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## Study of Role of CT Mastoids in the Diagnosis and Surgical Management of Chronic Inflammatory Ear Diseases in Jharkhand Population

Abhinav Paul Minj<sup>1</sup>, Rohit Kumar Jha (Corresponding Author)<sup>2</sup>

1. Assistant Professor and Head of the Department

Medimirai Medical College and Hospital

Palamu, Jharkhand – 822101

2. Rohit Kumar Jha

Assistant Professor

Department of ENT

MGM Medical College

Jamshedpur – 831020

### Abstract

- **Background** – CT scanning has made substantial contributions in the ability to diagnose and evaluate chronic inflammatory ear diseases. CT scan much enhanced ability for pre-operation delineation of middle ear, mastoid pathology.
- **Method** – Every patient was undergone CT scan before surgery. CT scan of temporal bone with high resolution in both axial and coronal settings (Supine and prone axis) with 1.5mm thick slices. Surgeries were carried out under local anesthesia but 12 cases were under general anesthesia due to their old age, 16 cases had left ear, 19 had right ear chronic inflammatory diseases.
- **Results** – 30(87.5%) discharge, 26(74.2%) decreased hearing, 23(65.7%) had ringing sensation were major clinical manifestations. 13(37.1%) of attic perforation, 11(31.4%) of retraction pockets of TM were major Tympanic perforations. The Major pathology were 15(42.8%) were granulation, 12(34.2%) cholesteatoma and 11(31.4%) were CSOM patients. Types of surgeries were 19(54.2%) simple mastoidectomy, 12(34.2%) modified radical mastoidectomy 4(11.4%) Atticotomy with simple mastoidectomy. Post surgical complication were 5(14.2%).
- **Conclusion** – CT scan has role in the evaluation of selected patients with chronic otitis media but must be interpreted cautiously in view of its limitations and numerous pitfalls.
- **Keywords** – CSOM, Tubo-tympanic-otoscopy, Atticoantral, Cholesteatoma, Jharkhand.

## Introduction

In recent years CT (Computed Tomography) scanning has made substantial contribution in the ability to diagnose and evaluate temporal bone disorders<sup>(1)(2)</sup> while much has been written about the imaging capabilities of this powerful new technology its role in the management of suppurative ear disease has not been well defined. Surgery for Chronic Otitis media (COM) has traditionally been preceded by plain mastoid radiographs supplemented, on occasion by polytomographic views. With the advent of CT scanning a much enhanced ability for the pre-operative delineation of middle ear and mastoid pathology exists. The main advantages of CT scanning over traditional radiographic techniques are superior soft tissue contrast resolution and improved spatial detail at a reduced radiation dose to the patient when compared with polytomography<sup>(3)(4)</sup>. Surgeons frequently employ pre-operative CT scanning in an effort to identify and define potentially dangerous pathologic entities which might be more safely handled with prior knowledge. The intent of this study is to develop criteria for the selective clinical use of CT scanning in surgical management in chronic inflammatory ear diseases in different age groups of both sexes.

## Material and Method

35 (Thirty-five) adult patients aged between 25 to 58 years regularly visiting to ENT department of Medinirai Medical College and Hospital, Palamu, Jharkhand – 822101 were studied.

- **Inclusive Criteria**—Atticoantral type of disease, patients with COSM complications both intra and extra cranial complication.
- **Exclusion Criteria** – Patients with type-II DM and already undergone surgery of Ear, tubotympanic type of CSOM, bilaterality of disease.

**Method** – Every patient was undergone CT scan and surgery, patients underwent otoendoscopy to rule out tubo-tympanic type of chronic ear diseases and to exclude pathologies which causes discharging ear like otitis externa and otomycosis. Patients with active squamosal type or atticoantral type were included after confirming the findings in endoscopy of the ear. Routine blood examination was done to confirm the fitness for surgery.

Each patient was subjected to CT scan of the temporal bone, with high resolution in both axial and coronal settings (Supine and prone axis) with 1.5mm thick slices, scanning commenced from the lower margins of external auditory meatus and extend upwards from the arcuate eminence of the superior semi-circular canal as seen on the lateral tomogram. Coronal images were obtained perpendicular to axis plane from the cochlea to semi-circular canal.

Surgeries were carried out under local anesthesia. 12 (Twelve) patients by general anesthesia due to their old age. 16 patients had right ear 19 had left ear pathologies.

