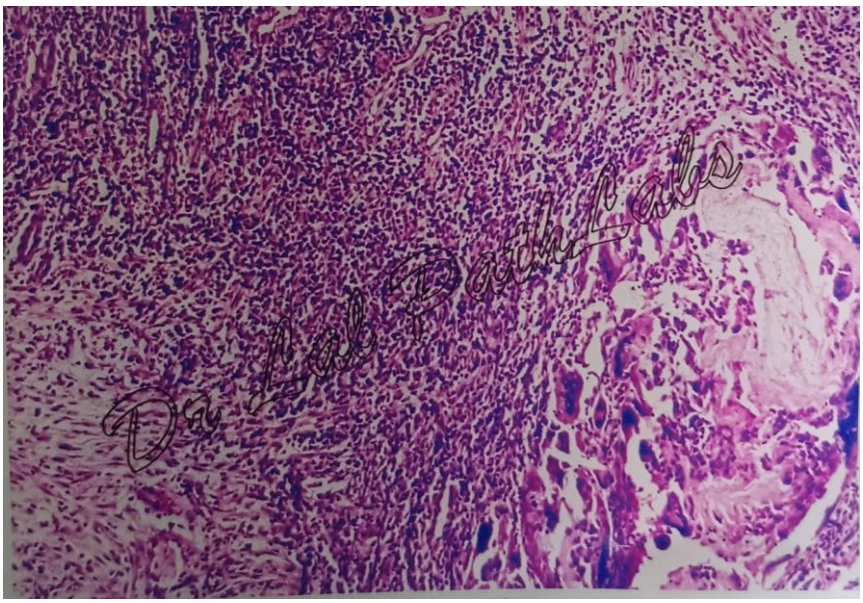


Figure 4 Case 1: Microphotograph Showing Squamous Epithelium Covered Tissue with Moderate to Marked Chronic Inflammation As Well As Foreign Body Giant Cell In Subepithelial Fibrocollagenous Connective Tissues

Case 2

A 9 year-old child presented to the ENT outpatient department with complaints of right ear discharge for 2 years, decreased hearing, and persistent discharge from behind the right ear for 1 year.

The ear discharge was foul-smelling, purulent, and continuous. The patient also complained of occasional ear pain with post auricular fistula and on and off discharge from the fistula. There was no history of vertigo, facial weakness, headache, or fever.

On Examination in the Right Post-Auricular Region, there is a presence of a small opening behind the right ear suggestive of a post-auricular fistula [FIGURE 5]. Surrounding skin was indurated and mildly tender.

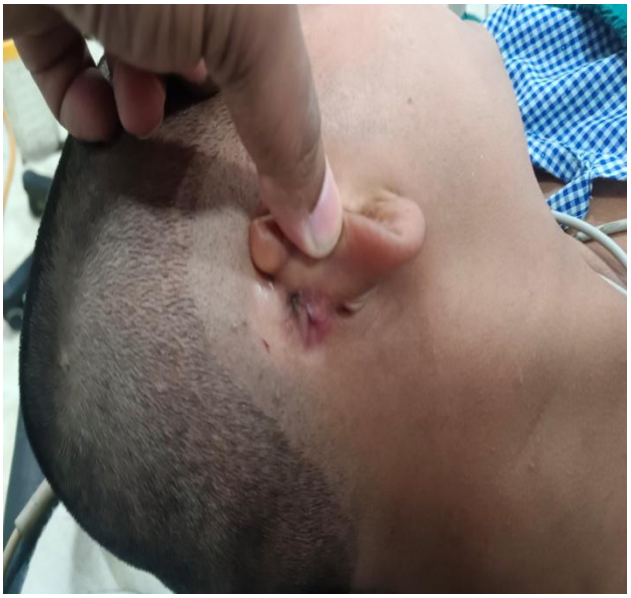


Figure 5 Case 2: Preoperative Picture Showing Right Csom with Post Auricular Fistula

On Otoscopic Examination of Right Ear- External auditory canal contained foul-smelling discharge. There was attic perforation of the tympanic membrane. Middle ear mucosa was congested with granulation tissue. Rinne's test was negative on right side and Weber was lateralized to right side.

