



# ORIGINAL RESEARCH PAPER

# Radiodiagnosis

## HRCT TEMPORAL BONE FINDINGS IN CSOM

**KEY WORDS:** CSOM, Mastoiditis, Cholesteatoma, HRCT.

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### ABSTRACT

**Background and purpose :** To study the HRCT temporal bone findings in chronic middle ear and mastoid infections with reference to its extent and complications.

**Materials and Methods :** After an initial clinical assessment, 30 patients diagnosed clinically with chronic suppurative otitis media (CSOM) and mastoiditis were referred for a HRCT of temporal bone which was done with a Toshiba Activion 16 slice MDCT.

**Results :** Of the 30 patients, age at presentation ranged from 5 to 40 years. The mean age was 25 years. Otorrhoea was the most common symptom. Chronic mastoiditis was the most common complication followed by erosion of ossicles. Incus is most commonly eroded among the ossicles. Bezold's abscess was seen in only one case.

**Conclusions :** HRCT of temporal bone is useful in identifying various findings related to the location and extent of disease which are clinically occult and is of great importance in guiding the surgeon in planning the surgical approach.

### I. INTRODUCTION

Chronic suppurative otitis media and resultant hearing loss remains a significant health problem in terms of prevalence, economics and sequelae. Short and long term sequelae of otitis media may be devastating. It can be avoided if recognised early and properly treated. Early surgical intervention is needed to limit the disease. The presence, location and extent of disease along with the presence of any complications determine the surgical approach to be followed.

HRCT provides a direct visual window into the temporal bone providing hitherto unavailable minute structural details. The purpose of this study is primarily to understand the capability of CT in diagnosis and detection of various pathological changes occurring in the temporal bone in case of chronic suppurative otitis media.

### II. MATERIAL AND METHODS

This is a prospective cross sectional study to evaluate the role of HRCT of temporal bone in 30 patients of clinically diagnosed with CSOM and mastoiditis and referred to the Department of Radiodiagnosis and Imaging, MGM Medical College and Hospital between July 2017 to September 2018. All male and female patients between the age of 5 to 40 yrs were imaged.

All HRCT scans were performed at our institute on the Toshiba Activion 16 slice MDCT.

Topograms were taken routinely in all patients before starting the scan. Scanning commenced from the lower margin of external auditory meatus including the lower mastoid and extended upwards to the arcuate eminence of the superior semicircular canal as seen on lateral tomogram. Slight extension Helical acquisition in the axial plane was performed. Reformatted coronal images were obtained perpendicular to the axial plane from cochlea to the posterior semicircular canal.

Scanning parameters: 120 kv, 75 mA s, 1 mm and 0.5 mm thickness at 1 mm and 0.5 mm interval respectively and 0.5 x 16 pitch. Images were documented at bone window WL 350 and WW 2700 and soft tissue window WL 40 and WW 100.

The contralateral temporal bone was included for comparison. The images were reconstructed with a bone algorithm. All images were interpreted on Apple workstation using source images, multiplanar reformations and required window setting.

### III. RESULTS

Of the 30 patients, the age at presentation ranged from 5 year to 40 years. The mean age was 25 years and the maximum no of patients affected belonged to age group of 19 to 25 yrs of age. Otorrhoea (100%) is the most common symptom followed by hearing loss (62%), otalgia (30%), vertigo (12%), tinnitus (10%), fever with chills and rigors (10%), headache (8%), nausea and vomiting (6%), swelling behind the ear (6%), and facial weakness (4%).

Wide spectrum of complications of CSOM were observed in the study population. Chronic Mastoiditis (18 cases) was the most common complication followed by erosion of middle ear ossicles (10 cases) with superadded cholesteatoma (7 cases), erosion of dural plate (5 cases), Scutum erosion (3 cases), sinus plate erosion (2 cases), destruction of semi-circular canal (1 case), destruction of outer cortex and extension of infective process into soft tissues behind pinna (Bezold's abscess, 1 case).

Incus is the most commonly eroded among the ossicles followed by malleus and stapes.

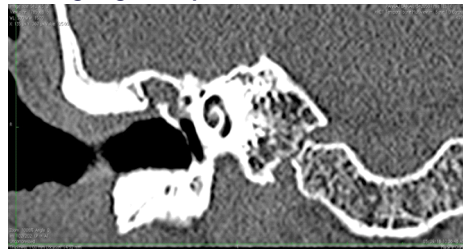
Mastoid air cells were well pneumatized in 12 cases (40 %), sclerotic in 15 cases (50%) and diploic in 3 cases (10%).