Duration of study was January 2020 to December 2020.

**Statistical analysis** – Different types of clinical manifestations, types of tympanic perforations, complications of CSOM types of surgeries were classified with percentage. The Statistical data was analyzed in SPSS Software. The ratio of male and female was 2:1.

## Observation and Results

**Table-1** – (a) Study of Clinical Manifestations – 30(87.5%) discharge from Ear, 26(74.2%) decreased hearing, 3(8.57%) mass in EAC, 2(5.7%) giddiness, 23(65.7%) ringing sensation of ear, 3(8.57%) pain, 3(8.57%) post-aural abscess, 3(8.57%) facial palsy.

(b)Types of tympanic perforation 13(37.1%) Attic perforation, 4(11.4%) marginal perforation, 11(31.4%) retraction of tympanic membrane (TM)

**Table-2** – Pathology of Ear diseases. 15(42.8%) Granulation, 12(34.2%) Cholesteatoma, 3(8.57%) Polyp, 5(14.2%) Mucosal Oedema.

(b)Complication of CSOM (Chronic Suppurative Otitis Media) out of 11(31.4%) 4(36.3%) Mastoid abscess, 2(18.1%) labyrinthitis, 2(18.1%) Sinus thrombosis, 3(27.2%) Facial nerve palsy

**Table-3** – Types of surgery in Chronic Inflammatory Ear Diseases – 19(54.2%) were simple mastoidectomy, 12(34.2%) modified radical mastoidectomy, 4(11.4%) Attectomy with Simple Mastoidectomy.

**Table-4** – Post-surgical Complications out of 35 surgeries 5(14.2%) had unheal cavities.

## Discussion

Present study of role of CT Scan mastoids in the diagnosis and management of Chronic inflammatory ear diseases – 30(87.5%) discharge, 26(74.2%) decreased hearing, 3(8.5%) Mass in Ear, 2(5.71%) Giddiness, 23(65.7%) Ringing Sensation in ears, 3(8.5%) Pain, 3(8.57%) Post-aural abscess, 3(8.57%) Facial nerve palsy. The types of tympanic membrane perforations were 13(37.1%) Attic Perforations, 7(20%) Central or sub-total, 4(11.4%) marginal perforation, 11(31.4%) Retraction pockets of TM. (Table-1). The pathology of middle ear was 15(42.8%) granulation, 12(34.2%) Cholesteatoma, 3(8.57%) Polyp, 5(14.2%) Mucosal Oedema. The complication of CSOM were 11(31.4%) (Table-2). The types of surgeries were 19(54.2%) were simple mastoidectomy, 12(34.2%) were modified radical mastoidectomy, 4(11.4%) Attectomy with simple mastoidectomy (Table-3). Post –surgical complication 5(14.2%) were unhealed cavities (Table-4) These findings are more or less in agreement with previous studies.<sup>(5)(6)(7)</sup>

The mastoid cavity is almost universally involved in chronic inflammatory ear diseases. The CT scan was able to provide excellent views of the mastoid air cells, antrum and aditus-adantrum in either coronal or axial planes. The most common findings was hypopneumatization remaining pneumatic space was the antrum which was frequently surrounded by a dense rim of Sclerotic bone when such abnormal antrum is filled with soft tissue, it is commonly misinterpreted as a bone erosive lesion by in experienced radiologist or ENT surgeon. The next common mastoid abnormalities seen were soft tissue and presence of bone erosion. These predict the pathologic anatomy at surgery. In the CT scan it was not possible to distinguish among different pathologic soft tissue.

Cholesteatoma can occasionally erode the lateral semicircular canal where it lies exposed on medial wall of the antrum. If fenestrated at the time of surgery, severe sensorineural hearing loss and vestibular dysfunction may result. Complete destruction of the ossicular chain was successfully predicted by CT view. Facial nerve is clearly seen in the cross section on coronal scan. The

tympenic portion Facial Nerve(FN) frequently dehiscent in normal individuals and radiographically almost always appears devoid of bony covering on at least one coronal slice. When pathologic soft tissue abuts the tympanic portion of FN is often difficult to view. Hence coronal section is ideal way to visualize FN because traditionally two planes of CT scan routinely employed are axial and coronal, although non-reconstructive multipolar CT has been shown to be of value in temporal bone disorders<sup>(8)(9)</sup> CT revealed a discrete soft tissue collection involving the epitympanum and antrum which although highly suggestive of cholesteatoma, proved to be other benign inflammation such as granulation tissue or polypoid mucosal hypertrophy.