Left Ear examination was within normal limits. Pure tone audiometry showed moderate conductive hearing loss. HRCT Scan Temporal bone showed soft tissue opacity in the middle ear cleft with ossicular chain destruction [FIGURE 6].

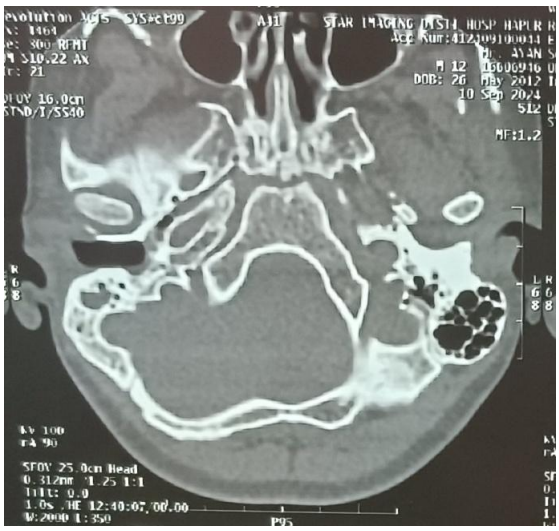


Figure 6 Case 2: Hrct Scan Temporal Bone Showing Soft Tissue Opacity in the Right Middle Ear Cleft With Ossicular Chain Destruction.

Patient had undergone canal wall down mastoidectomy with type 3 tympanoplasty [FIGURE 7].

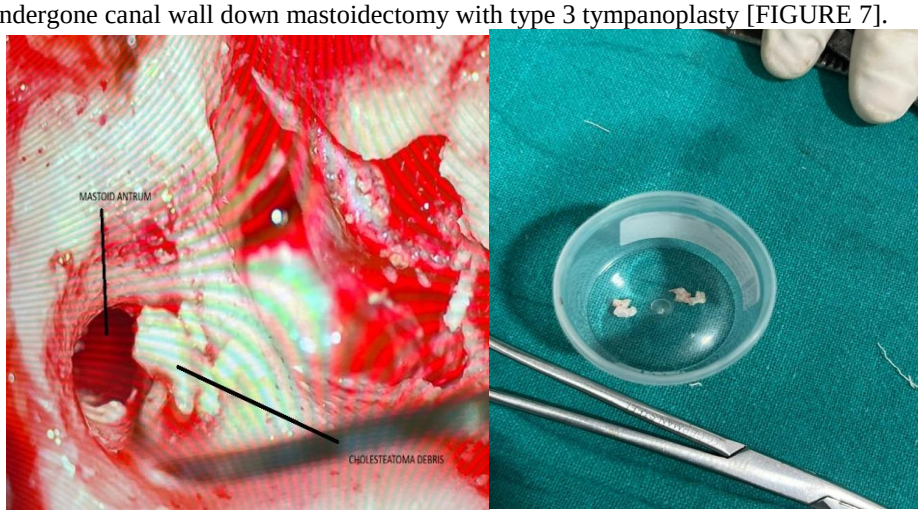


Figure 7(A, B) Case 2: Intraoperative Picture Showing Cholesteatoma Debris

Cholesteatoma sac was sent for HPE which showed squamous epithelium with lamellar keratin and high infiltration of chronic inflammatory cells [FIGURE 8].