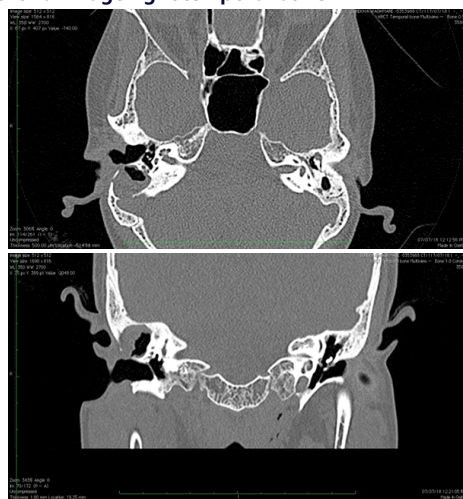
**Figure 1: Axial and coronal images of bilateral temporal bone showing right otitis media and chronic mastoiditis with erosion of ossicles suggestive of superadded cholesteatoma**



1 a) Axial image right temporal bone



1 b) Coronal image right temporal bone



**Figure 2 : Axial and coronal images of bilateral temporal bone showing right suppurative mastoiditis with destruction of air cells and bony walls.Erosion of lateral wall, sigmoid plate and dural plate and mastoid parts of right temporal bone, partial destruction of malleus and incus.**



2 a) axial image right temporal bone



2 b)Coronal image right temporal bone

#### IV. DISCUSSION

In an attempt to establish the HRCT imaging features of temporal

bone in CSOM and chronic mastoiditis, a total no of 30 patients were studied. Maximum number of patients were in second and third decade of life.

In this study male: female ratio was 1.08:1 which is in accordance with the study by Kempainen et al.1.

Most common symptom was otorrhea followed by hearing loss and otalgia which is in accordance with the study by E. Yorgancinar et al 2

Ossicular erosion was observed in most cases of CSOM associated with cholesteatoma. Though there was some variation in the incidence of erosion of each ossicle in different studies,it was identified that incus was the most commonly involved ossicle in all the studies.Most studies have stated that erosion of scutum is also a common finding associated with cholesteatoma.Also involvement of single or multiple ossicle is associated with severity of disease and is a poor prognostic indicator.

Patients of mastoid pneumatization were in agreement with findings of Petros V Vlastarakos et al.3.

Mastoiditis is the most common complication observed in the study. This is keeping in findings with the findings of E. Yorgancinar et al. 2.

In this study, Patients with CSOM associated with cholesteatoma showed well pneumatized mastoid in 40 % cases, sclerotic in 50 % and diploic in 10 %. These values are comparable to studies by Ashwani Sethi et al. 5 .

Lateral semi-circular canal erosion was seen in 1 case which is similar to study by O' Reilly BJ et al.7,Petros V. Vlastarakos et al.4 and Zhang X et al. 4.

One of the main drawback in our study is that soft tissue changes like labyrinthitis could not be evaluated on HRCT. MRI has a higher soft tissue resolution in identification of labyrinthitis. Similarly differentiation between cholesteatoma,granulation tissue and effusion is difficult on HRCT.However on MRI this is possible specially on diffusion weighted imaging where cholesteatoma restricts but granulation tissue does not restrict.As such HRCT apart from diagnosis, is mainly useful in preoperative evaluation of the type, location and extent of disease process to help the surgeon in planning further management.

Also a further population based study for a longer duration is needed to make a more reliable comparison with the standard studies.

#### V. CONCLUSION

CSOM is a common disease that can have serious life threatening complications. As such early diagnosis and treatment is of importance for a good patient prognosis.HRCT of temporal bone is of great value in the diagnosis and preoperative assessment of a case of CSOM. CSOM is more common in younger age group with a slight male preponderance.Patients usually present with otorrhea.Other symptoms include hearing loss,otalgia,vertigo, tinnitus,fever with chills and rigors,headache, nausea,vomiting, swelling behind the ear and facial weakness. Scutum and ossicular erosion is frequently present in a case of csom with cholesteatoma. Incus is the most frequently involved ossicle,followed by malleus and stapes. Mastoiditis is the most common complication followed by ossicular erosion and cholesteatoma formation. Mesotympanum was the most common involved site followed by hypotympanum.HRCT of temporal bone is useful in identifying various findings related to location and extent of disease which are clinically occut and is of great importance in guiding the surgeon in planning the surgical approach.

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