International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Imaging Spectrum of Chronic Otitis Media and Its Complications: A High-Resolution CT Study

Prof. Dr. Bhawana Sonawane[1], Dr. Prakash S[2], Dr. A Yashwanth Reddy[3], Dr. Aditi Singhal[4]

[1]HOD, Radiology, IGGMC, NAGPUR
[2]Senior Resident, Radiology, IGGMC, NAGPUR
[3]Junior Resident, Radiology, IGGMC, NAGPUR

Abstract

This retrospective study was conducted at a tertiary care institution. HRCT scans of the temporal bone performed for patients with suspected or diagnosed chronic ear disease were reviewed over a defined study period in our institute Indira Gandhi government college, Nagpur, Maharashtra (India)

Inclusion Criteria

- Patients who underwent HRCT temporal bone imaging
- Clinical suspicion or diagnosis of chronic otitis media
- Adequate **imaging quality for interpretation**

Exclusion Criteria

- **Incomplete imaging studies**
- **Poor image quality due to motion artifacts**
- **Lack of relevant clinical data**

Introduction

Chronic otitis media (COM) is a long-standing inflammatory condition of the middle ear and mastoid air cell system characterized by persistent or recurrent ear discharge, tympanic membrane perforation, and hearing impairment. It remains a significant public health problem worldwide and can lead to serious complications if left untreated.

The chronic inflammatory process may result in structural damage to the middle ear, including ossicular erosion, scutum destruction, mastoid involvement, and spread to adjacent anatomical structures. In advanced cases, complications may involve the facial nerve, inner ear, or intracranial structures.

High-resolution computed tomography (HRCT) of the temporal bone has become the imaging modality of choice for evaluating chronic ear disease. HRCT provides excellent visualization of the complex osseous anatomy of the temporal bone and allows accurate detection of bony erosions, ossicular chain abnormalities, and mastoid air cell pathology.

The purpose of this study is to evaluate the imaging spectrum of chronic otitis media and its complications using HRCT and to highlight its importance in disease assessment and surgical planning.

Materials and Methods

Study Design

This retrospective study was conducted at a tertiary care institution. HRCT scans of the temporal bone performed for patients with suspected or diagnosed chronic ear disease were reviewed over a defined study period.

Inclusion Criteria

- Patients who underwent **HRCT temporal bone imaging**
- Clinical suspicion or diagnosis of **chronic otitis media**
- Adequate imaging quality for interpretation

Exclusion Criteria

- Incomplete imaging studies
- Poor image quality due to motion artifacts
- Lack of relevant clinical data