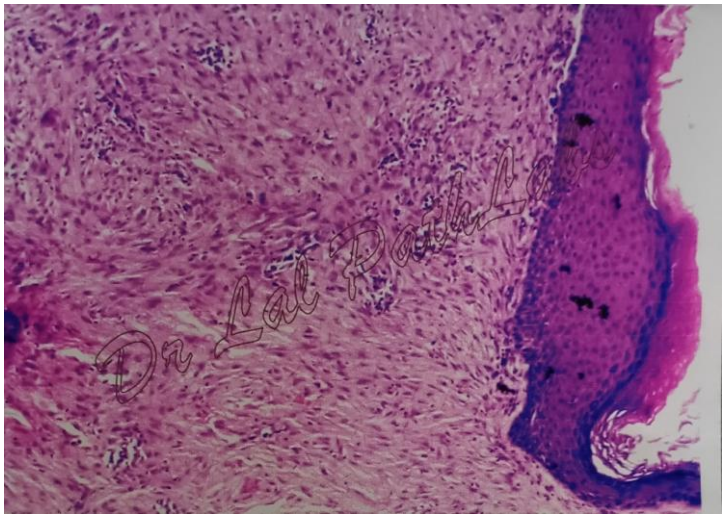


FIGURE 8 CASE 2: Microphotograph Showing Squamous Epithelium with Lamellar Keratin and High Infiltration of Chronic Inflammatory Cells

Case 3

A 9 year-old child presented to the ENT outpatient department with complaints of right ear discharge since 3 years on and off episodes , decreased hearing since 2 years, and painful soft swelling behind the right ear for 5 days.

The ear discharge was foul-smelling, purulent, and continuous. The post-auricular swelling was progressively increasing in size and associated with pain and fever with cheesy white discharge .There was no history of vertigo, facial weakness, or headache.

On Local Examination of Right Ear Post Auricular Region there is diffuse, tender, erythematous, and fluctuant swelling. Also obliteration of post-auricular sulcus is seen. Pinna pushed forward and downward. There was pus discharge on compression of the swelling [FIGURE 9]. Otoscopic Examination of Right Ear revealed purulent discharge completely filling the external auditory canal. After EUM and Suction clearance posterosuperior marginal perforation of the tympanic membrane was visualized. Middle ear mucosa was congested. Rinnes test was negative in right ear and Weber was lateralized to right ear.

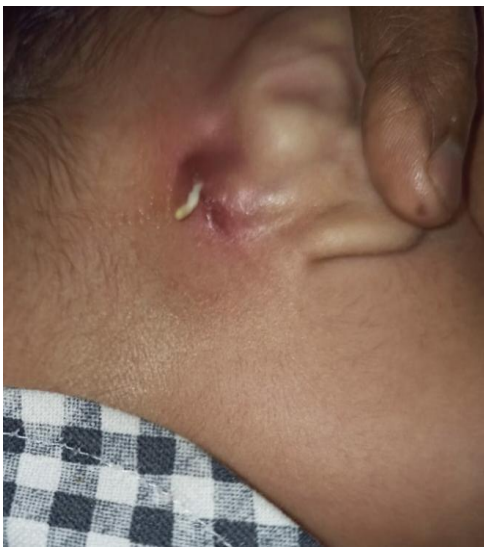


Figure 9 Case 3: Preoperative Picture Showing Right Csom with Postauricular Abscess

Left Ear examination was within normal limits.

Pure Tone Audiometry showed moderately severe conductive hearing loss in right ear. HRCT Scan Temporal bone showed soft tissue mass like density completely filling the middle ear and mastoid antrum with ossicular erosion. There was erosion of the scutum also [FIGURE 10].

