



ORIGINAL RESEARCH PAPER

Otolaryngology

COMPARISON OF PREOPERATIVE TEMPORAL BONE HRCT FINDINGS WITH INTRAOPERATIVE FINDINGS IN PATIENTS WITH CHOLESTEATOMA

KEY WORDS: Temporal bone, Chronic suppurative otitis media, Cholesteatoma, High resolution CT, Bone erosion, Ossicular erosion

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ABSTRACT
Objectives: Comparing Preoperative High resolution CT image of Temporal bone with intraoperative findings in patients with chronic suppurative otitis media with cholesteatoma
Study Design: Prospective study
Methods: 50 patients with cholesteatoma presenting to ENT outpatient department at Government Rajaji Hospital attached to Madurai Medical College between December 2017 and November 2018 were taken up for study. Radiological findings were noted and extent of disease established, management was done accordingly.
Observation: The prospective cohort clinical study was carried out on 55 patients. Scutum erosion was visualized in all patients and similar findings intra operatively. Incus appeared eroded on CT scan in 25(45.45%) of cases, whereas intra operatively it was seen in 27(49.09%)
Conclusion: HRCT can act as a guide to the nature of disease, potential dangers and possible complications, and this information can assist the surgeon in the choice of surgery to be performed and better advise the patient on the degree of hearing attainable after surgery.

INTRODUCTION

Chronic otitis media attico-antral disease with cholesteatoma remains a significant health problem in terms of prevalence, economics and sequelae. Historically, surgery for chronic otitis media has been undertaken with only plain x-rays. High resolution computed tomography (HRCT) scanning has evolved as the standard imaging technique for temporal bone, but its exact role in preoperative assessment of patients with Chronic otitis media attico-antral disease still remains controversial. Many experienced otology surgeons seldom use computed tomography scanning arguing that nature and extent of pathology becomes evident during surgical dissection. Some otologists use it regularly aiming to evaluate the extension of disease, schedule the surgical technique to be adopted and identify potential risk of complications. Others reserve its utilization for cases with complication, recurrence or diagnostic doubt. CT scan findings of acquired cholesteatoma of temporal bone consists of a homogenous soft tissue mass with local bone erosion, middle ear opacification, erosion of scutum, erosion of ossicles, labyrinthine fistula, erosion of fallopian (facial) canal, erosion of tegmen, sigmoid sinus erosion, widening of aditus ad antrum, and automastoidectomy. Prior knowledge about temporal bone anatomy and the extent of disease may help surgeons plan and choose the appropriate type of the surgery and avoid complications.

This study was done to evaluate the role of high resolution computed tomography temporal bone as a diagnostic modality in Cholesteatoma and its usefulness in determining the management strategy like the approach and route and surgical intervention required.

AIMS AND OBJECTIVES

1. To study the role of high resolution Computed tomography (HRCT) in patients with cholesteatoma
2. To determine the extension and site of cholesteatoma and its sac, assessing the ossicles, evaluating the facial nerve canal, the tegmen and sinus plate, and evaluating positions of dura, sigmoid sinus, and jugular bulb
3. To compare the above with intra-operative findings and proceed the surgery accordingly so as to avoid complications intraoperatively and for better outcome to evaluate the results of our study and compare with similarly published studies.

MATERIALS AND METHODS

The present work was undertaken to study the radiological

findings of CT temporal bone in patients with cholesteatoma at Government Rajaji Hospital attached to the department of ENT, Madurai Medical College, Madurai between December 2017 and November 2018.

Sample size: 50 patients with cholesteatoma presenting to ENT outpatient department at Government Rajaji Hospital attached to Madurai Medical College were taken up for study. As soon as the patient presented to the hospital, detailed clinical history and examination were carried out as per the proforma prepared.

Laboratory investigations were done. All patients were subjected to HRCT temporal bones, 1mm axial and coronal slices. Once the radiological findings were noted and extent of disease established, management was done accordingly

Inclusion criteria

All patients diagnosed clinically as chronic suppurative otitis media with acquired cholesteatoma and presented with chronic scanty ear discharge, which is offensive and conductive hearing loss.

Exclusion criteria

Previous ear surgery, Previous head trauma and Known history of sensorineural hearing loss, Systemic disease which may affect the ear (e.g. collagen vascular or granulomatous diseases), Malignancies of the temporal bone and skull base, and those with a history of head and neck radiotherapy.