Congenital cholesteatoma appears as well marginatedexpensile, hypo dense lesion. Differentiating them by imaging is difficult, but history and molecular biological techniques are helpful in differentiating them.<sup>(10)</sup> As human temporal bone is extremely complex structure. CT scan has proved to be the diagnostic imaging method of choice for studying normal and pathological details of temporal bone.

## Summary and Conclusion

The role of CT mastoids in the diagnosis and surgical management of chronic inflammatory ear diseases The CT scan has a role in the evaluation of selected patients with chronic inflammatory ear diseases but must be interpreted cautiously in view of its limitations and numerous pitfalls. CT scan is superior to polytomography in the evaluation of suppurative ear disease. Both axial and coronal views should be obtained in most cases as many relevant structures are best seen in only one of these planes. CT occasionally gives the erroneous impression of lateral semicircular canal fistualization, fegmentympani erosion and facial nerve involvement due to volume averaging of the thin bony covering of these structure with adjacent soft tissues.

Abnormal soft tissue associated with bone erosion on CT scan is highly correlated with cholesteatoma. The total absence of abnormal soft tissue on CT scan essentially excludes cholesteatoma. Hence before viewing the CT one must have complete knowledge of anatomy of ear.

Table-1

## Study of Clinical Manifestations

Total No. of patients 35

Sl No.	Clinical Manifestation	No. of Cases	Percentage
(a)1	Discharge	30	87.5
2	Decreased Hearing	26	74.2
3	Mass in EAC	3	8.57
4	Giddiness	2	5.71
5	Ringling Sensation of Ears	23	65.7
6	Pain	3	8.57
7	Post-aural Abscess	3	8.57
8	Facial Palsy	3	8.57
(b)	<b>Types of Tympanic Perforation</b>		
9	Attic Perforation of TM	13	37.1
10	Central or Sub total Perforation of TM	7	20
11	Marginal Perforation of TM	4	11.4
12	Retraction Pockets of TM	11	31.4

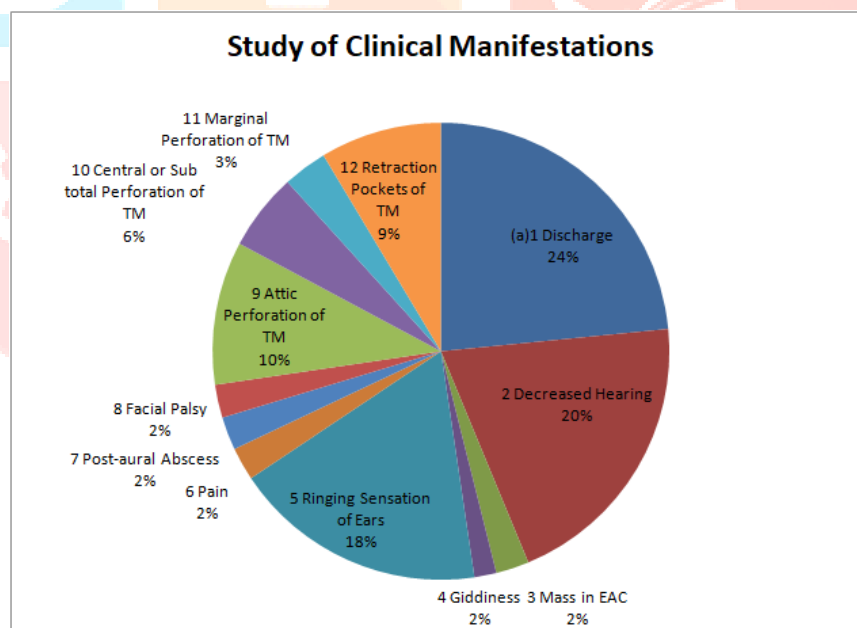


Table-2

**Pathology of Ears diseases.**

Sl No.	Particulars	No. of Patients (30)	Percentage(%)
(a)	<b>Pathology of Middle Ear</b>		
1	Granual Ear	15	42.8
2	Cholesteatoma	12	34.2
3	Polyp	3	8.57
4	MycosalOedema	5	14.2
(b)	<b>Complications of CSOM</b>		
1	Mastoid abscess	4	36.3
2	Labyrinthitis	2	18.1
3	Sinus thrombosis	2	18.1
4	Facial Nerve Palsy	3	27.2