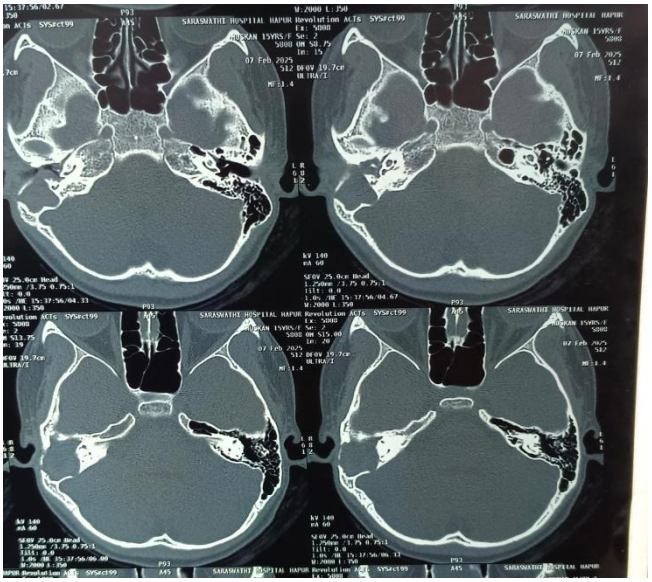


Figure 10 Case 3: Hrct Scan Temporal Bone Showing Soft Tissue Mass Like Density Completely Filling The Right Middle Ear and Mastoid Antrum with Ossicular Erosion and Erosion of The Scutum and Tegmen Tympani.

Patient had undergone canal wall down mastoidectomy with type 4 tympanoplasty [FIGURE 11].

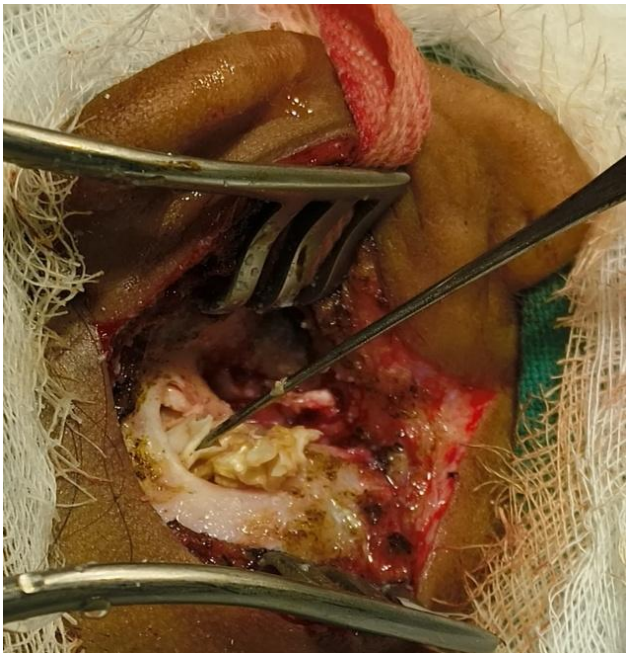


Figure 11. Case 3: Intraoperative Picture Showing Cholesteatoma Debris in Mastoid Antrum

Sample collected from middle ear was sent for histopathological examination which showed keratinizing stratified squamous epithelium and surrounding inflammatory cells. No significant atypia and dysplasia was seen **[**FIGURE 12].

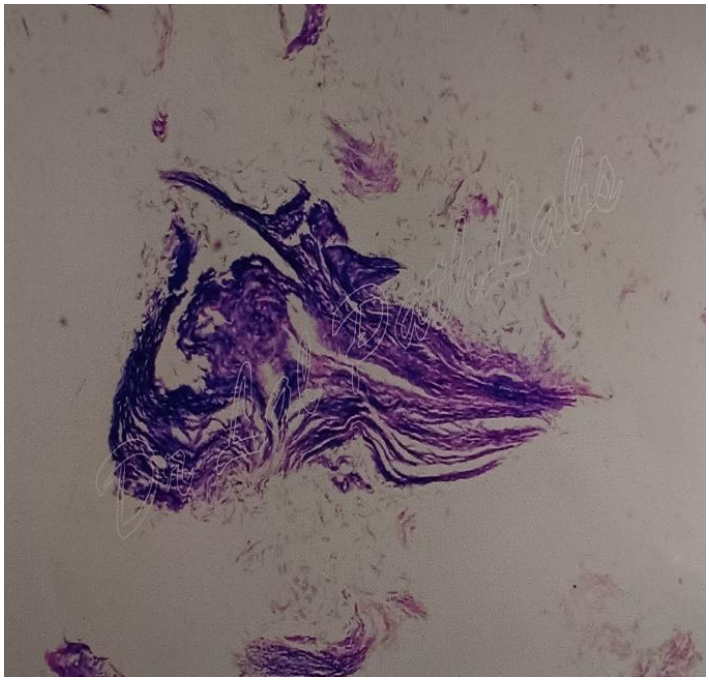
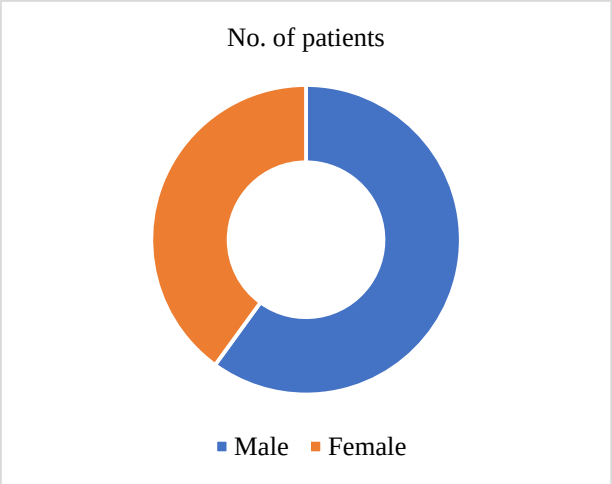


