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# HRCT Temporal Bone Scan Findings of Sinus Tympani, Facial Recess and Mastoid in CSOM Patients

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**ABSTRACT**
MRI is best for evaluation of inner ear pathology, particularly sensorineural hearing loss (SNHL). High-resolution 3D MR cisternographic sequences provide an excellent screening examination for patients with SNHL. These thin-section (≤1mm) T2-weighted MR sequences (SPACE, FIESTA, etc.) in the axial and coronal planes can help identify mass lesions of the internal auditory canal (IAC), particularly a vestibular schwannoma. CSOM patients who are planned for surgical management underwent HRCT TEMORAL BONE SCAN before surgery. Intra operative findings of middle ear cleft in such patients was noted and compared with the pre-operative HRCT TEMPORAL BONE scan findings. HRCT temporal bone scan will compliment the clinical assessment of the patients in diagnosis and surgical management of the same.

## INTRODUCTION

CT is the primary imaging modality for evaluating the fine bony detailed anatomy of the temporal bone. Multislice CT scanners allow thin slices (<1mm) and provide excellent multiplanar reformatted images. Current protocols include direct axial and reformatted coronal views, vestibular oblique or short-axis views (Poschl plane) and cochlear oblique or long-axis views (Stenver plane)[1]. A window width of 4,000 HU is ideal. CT scan is the imaging study of choice for CSOM, external auditory canal atresia/stenosis/ cholesteatoma, evaluation of conductive hearing loss[2].

MRI is best for evaluation of inner ear pathology, particularly sensorineural hearing loss (SNHL). High-resolution 3D MR cisternographic sequences provide an excellent screening examination for patients with SNHL. These thin-section (≤1mm) T2-weighted MR sequences (SPACE, FIESTA, etc.) in the axial and coronal planes can help identify mass lesions of the internal auditory canal (IAC), particularly a vestibular schwannoma. Sagittal oblique planes are excellent for evaluation of a child with SNHL to easily identify the 4 nerves within the IAC[3,4].

The gold standard for imaging patients with acquired SNHL is enhanced thin-section (≤3 mm) axial and coronal images through the T-bone with fat-saturated, postcontrast images. Precontrast T1-weighted images are helpful to evaluate for T1 hyperintense lesions, such as hemorrhage or lipoma[5].

When the clinical question is SNHL, a petrous apex lesion, or possible IAC or cerebellopontine angle (CPA) lesion, MR is the imaging study of choice[6].

## MATERIALS AND METHODS

**Source of Data:** CSOM patients presenting to hospital which is a tertiary care centre and who are undergoing ear surgery.

**Methods of Collection of Data:**

- CSOM patients who are planned for surgical management underwent HRCT TEMORAL BONE SCAN before surgery.
- Intra operative findings of middle ear cleft in such patients was noted and compared with the pre-operative HRCT TEMPORAL BONE scan findings.

**Design of Study:** Cross Sectional Comparative.

**Study:**
**Sample Size:** 180 patients.

**Inclusion Criteria:** CSOM patients above 10 years who are undergoing ear Surgery.

**Exclusion Criteria:**

- Patients with revision surgery.
- Patients with congenital anomalies of temporal bone.
- Patients with other temporal bone diseases.

## RESULTS AND DISCUSSIONS

**Table 1: HRCT Findings**

| | | |
|---|---|---|
| **Sinus tympani** | | |
| Normal | 163 | 90.6 |
| Diseased | 17 | 9.4 |
| Cholesteatoma | 0 | |
| Facial recess | | |
| Normal | 163 | 90.6 |
| Diseased | 17 | 9.4 |
| Cholesteatoma | 0 | |
| Mastoid | | |
| Normal | 86 | 47.8 |
| Diseased | 94 | 52.2 |
| Cholesteatoma | 0 | |

