

“A CORRELATION STUDY OF CLINICAL , RADIOLOGICAL AND INTRA OPERATIVE FINDINGS OF CHRONIC SUPPURATIVE OTITIS MEDIA”

Dr .SBV.chandrasekhar [Assistant professor] Mobile No : 9908029872

Dr .P. Ramakrishnaiah [Associate professor] Mobile No: 9966791501

Dr.Ranjith parupalli [post graduate] Mobile No: 8096356465

Corresponding Author: Dr. S. Indira Devi [Professor & HOD] Mobile No: 9959360123

Subject : ENT [OTO RHINO LARYNGOLOGY]

Full Address for Hard Copy With Name : Dr. S. Indira Devi [Professor & HOD] , Department of ENT ,Bhaskar Medical college ,Yenkapally , Moinabad Mandal , Ranga Reddy District, Telangana Mobile No. 9959360123

Abstract- chronic suppurative otitis media is the disease of the middle ear which may occur in two forms , Tubo-Tympanic and Attico-Antral. It can be diagnosed by Clinical examination ,Endoscopy and confirmed by High Resolution CT scan of Temporal Bone. This study is based on correlating the clinical ,Radiological and Intraoperative findings of chronic suppurative otitis media. 60 cases of chronic suppurative otitis media were studied over a period of one and a half year and details were noted. Based on the observations HRCT Temporal Bone was found to be a useful tool for proper diagnosis ,management of the disease and its correlation with intraoperative findings was confirmed.

Key words- *Chronic suppurative otitis media ,Tubo -Tympanic ,Attico Antral , HRCT Temporal Bone ,Surgical Findings ,Mastoidectomy*

INTRODUCTION :

Chronic Suppurative Otitis Media (CSOM) is the chronic inflammation of the middle ear cleft which is composed of eustachian tube, hypotympanum, mesotympanum, epitympanum,aditus and mastoidaircell swchich presents with recurrentear discharge through tympanic membrane perforation¹. Persistent mucosal infection of the middle ear by resistant organisms, infections nasopharynx with secondary infection of the middle ear cleft and mucosal changes of the middle ear secondary to eustachiantubedysfunction may contribute to the development of chronic otitis media². Clinically CSOM is of two types- Tubo-tympanic type (safe)and Attico-antral type (unsafe) depending on the likelihood of developing complications, that can be life threatening and may involve the vital structures such as facial nerve, inner ear, and intracranial components.³

AIMS OF STUDY:

1. To correlate the Clinical , Radiological findings with Intra-operative Surgical findings of chronic suppurative otitis media(CSOM).
2. To find out the utility of Pre-operative CT scan of Temporal bone in the management of CSOM and its correlation during surgical intervention.

OBJECTIVES OF THE STUDY:

- 1.To Evaluate the Clinical and Radiological findings of CSOM and their corelation with the Operative findings.
- 2.To Establish the efficacy of CT in the Diagnosis of Complications in CSOM.
3. To find subgroups of CSOM where CT is particularlyuseful.

COMPUTED TOMOGRAPHY OF THE TEMPORAL BONE:

A major advance in imaging of the ear structures has occurred with the development of high-resolution thin section computed tomography.

Technique Of CT Scan: The CT examination of the ear significantly enhances the diagnostic results. Two separate series, one axial or (30°) and one coronal (70-105°), of approximately 1.5mm thick sections each are chosen for the examination.

Appropriate projections to view the ossicles :

	Structure	Axial	Coronal	Either/both
1	Stapes footplate			ü
2	Stapes suprastructure	ü		
3	Incus Long Process		ü	
4	Incus Body	ü		
5	Malleus Head			ü
6	Malleus Manubrium		ü	
7	Malleus Neck			ü
8	Incudostapedial Joint	ü		

TABLE :1
APPROPRIATE PROJECTIONS FOR OTHER MIDDLE EAR STRUCTURES

	Structure	Axial	Coronal	Either(Both)
1	Prusaak's space		ü	
2.	Scutum		ü	
3.	Attic		ü	
4	Antrum and mastoid system	ü		
5	Aditus	ü		
6	Tegmen Tympani		ü	
7	Sigmoid Sinus Groove	ü		
8	Fossa Incudis	ü		

9	Round Window		ü	
10	Facial Recess	ü		
11	Pyramidal Eminence	ü		
12	Sinus Tympani	ü		
13	Pattern Of Pneumatisation	Ü		
14	Tympanic Membrane		ü	
15	Epitympanic Recess	Ü		
16	Tensor Tympani Tendon			ü

TABLE :2 :CT FINDINGS CHART

MATERIAL AND METHODS:

The present study of ‘To Correlate clinical, radiological and intra operative findings of chronic suppurative otitis media’ will be conducted in the Department of E.N.T and Head and Neck Surgery, Bhaskar Medical College and Hospital ,Moinabad, between January 2018 and June 2019.All patients attending the E.N.T outpatient as well as casualty, pediatric, and medical units with complaints of ear discharge, ear ache, deafness, vertigo, tinnitus, swelling,ordischargeinthepost-auralregion,headache,feverandneurologicalsigns will be screened thoroughly and those, in whom C.S.O.M is diagnosed with or without complication would be suspected, will be taken for the study. The duration of study was one and half year ,with a sample size of 60 . study design chosen was Cross sectional study .