All patients coming under the present study underwent

Routine investigations: Complete hemogram, bleeding time, clotting time, urine analysis, Random blood sugar, Renal function tests, Specific investigations : X-Ray Mastoids- Lateral Oblique view, HRCT of temporal bones

4. Duration of study: 12 months

Radiological anatomy of temporal bone - HRCT

Original plane of sections. the scan angle is chosen such that it covers the temporal bone but avoids the lens of the eye.

Nowadays, the introduction of multi detector spiral CT Scanner has meant that an entire volume of the temporal bone can be visualized by passing the scanner just once in one plane. The data set can be sectioned in virtually any plane. The plane of the reformatted image is not governed by ease of

patient positioning, but by the optimal plane for visualizing a structure. Since the plane of the final image does not depend on the original scan angle, the scan needs to be performed avoiding the lens of the eyes.

The following images detail the anatomy of the temporal bone in various planes of section:-
Axial sections from superior to inferior
Coronal sections from anterior to posterior are evaluated.

PARAMETERS INVESTIGATED

Apart from evaluation of normal anatomical structures, pathological changes in bony structures like ossicles, scutum labyrinthine capsules, and soft tissue lesions are assessed

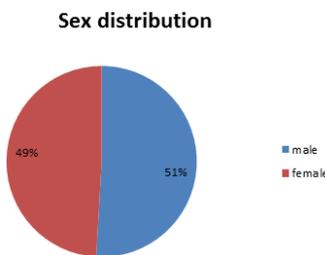
OBSERVATION

The prospective cohort clinical study was carried out on 50 patients attending ENT OPD, Govt. Rajaji hospital, Madurai in the period of one year.

The ages of the patients ranged from 9 to 55 years with mean age of 27.3 years.

- 5. The minimum age in the study was 9 years, and the maximum age was 55 years.
- 6. The maximum numbers of patients were found in the age group of 9 to 25 years.

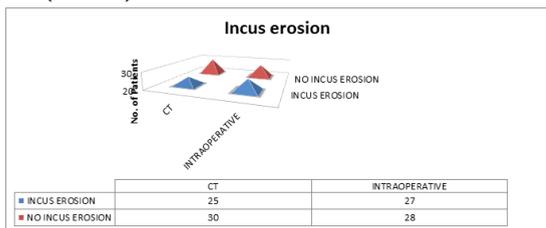
There were 28 male (51%) and 27 female (49%) patients showing



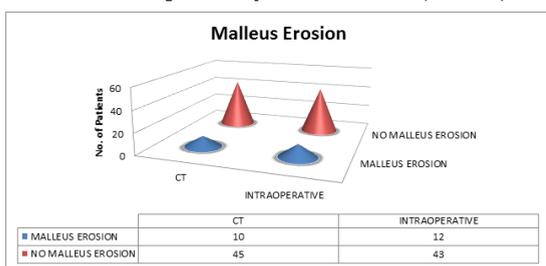
Age and sex distribution of cases:

AGE	MALE	FEMALE	TOTAL
5 - 25	14	16	30
26 - 40	9	9	18
41 - 55	5	2	7
Total	28	27	55

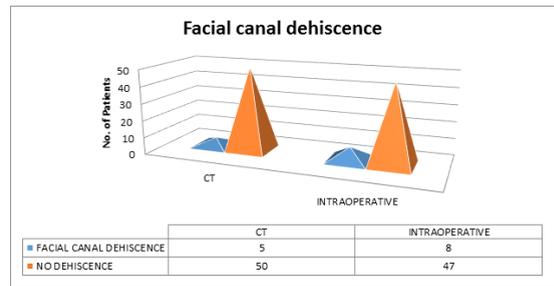
- 1. Scutum erosion was visualized in all patients and similar findings intra operatively.
- 2. Incus appeared eroded on CT scan in 25(45.45%) of cases, whereas intra operatively it was seen in 27(49.09%).



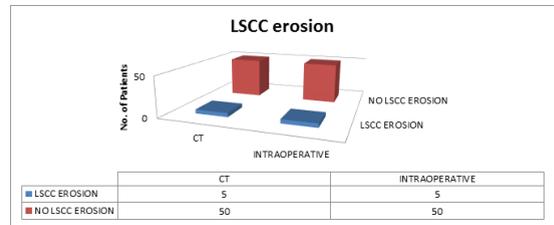
- 3. Malleus erosion was reported by CT in 10(18.18%), and whereas intra operatively it was seen in 12(21.81%)