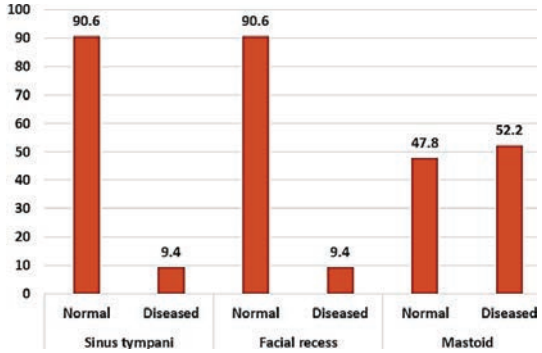


Fig 1: HRCT Temporal Bone Scan Findings

The T-bone is located in the middle cranial fossa posterolateral floor. Its boundaries include the sphenoid bone anteriorly, occipital bone posteriorly and medially and parietal bone superiorly and laterally. There are 5 bony parts of the adult T-bone. Squamous, mastoid, petrous, tympanic and styloid portions. The squamous portion forms the lateral wall of the middle cranial fossa. The mastoid process represents the postnatal development of the posteroinferior mastoid[7]. The petrous portion of the T-bone contains the middle and inner ear, IAC and petrous apex. The tympanic segment is a U-shaped bone that forms most of the bony external ear. The styloid portion forms the styloid process after birth.

The EAC is made up of the tympanic bone medially and fibrocartilage laterally. The medial border of the EAC is formed by the TM, which attaches to the scutum superiorly and the tympanic annulus inferiorly. The middle ear includes the epitympanum, mesotympanum and hypotympanum[8].

The epitympanum (attic) is defined superiorly by the tegmen tympani, which forms the roof. The inferior margin is defined by a line between the scutum and the tympanic segment of the facial nerve. The tegmen tympani is the thin bony roof between the epitympanum and the middle cranial fossa dura.

Prussak space represents the lateral epitympanic recess and is a classic location for acquired (pars flaccida) cholesteatoma. The malleus head and body and the short process of the incus are present within the epitympanum[9].

The mesotympanum is the middle ear area between the epitympanum above and the hypotympanum below. It is defined superiorly by a line between the scutum and tympanic segment of the facial nerve and inferiorly by a line between the tympanic annulus and the base of the cochlear promontory. The remainder of the ossicles (manubrium of the malleus, long and lenticular process of the incus and stapes) is located in the mesotympanum. The 2 muscles of the middle ear, the tensor tympani and stapedius muscles, are also in the mesotympanum and function to dampen sound. The posterior wall of the mesotympanum has 3 important structures: Facial nerve recess, pyramidal eminence and sinus tympani. The facial nerve recess contains the mastoid facial nerve and may be dehiscent or have a bony covering. The pyramidal eminence contains the belly and tendon of the stapedius muscle. The sinus tympani is a clinical blind spot during a standard mastoid surgical approach to the Temporal bone, where cholesteatomas may hide. The medial wall contains the lateral SCC, the tympanic segment of the facial nerve and the oval and round windows[10].

The hypotympanum is a shallow trough on the floor of the middle ear cavity.

The mastoid cavity contains 3 important anatomic structures. The mastoid antrum (Latin for cave) is the large, central mastoid air cell. The aditus and antrum (Latin for entrance to the cave) connects the epitympanum of the middle ear to the mastoid antrum.

Körner septum is part of the petrosquamosal suture running posterolaterally through the mastoid air cells. This septum functions as an important surgical landmark within the mastoid air cells and also serves as a barrier to the extension of infection from the lateral mastoid air cells to the medial mastoid air cells. The mastoid continues to develop after birth. As the mastoid eminence protects the facial nerve, this nerve is relatively unprotected until the eminence is formed. This is why the facial nerve is vulnerable to birth trauma.

The posterolateral aspect of the mastoid abuts the sigmoid sinus., the bone separating the sigmoid sinus from mastoid air cells is called the sigmoid plate.

## CONCLUSION

In this study we found out that HRCT temporal bone scan will compliment the clinical assessment of the patients in diagnosis and surgical management of the same.

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