Methodology:

All 60 patients included in the study had been explained about the study, need for them to undergo CT Mastoids preoperatively and need for surgery and follow up. Patients were selected randomly initially, then included or excluded based on the criteria listed above. Both males, females and children were included in the study done. All patients included first underwent oto endoscopy to rule out of other chronic eardiseasesandalsotoexcludeotherpathologieswhichcausesdischargingearlike otitis externa and otomycosis. Patients with Mucosal or Tubo tympanic type and Squamosal type or Atticoantral type were included after confirming the findings in endoscopy of the ear. Consent for undergoing CT scan and followed by appropriate surgery were taken in written. All basic hematological examinations done for surgical fitness of the patients. AllpatientsweresubjectedtoCTScanoftemporalbone,highresolutioninboth axial and coronal settings (supine and prone axis) with 0.625 mm thick slices. A radiologist was assigned to read and report all these scans.

Surgeries according to the pathology were undertaken, Out of 60 patients 22 patients underwent mastoidectomies, postaural approach and 38 Patients underwent Tympanoplasty, all cases were done under General anesthesia, graft used was temporal is fasciainall. Ontable, the surgical findings were note dinaproformamade exclusively to note down all surgical and radiological findings.

These surgical findings were correlated to the radiological findings seen preoperatively on CT mastoids. The surgical findings were also informed to the radiologist to improve the learning curve. Patients were followed up to success rates of surgeries performed with regular follow up till ear is dry.

SAMPLE CASE PROFORMA :A50 year female , with Chief Complaints : Complain of Right ear discharge since 3years.On clinical examination- Right ear posterior canal wall erosion present

OTOSCOPIC FINDINGS		
	RIGHT	LEFT
PINNA	NORMAL	NORMAL
PRE AURICULAR REGION	NORMAL	NORMAL
POST AURICULAR REGION	NORMAL	NORMAL
TRAGAL TENDERNESS	ABSENT	ABSENT
MASTOID TENDERNESS	ABSENT	ABSENT
EAC	Purulent discharge in the floor of canal and erosion of postero superior meatal wall	NORMAL
TYMPANIC MEMBRANE	POSTERO SUPERIOR MARGINAL PERFORATION,CHOLESTEATOMA FLAKES +	NORMAL
MEM	CONGESTED	NORMAL
FACIAL NERVE	INTACT	INTACT

TABLE :3 : FINDINGS OF SAMPLE CASE
 Diagnosis : Rt CSOM active squamosal type with Conductive hearing loss

	CT FINDINGS		OPERATIVE FINDINGS	
	RIGHT EAR	LEFT EAR	RIGHT EAR	LEFT EAR
OSSICLES	ERODED	INTACT	MALEUS AND LONG PROCESS OF INCUS ERODED	
CHOLESTEATOMA	PRESENT	ABSENT	PRESENT	
DURAL PLATE	INTACT	INTACT	INTACT	
SINUS PLATE	INTACT	INTACT	INTACT	
BONY LABYRINTH	INTACT	INTACT	INTACT	

ADITUS	SOFT TISSUE OPACIFICATION	PATENT	CHOLESTEATOMA SAC PRESENT	
PNEUMATISATION	ABSENT	PRESENT	ABSENT	
SOFT TISSUE	OPACIFICATION PRESENT IN MIDDLE EAR, ADITUS, ANTRUM	ABSENT	CHOLESTEATOMA INVOLVING EPITYMPANUM, ADITUS , ANTRUM	
FALLOPIAN CANAL	INTACT	INTACT	INTACT	

TABLE :4 :CT FINDINGS OF THE SAMPLE CASE

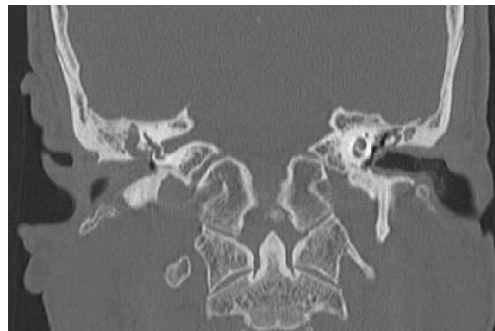


Figure 1: Showing soft tissue opacification in the right middle ear and Mastoid..



Figure 2: Showing posterior canal wall erosion

Conclusion: Clinical , radiological findings have good correlation with surgical findings.