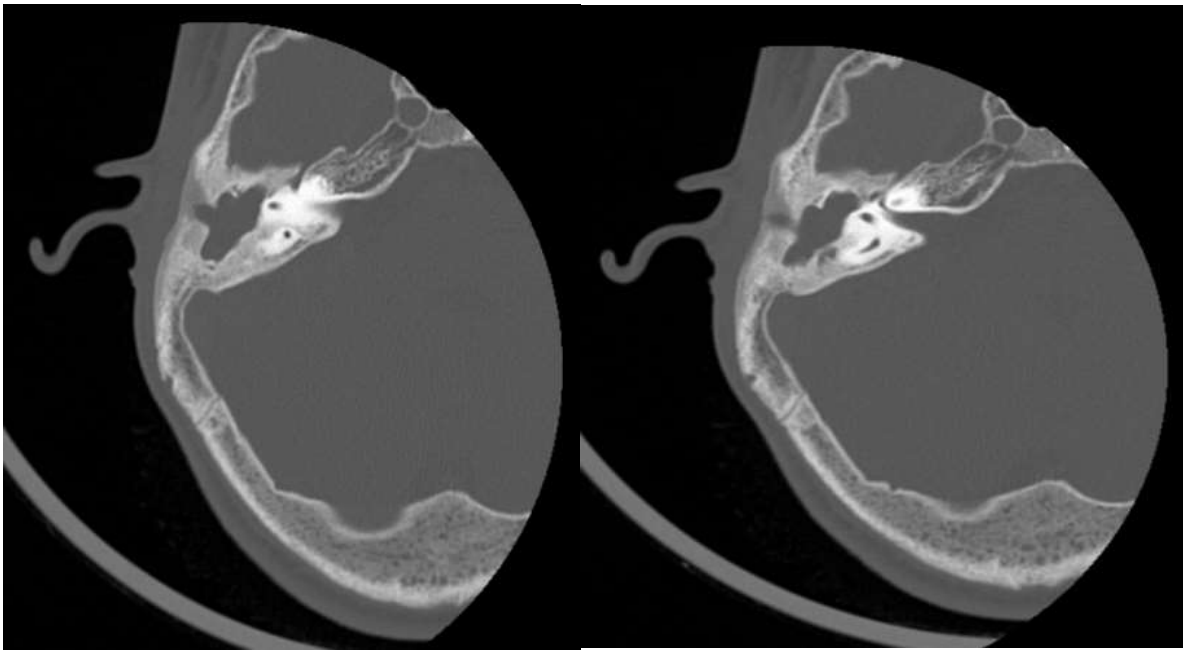
Imaging Technique

All patients underwent **high-resolution computed tomography (HRCT) of the temporal bone** using thin-section axial images with multiplanar reconstructions.

HRCT evaluation included assessment of:

- External auditory canal
- Middle ear cavity
- Mastoid air cells
- Ossicular chain
- Scutum
- Facial nerve canal
- Tegmen tympani
- Sinus plate and adjacent vascular structures

CASE 1



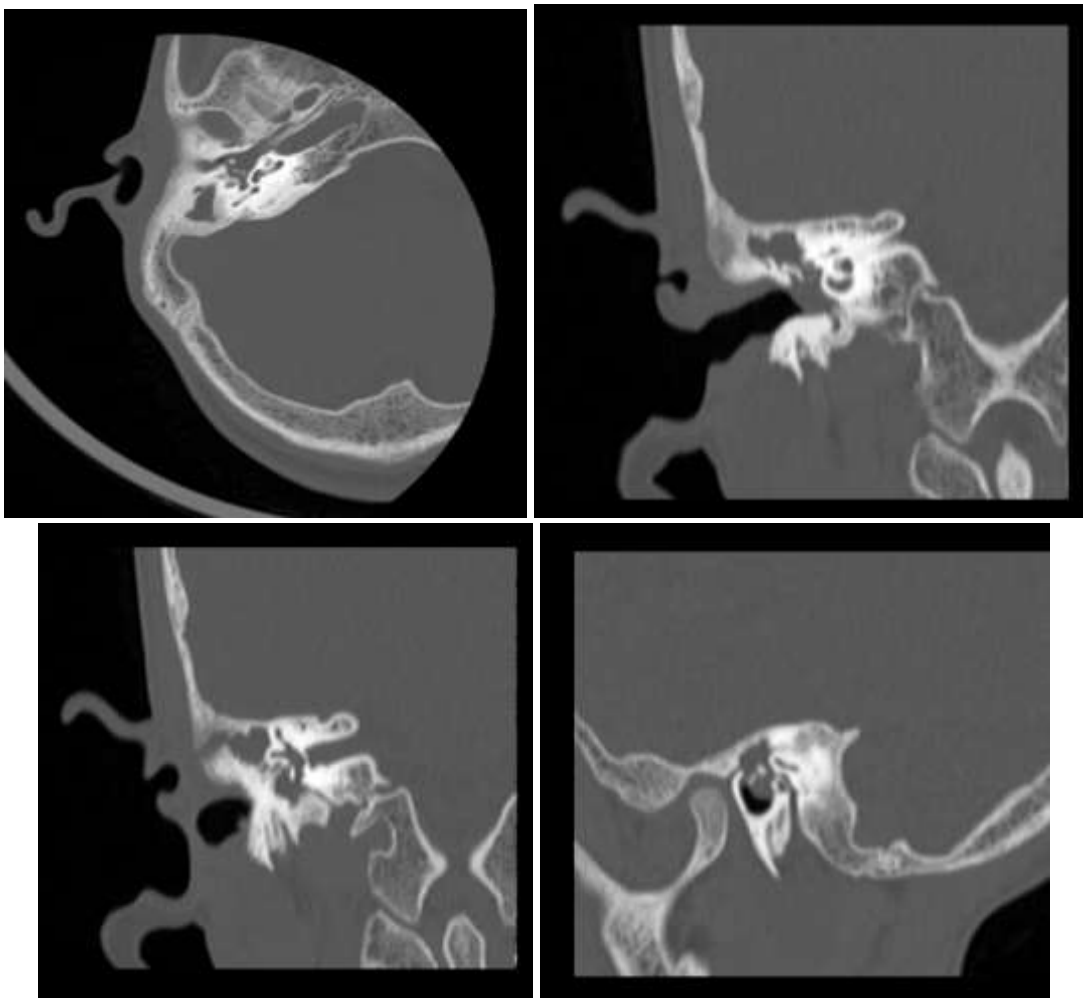
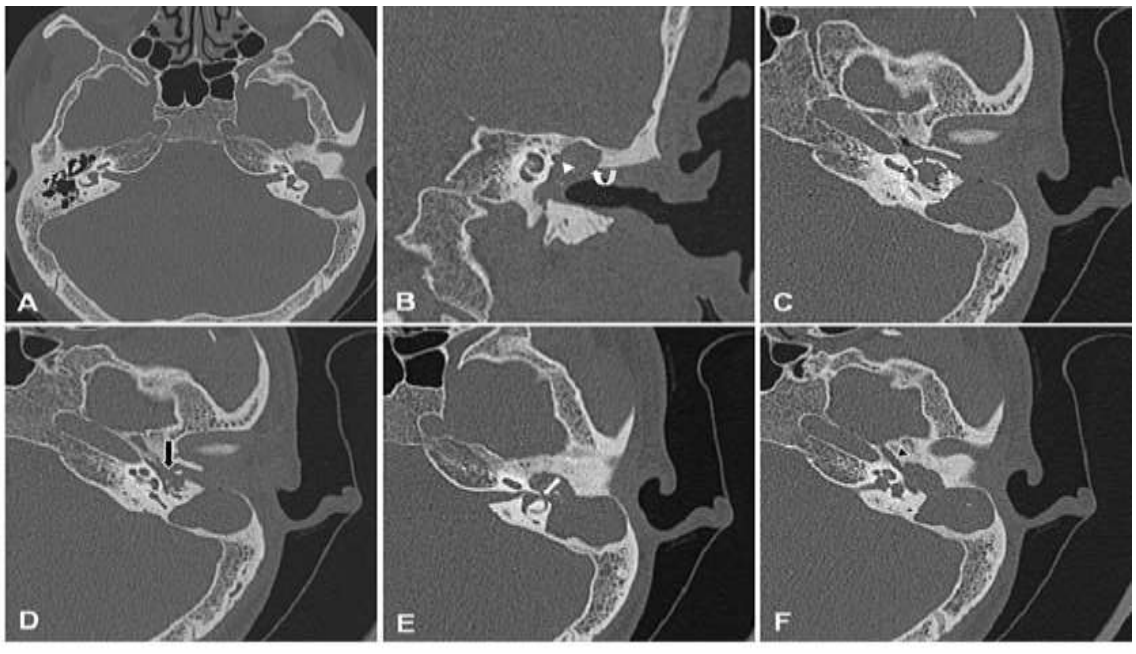