Figure 12. Case 3: Microphotograph Showing Keratinizing Stratified Squamous Epithelium and Surrounding Inflammatory Cells.

OBSERVATIONS AND RESULTS

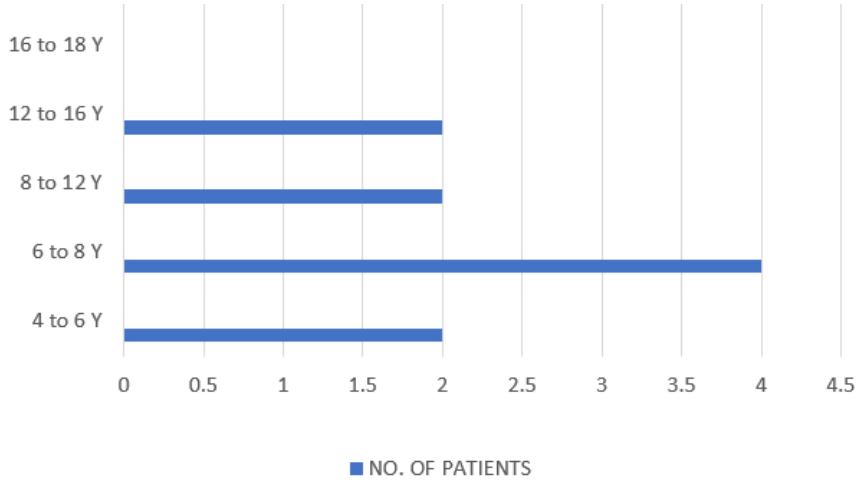
The results of our study were analysed as follows:

Out of the Ten Patients included in the study, 6 were Males and 4 were females



Demographic Details of the Patients Were Noted.

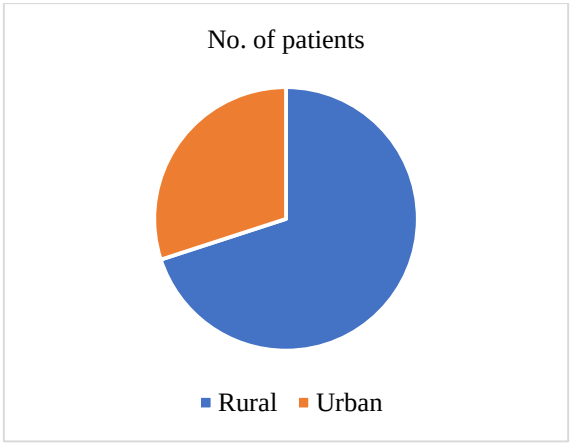
AGE GROUP (In Years)	NO. OF PATIENTS
4-6	2
6-8	4
8-12	2
12-16	2
16-18	0