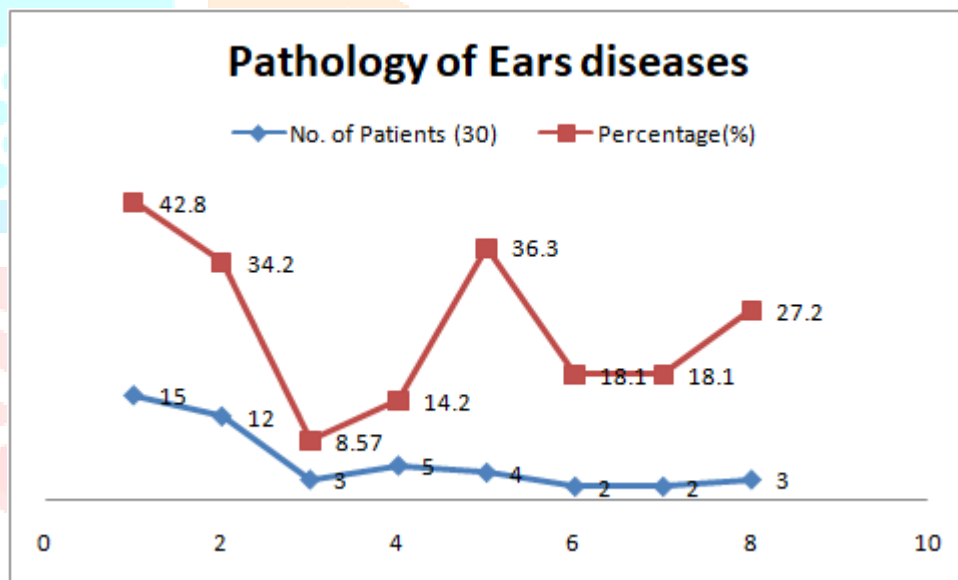


Table-3

**Types of Surgery in Chronic inflammatory Ear disease.**

Sl No.	Types of Surgery	No. of Patients	Percentage
1	Simple Mastoidectomy	19	54.2
2	Modifiedradicalmastoidectomy	12	34.2
3	Atticotomy with simple mastoidectomy	4	11.4

