



EVALUATION OF TEMPORAL BONE IN CHOLESTEATOMA PATIENTS BY HIGH RESOLUTION COMPUTED TOMOGRAPHY

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ABSTRACT

Background: Cholesteatoma is a potentially dangerous condition affecting middle ear cavity. As high-resolution computed tomography (HRCT) of temporal bone clearly depicts the inner anatomy, it can serve as an important imaging tool in evaluating cholesteatoma for preoperative planning. Hence, this study evaluates the efficacy of pre-operative HRCT in the evaluation of patients with middle ear cholesteatoma. **Subjects and Methods:** This was a prospective pilot study of 50 patients with chronic suppurative otitis media and unsafe type cholesteatoma. Each patient was subjected to full clinical evaluation, and HRCT examination prior to operative intervention. Preoperative radiological data were correlated with data related to surgical findings. **Results:** The study showed that a high incidence of cholesteatoma in the 2nd to 4th decade of life. The scutum and lateral attic wall were the most common bony erosions in the middle ear bony wall in nearly two-third patients. The malleus was the most eroded ossicle in the middle ear in nearly 80% cases. Facial canal erosion was found in nearly one-fifth patients. Temporal bone complications were commoner than intracranial complications. When compared with operative features, HRCT findings had an accuracy of more than 90% in detecting, localizing and determining the extent of cholesteatoma and nearly 100% accuracy in demonstrating ossicular chain erosion, labyrinthine fistula and intracranial complications. **Conclusion:** HRCT scan is an excellent preoperative imaging modality for the otologist to predict ossicular status and determining patient prognosis.

KEYWORDS :

INTRODUCTION:

The human temporal bone is an extremely complex structure that contains the organs of hearing and balance with many other components as major vessels and nerves coursing through it. The choice of surgery for cholesteatoma is very important in order to preserve hearing and to prevent further complications^[1-2]. A major advantage in diagnostic imaging has occurred with the introduction of High-Resolution Computed Tomography and MRI. Though MRI has expanded the range of pathology that can be accurately evaluated because of its superb soft tissue delineation, it cannot image bony structures.

HRCT provides excellent detail of bony landmarks with in temporal bone due to inherent contrast, its dense bone being surrounded by air of the tympanic cavity and mastoid air cells. Because HRCT can assess this area with unprecedented accuracy, it has allowed better understanding of the etiology, pathology, the disease course, earlier detection of complications and alter treatment modality. Infections of middle ear are common and much of temporal bone surgery are done for infections of the ear. Cholesteatoma is traditionally diagnosed by otoscopic examination and treated by explorative surgery. The need for imaging in an uncomplicated case is contentious. This study assesses the usefulness of a pre-operative high-resolution CT scan in depicting the status of the middle ear structures in the presence of cholesteatoma.

AIMS AND OBJECTIVES OF STUDY:

- To understand the role of preoperative HRCT temporal bone in CSOM patients in evaluation of following:
- Detection of middle ear cholesteatoma
- Defining extent and severity of ossicular pathology
- Detecting complications

SUBJECTS AND METHODS:

A total of 50 patients of whom 30 were males and 20 were females were studied. Age group varied from 5 to 60 years. Patients were selected from out patient's clinic and wards of Otorhinolaryngology department. Patients were selected on the basis of their symptoms and clinical findings suggestive of a lesion involving temporal bone such as refractory otorrhoea,

otoscopically evident cholesteatoma, retracted tympanic membrane in its posterosuperior part.

Each patient was subjected to full clinical evaluation, and HRCT examination prior to operative intervention. Axial images of 0.6-0.7 mm thickness were acquired in spiral & high-resolution mode parallel to the orbitomeatal plane with subsequent reconstruction in coronal plane is taken.

Observations:

In our study, male (30/50) outnumbered female patients (20/50).

Table 1 shows distribution of patients according to age, where we can see that majority of patients 30 out of 50 were in 2nd to 4th decade of life.

Table 2 shows distribution of patients with destruction of bony middle ear walls where scutum & lateral attic wall erosions were the commonest, contributing to 45% in our study. Additional findings noted in our study were sclerosis of mastoid air cells in 40% (20/50), facial canal erosion in 20% (10/50) and lateral semicircular canal involvement in 10% (5 out of 50).

Majority of patients in our study revealed complete erosion of ossicular chain with malleus being most commonly involved isolated as well as with other ossicles [Table 3].

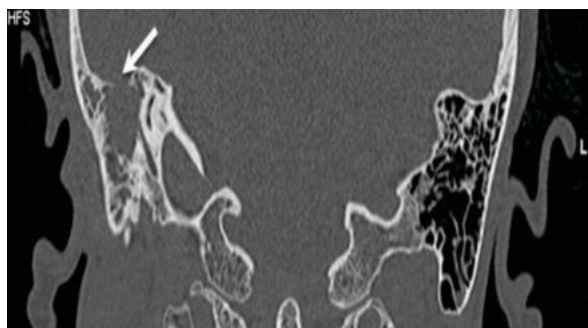


Figure 1 Coronal CT. Dehiscence of right tegmen tympani (arrow).