In our study, Majority of the patients were belonging to the age group of 6-8 years

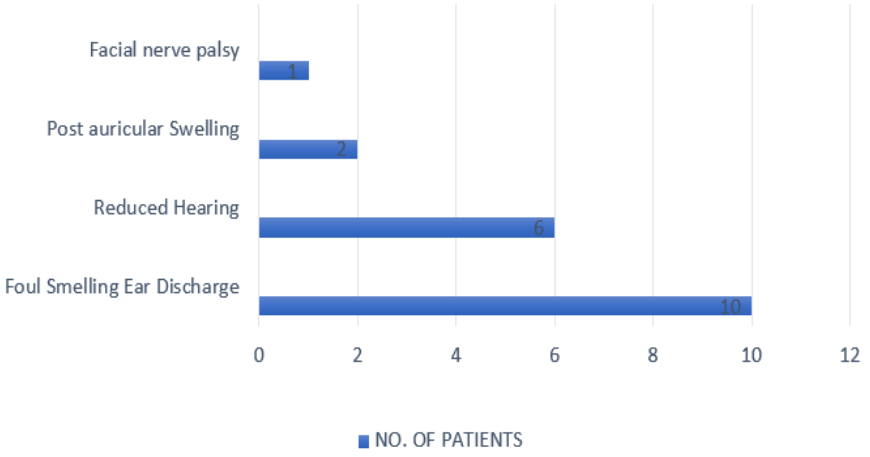
Place Of Residence	No. Of Patients
Rural	7
Urban	3

Most of the patients included in the study were belonging from rural areas and were having poor sanitation conditions around them.



Then they were further analysed and it was observed that the commonest chief complaint of the patients was Foul smelling ear discharge, scanty in amount and blood tinged. Other chief complaints included reduced hearing

Presenting Chief Complaint	No. Of Patients
Foul Smelling Ear Discharge	10
Reduced Hearing	6
Post Auricular Swelling	2
Facial Nerve Palsy	1



Associated Condition	No. Of Patients
Adenoid Hypertrophy	7
Allergic Rhinitis	3
Craniofacial Abnormalities	0
Gastrointestinal Disturbances	2

On Clinical Examination, the following clinical findings were noted.

Clinical Examination	No. Of Patients
Retraction Pocket	10
Attic Erosion	7
Perforation Of The Tympanic Membrane	2

Further all the patients underwent High Resolution Contrast CT of the Temporal Bone to confirm the diagnosis of unsafe type of otitis media

Radiological Finding	No. Of Patients
Soft Tissue In Middle Ear And Mastoid	10
Ossicular Erosion	7
Scutum Erosion	8
Facial Nerve Canal Dehiscence	1
Inner Ear Fistula	0

All the patients were then planned for Mastoid Exploration Procedures.

Surgical Procedure Performed	No. Of Patients
Canal Wall Down Mastoidectomy	6
Canal Wall Up Mastoidectomy	4

Histopathological Sample of all the patients of was sent for confirmation of the diagnosis of Cholesteatoma

The patients were then discharged on post-operative Day 2 and examined weekly for 6 months to identify any recurrence or complications

DISCUSSION

A number of classification systems for cholesteatoma have been proposed.

Acquired cholesteatoma may be subdivided into primary and secondary types. Primary acquired cholesteatoma presents without evidence of preexisting perforation or infection. This is also termed attic cholesteatoma as it arises in the pars flaccida region of the tympanic membrane[2].

Secondary acquired disease includes those cholesteatomas that form as the result of traumatic (or iatrogenic) perforation or infection[4]. Secondary acquired disease is found in the pars tensa region of the tympanic membrane and is most commonly seen in the posterior superior quadrant.

Four mechanisms for the pathogenesis of acquired cholesteatoma have been proposed which are Metaplasia, implantation, proliferation and retraction

Established risk factors include conditions that may predispose a patient to abnormal epithelial pathology within the middle ear, such as chronic middle ear disease, injury (iatrogenic or traumatic), and congenital anomalies and syndromes [9,10,11].