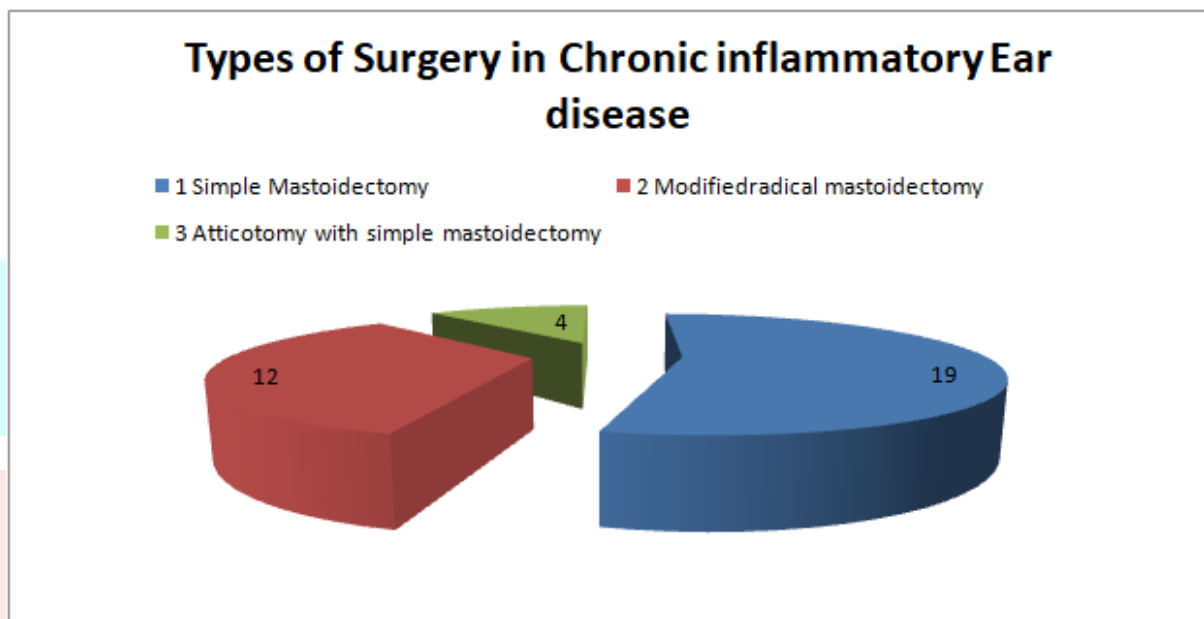
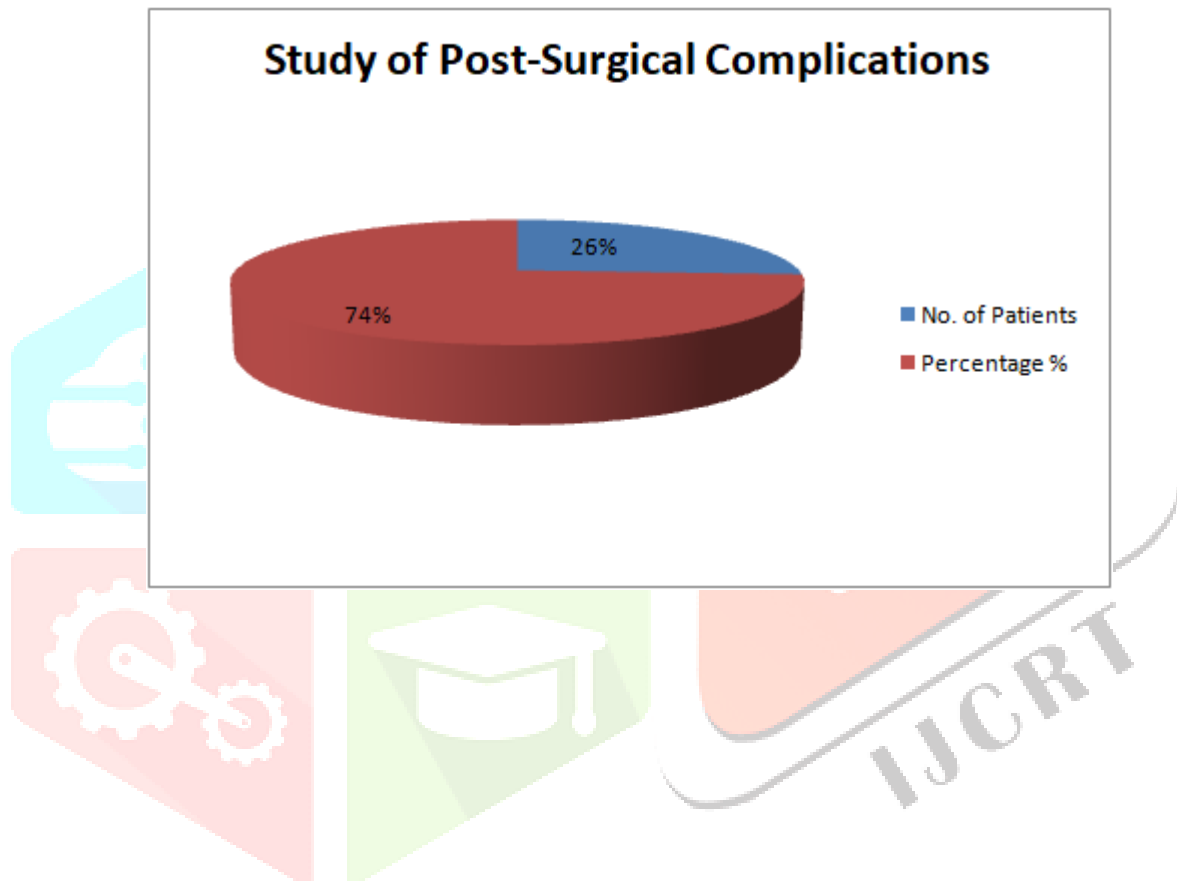


Table-4

**Study of Post-Surgical Complications.**

Sl No.	Post Surgical Complication	No. of Patients	Percentage %
1	Healed Cavities (out of 35)	5	14.2





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