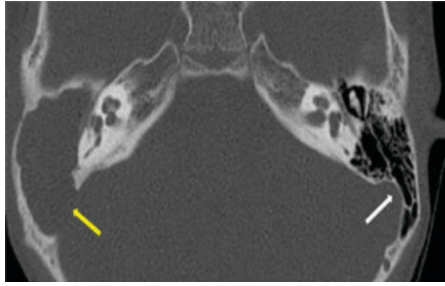


Fig. 2 Axial CT shows normal “ice cream cone” configuration of ossicles in epitympanum on the left side formed by the head of the malleus and the body of the incus. The right ear shows soft tissue in the middle ear and aditus with non-visualization of ice cream cone suggesting erosion. A large defect is also seen in the sigmoid sinus plate on the right side (yellow arrow). Left sigmoid sinus plate is intact (white arrow)



Fig.3 Axial CT reveals widening of aditus (denoted by A) and formation of common cavity between epitympanum (denoted by E) and aditus with soft tissue within



Fig. 4 Axial CT image showing non-dependent soft tissue in the Prussack's space, lateral to ossicles in a patient with pars flaccida cholesteatoma (arrow)

RESULTS:

Our study revealed a high incidence of cholesteatoma in the second decade of life. The scutum and lateral attic wall were most commonly eroded in middle ear cavity accounting to nearly two-third patients. The malleus was the most commonly eroded ossicle of middle ear in 80% cases. Sclerosis of mastoid air cells were encountered in less than two-third patients while lateral semicircular canal was affected in less than 10%. Temporal bone complications were far more common than intracranial complications in CSOM. Facial canal erosion was found in nearly one-fifth patients. When compared with operative findings, HRCT findings had an accuracy of more than 90% in detecting, localizing and determining the extent of cholesteatoma and nearly 100% accuracy in demonstrating ossicular chain erosion, labyrinthine fistula and intracranial complications.

Table 1: Age wise distribution

Age group(years)	Total
0-10	9
11-20	13
21-30	9
31-40	8
41-50	6
51-60	5

Age group(years)Total0-10911-201321-30931-40841-50651-605

Table 2: Distribution of Patients with Middle Ear Wall Erosion

Bony wall erosion	No.of Patients	%
Blunted scutum	7	15
Eroded scutum& lateral attic wall	15	30
Eroded tegmen	8	15
Thinning of the tegmen	10	20
Eroded sigmoid sinus plate	5	10
Eroded superior and posterior meatal wall	5	10

Bony wall erosionNo. of Patients%Blunted scutum715Eroded scutum& lateral attic wall1530Eroded tegmen815Thinning of the tegmen1020Eroded sigmoid sinus plate510Eroded superior and posterior meatal wall510

Table 3: Distribution of Patients with Ossicular Chain Erosion

Integrity of the Ossicles	No. of Patients	%
Completely eroded (no ossicles)	23	45.0
Eroded malleous only	18	35.0
Eroded incus only	7	15.0
Intact ossicles	2	5.0
Total	50	100.0

Integrity of the OssiclesNo. of Patients%Completely eroded (no ossicles)2345.0Eroded malleous only1835.0Eroded incus only715.0Intact ossicles25.0Total50100.0

DISCUSSION:

Acquired cholesteatoma may be associated with multiple pathologies viz. infection, tumor, etc. The commonest association in our study was infection of the middle ear cavity which is similar to that described by Sethom et al & Gaurano et al in their studies. Common complications encountered in severe late cases of CSOM are extradural abscess, cerebral or cerebellar abscess and otitic hydrocephalus. Incidence of intracranial complications in our study was approximately 20%. Crandal et al also showed that brain abscess is the most common intracranial complication and mostly affects the temporal lobe and cerebellum. Results of our study suggest that preoperative HRCT scan in CSOM have high concurrence with intraoperative findings. Our study results are similar to those reported in multiple other studies in the world literature. Thus, early recognition of disease by HRCT temporal bone can help prevent hearing loss and grave intracranial complications. HRCT scan can serve as a guide to nature of disease (destructive / non- destructive), potential dangers (such as labyrinthine fistula) and possible complications thus assisting the choice of surgical procedure (simple or radical mastoidectomy with or without tympanoplasty / atticotomy). Thus, a routine preoperative HRCT scan can be justified as it can predict outcome of surgery and significantly lowers morbidity.

CONCLUSION

HRCT temporal bone scan is an excellent & justifiable preoperative imaging modality for the otologist to detect cholesteatoma, predicting ossicular status and other complications in patients with CSOM not only determining patient prognosis but also serving as a roadmap to surgeon.

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