Increased permeability of the middle ear epithelium has been implicated as well [1].

Paediatric cholesteatoma presents with a multitude of challenges from diagnosis to treatment. Even though otorrhea and hearing loss represent the most common presenting symptoms, many cases are asymptomatic and thus diagnosed incidentally. Others can present with post aural swelling, giddiness or facial weakness[5].

The primary endpoints of cholesteatoma surgery are complete disease ablation and restoration/preservation of hearing. Surgical intervention for paediatric cholesteatoma includes tympanoplasty (TM) alone for limited disease or may include tympanomastoidectomy for more extensive disease[6].

Tympanoplasty provides excellent exposure of the middle ear but only limited visualization of the epitympanum, which is frequently involved with cholesteatoma[12,13]. It can only be used in limited cases of cholesteatoma

Canal wall-up tympanomastoidectomy is characterized by preservation of the posterior external auditory canal wall. Advantages include the avoidance of an open mastoid cavity which may require periodic office debridement. Maintaining separation between the mastoid and ear canal avoids restrictions on water exposure and provides greater choice of hearing aids should they become necessary. The primary disadvantage of this technique is the relatively limited exposure to the epitympanum and sinus tympani when compared with the CWD approach[7]. This generally results in higher rates of recidivism . Hearing results are typically better with this technique although outcomes may be influenced by the fact that CWU procedures are typically used for less extensive cholesteatoma. CWU procedures can be staged with a second-look procedure done 6–12 months later to remove residual disease prior to ossiculoplasty[8].

In a canal wall-down mastoidectomy, the posterior external auditory canal is removed to provide enhanced access to the middle ear and the epi tympanum. Rates of recidivistic disease are lower because residual cholesteatoma in the mastoid is exposed to neutralize its destructive capacity and render it open for debridement. The resulting cavity epithelializes with skin that migrates into the cavity from the meatus and remaining ear canal. Grafting intraoperatively can facilitate the maturation of a ‘‘mastoid bowl.’’ The size of the cavity can be minimized intraoperatively or subsequently with muscle flaps, bone pate, or fascial flaps[6.8]. Indications for the CWD approach include operation in an only hearing ear, incomplete resection of dis ease, an unreconstructable canal wall defect, and a patient who is not likely to follow up after surgery or is unlikely to be able to undergo a second-look procedure[4]. Therefore Paediatric cholesteatoma needs to be identified and treated in an effective manner.

CONCLUSION

This study, done in a tertiary care hospital helps to analyse the patients who presented to ENT OPD in order to facilitate the establishment of a diagnosis based on clinical signs and symptoms and also to understand any underlying eustachian tube and palatal dysfunctions which likely contribute to the elevated risk of developing Cholesteatoma in a paediatric age group. Additionally, cholesteatoma in this population was diagnosed and required surgical intervention at a younger age, which may suggest a more aggressive disease course. Providers should maintain a high degree of suspicion for cholesteatoma in this complex population.

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The authors declare that they have no competing interest.

Authorship Statements by All Authors:

All authors of this article declare that we qualify for authorship as defined by icmje. Each author has participated sufficiently in work and takes public responsibility for appropriateness of content of this article**.**

Author’s Contribution:

AK- Definition of intellectual content, Literature survey, Prepared first draft of manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation; GS- Concept, design, clinical protocol, data collection; AK,GS- Design of study, manuscript preparation; AS- Manuscript editing, review and article submission; TDK,MS- Manuscript Revision; NA- Literature survey, Coordination and Manuscript revision

Consent

Written informed consent has been taken by the patient

Ethical Approval

The study was approved by the Institutional Ethics Committee. Written informed consent was obtained from all patients or guardians prior to enrolment.

Statistical Analysis

Data were analysed using descriptive statistics. Categorical variables were expressed as frequencies and percentages.

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