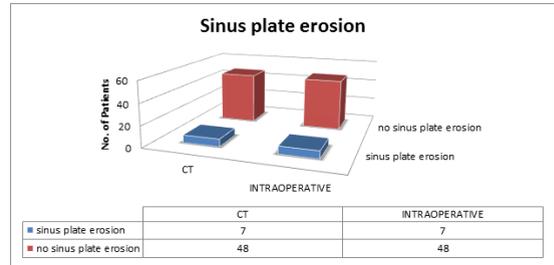
- 4. Fallopiian canal erosion was depicted by CT in 5(9.09%) cases, whereas intra operatively it was seen in 8(14.54%)



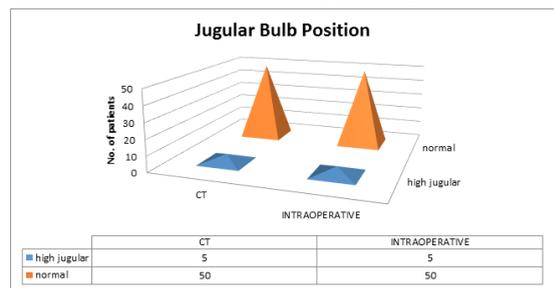
- 5. Erosion of lateral semicircular canal was reported only in 5 (9.09%) patients same intra operatively.



- 6. Sigmoid plate erosion was seen both on CT and during surgery in 7(12.72%)cases.



- 7. High Jugular was seen in 5(9.09%) of the patients which were confirmed intra operatively in all 5 patients.



DISCUSSION

HRCT is considered as imaging modality of choice for anatomical and pathological evaluation of temporal bone, prior to surgery, including chronic otitis media (Cholesteatoma). In this study, incus was most commonly affected ossicle followed by malleus and stapes. The sensitivity of HRCT for detecting malleus erosion was 83.3 %, incus was also 92.5%. Similarly, the specificity of CT scan for detecting malleus erosion was 100%, incus erosion was also 100%. These findings are consistent with the findings of Chee et al. and in contrast to study by Tatlipinar et al. who observed sensitivity of 62.8% and specificity of 85.7% for the same. In our series, HRCT had a sensitivity of 100% and specificity of 100% with regards to detection of erosion of tegmen plate, which is comparable to study by Jackler et al. Sirigiri et al., O'Reily et al. and Jackler et al. were able to diagnose dehiscence in the horizontal part of facial canal with a sensitivity of 62.5% and specificity 100%. However, Mafee et al. found CT to be very accurate in the diagnosis of erosion of facial canal. In the present study, erosion of the

horizontal part of the facial canal was correctly diagnosed in five cases out of eight with a sensitivity of 62.5% and specificity of 100%. We found a very 100% sensitivity and 100% specificity of CT scan in detecting sigmoid plate erosion. This finding is similar to study by Rogha et al. Conversely, Tatlipinar et al. reported a relatively low sensitivity of 33% and specificity of 100%. Variable results have been reported in literature with regard to ability of CT scan in detection of lateral semicircular canal. Rogha and colleagues reported a sensitivity of 75% and specificity of 87.5%. On the other hand, Sirigiri et al. reported a sensitivity of 100% and specificity of 94%. We found that the sensitivity of CT in detecting lateral semicircular canal erosion was 100% and specificity was also 100%. The variability in impression about lateral semicircular canal fistulisation could be due to volume averaging of these structures with adjacent soft tissues. These findings highlight the fact that, although HRCT temporal bone is helpful for diagnosing chronic otitis media, the findings must be interpreted cautiously in view of its limitations. The results of our study show that high resolution computed tomography of temporal bone gives precise information about the location and extent of disease. The sinus tympani and facial recess, known as the hidden areas of middle ear, can be easily identified in a HRCT. Information regarding the status of ossicular chain erosion, erosion of lateral semicircular canal and fallopian canal can also be well appreciated by this scan. The delineation of pathology prior to surgical exploration allows the operating surgeon to plan the most appropriate surgical approach that is required. The information about the possible anatomic variations helps in preparing for the difficulties that might not have been contemplated otherwise. Pre-surgical knowledge about status of ossicular chain also allows the surgeon to be ready for ossicular chain reconstruction and to advise the patient regarding degree of hearing attainable after surgery.

CONCLUSION

The results of this study suggest that preoperative HRCT imaging in cases of cholesteatoma, ossicular chain erosion, and SCC dehiscence have good correlation with intra-operative findings.

However, HRCT is not able to distinguish between cholesteatoma and mucosal disease, facial nerve dehiscence, incus and stapes erosions in the early stages. HRCT can act as a guide to the nature of disease, potential dangers and possible complications, and this information can assist the surgeon in the choice of surgery to be performed and better advise the patient on the degree of hearing attainable after surgery

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