Fig: Ill-defined soft tissue opacity in middle ear with bony erosion and sinus formation likely suggestive of chronic suppurative otomastoiditis and cholesteatoma formation with sinus formation.

CASE 2



(A) showing a large well-defined soft tissue density in the left middle ear extending into the aditus and mastoid antrum, causing bony expansion and destruction of the malleus and incus with loss of ice cream cone appearance. Coronal reformatted CT image in the same patient (B) shows soft tissue density occupying the epitympanum, mesotympanum, and hypotympanum. It is seen causing erosion of the scutum (curved arrow) and inferior wall of the horizontal portion of the facial canal (arrowhead). Axial HRCT image (C) showing soft tissue (encircled) is seen extending into the sinus tympani and facial canal recesses. Axial HRCT image showing the destruction of stapes (D) and mastoid cortex dehiscence with thinning of dural sinus plate (D). Axial HRCT image (E) shows a focal defect in the wall of the lateral semicircular canal (white arrow) suggestive of perilymphatic fistula. Soft tissue extension into the eustachian tube (black arrowhead) was also seen (F).

Image Analysis

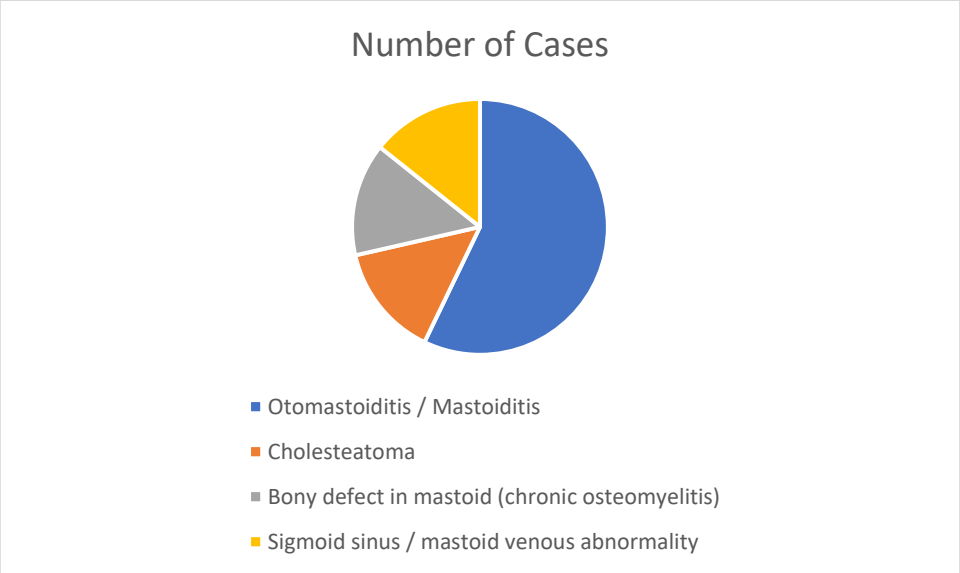
Images were reviewed to identify

- Presence of middle ear or mastoid soft tissue opacification
- Ossicular chain erosion
- Scutum erosion or blunting
- Mastoid sclerosis or coalescence
- Facial nerve canal involvement
- Bony destruction or complications
- Postoperative changes

Findings were categorized into inflammatory, infectious, congenital, neoplastic, or postoperative conditions.

Results

HRCT imaging revealed a wide spectrum of temporal bone pathologies associated with chronic otitis media.



Common Findings

The most frequently observed conditions included:

- **Chronic otomastoiditis** (unilateral or bilateral)
- **Chronic suppurative otitis media (CSOM)** with bony erosion
- **Cholesteatoma** with characteristic scutum erosion and ossicular destruction

These cases typically demonstrated mastoid air cell opacification, middle ear soft tissue density, and varying degrees of bone erosion.

Less Common Findings

Additional conditions identified included:

- Acute-on-chronic mastoiditis
- Malignant otitis externa
- Keratosis obturans
- Osteoma of the external auditory canal
- External auditory canal exostosis
- Congenital anomalies of the temporal bone
- Sinus plate dehiscence
- Sigmoid sinus–related vascular abnormalities
- Incidental temporal bone fractures

Advanced Complications

In a subset of patients, HRCT demonstrated advanced complications such as:

- Facial canal impending dehiscence
- Ossicular chain erosion
- Scutum blunting
- Spread of disease to adjacent paranasal sinuses
- Postoperative mastoidectomy changes
- Suspicion of neoplastic lesions such as glomus tympanicum

Normal Findings

Some patients demonstrated **no significant abnormalities**, which served as useful reference cases for normal anatomical variations of the temporal bone.

Discussion

HRCT is the imaging modality of choice for evaluating chronic otitis media because of its ability to clearly demonstrate the complex bony structures of the temporal bone.

One of the most important roles of HRCT is the identification of **cholesteatoma**, which often presents as soft tissue density within the middle ear accompanied by scutum erosion and ossicular destruction. Early detection is important because untreated cholesteatoma can cause progressive bone destruction and serious complications.

HRCT is also valuable in detecting **ossicular chain abnormalities**, which are a common cause of conductive hearing loss in patients with chronic otitis media. Erosion of the incus and stapes is frequently observed in advanced disease.

Another important application of HRCT is the evaluation of **mastoid air cells**. Chronic inflammation may result in mastoid sclerosis, opacification, or coalescent mastoiditis.

Identification of complications such as **facial nerve canal dehiscence, sinus plate erosion, and vascular anomalies** is essential for surgical planning and prevention of intraoperative complications.
Additionally, HRCT plays a critical role in assessing **postoperative temporal bone anatomy** in patients who have undergone mastoidectomy and in detecting recurrent or residual disease.

Conclusion

Chronic otitis media presents a wide range of imaging findings involving the middle ear, mastoid, and adjacent temporal bone structures. High-resolution computed tomography provides detailed visualization of osseous anatomy and is invaluable for identifying disease extent, complications, and structural damage. Early detection and accurate interpretation of HRCT findings are essential for appropriate clinical management and surgical planning, ultimately helping reduce long-term morbidity associated with chronic ear disease.