OBSERVATIONS AND RESULTS :This was a study of 60 patients

SEX	No.of Cases	Percentage
MALE	19	31.67%
FEMALE	41	68.33%
TOTAL	60	100%

Table 5: Showing Sex Distribution

S.No	Age(Years)	No.Of Cases	Total No. Cases	Percentage
1	11-20	13	60	21.67%
2	21-30	14	60	23.33%
3	31-40	21	60	35%
4	41-50	07	60	11.67%
5	51-60	02	60	3.33%
6	61-70	03	60	5%

TABLE 6 : AGE DISTRIBUTION

S.No	SIDE OF THE EAR DISEASE	No.Of Cases	Percentage
1	Right	23	38.3 %
2	Left	37	61.6%

TABLE : 7 Incidence Of Csom In Relation To Side [Total No. Of Cases : 60]

Presenting Complaints	1 no of cases=60) No. of Cases	Percentage
Discharge	52	87%
Decreased Hearing	55	92%
Ringing Sensation in Ears	48	80%
Pain	24	40%
Post-auricular abscess	4	7%
Deviation of Mouth	1	1.6%

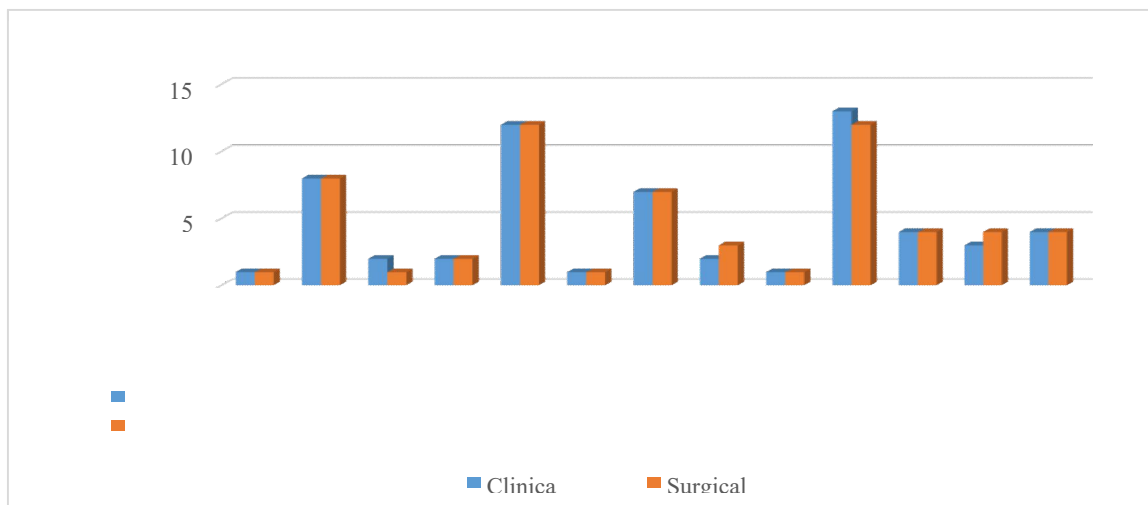
Table 8: Showing Presenting Complaints

Perforation	Clinical Findings(N=60)		Surgical Findings(N=60)	
	Number	Percentage	Number	Percentage
Antero- superior	1	2%	1	2%
Antero- inferior	8	13%	8	13%
Postero- superior	2	3%	1	2%
Postero- inferior	2	3%	2	3%
Subtotal	12	20%	12	20%
Large	1	2%	1	2%
Anterior	7	12%	7	12%
Posterior	2	3%	3	5%

Superior	1	2%	1	2%
Inferior	13	22%	12	20%
Attic	4	7%	4	7%
Marginal	3	5%	4	7%
Attic Retractions	4	7%	4	7%

P-Value – 0.276 (Nil Significant)

Table 9: Agreement between Clinical findings and surgical findings



	Antero-superior	Antero-inferior	Postero-superior	Postero-inferior	Subtotal	Marginal	Anterior	Posterior	Superior	Inferior	Attic	Marginal	Attic Retractions
Clinical	1	8	2	2	12	1	7	2	1	13	4	3	4
Surgical	1	8	1	2	12	1	7	3	1	12	4	4	4

Figure 7: Correlation between Clinical and Surgical Finding.

Type of CSOM	No. of Patients(N=60)	
	Patients	Percentage
Tubotympanic Type	50	83%
Atticoantral Type	10	17%

Table 10 : Showing Incidence of type of CSOM

Size of Perforation	Clinical Findings(N=50)		Surgical Findings(N=50)	
	Number	Percentage	Number	Percentage
Small	13	26%	13	26%
Medium	24	48%	24	48%
Subtotal	12	24%	12	24%
Large	1	2%	1	2%

P-Value – 0.00 (Nil Significant)

Table:11 Tubotympanic Disease: Correlating clinical and surgical findings regarding size of perforation

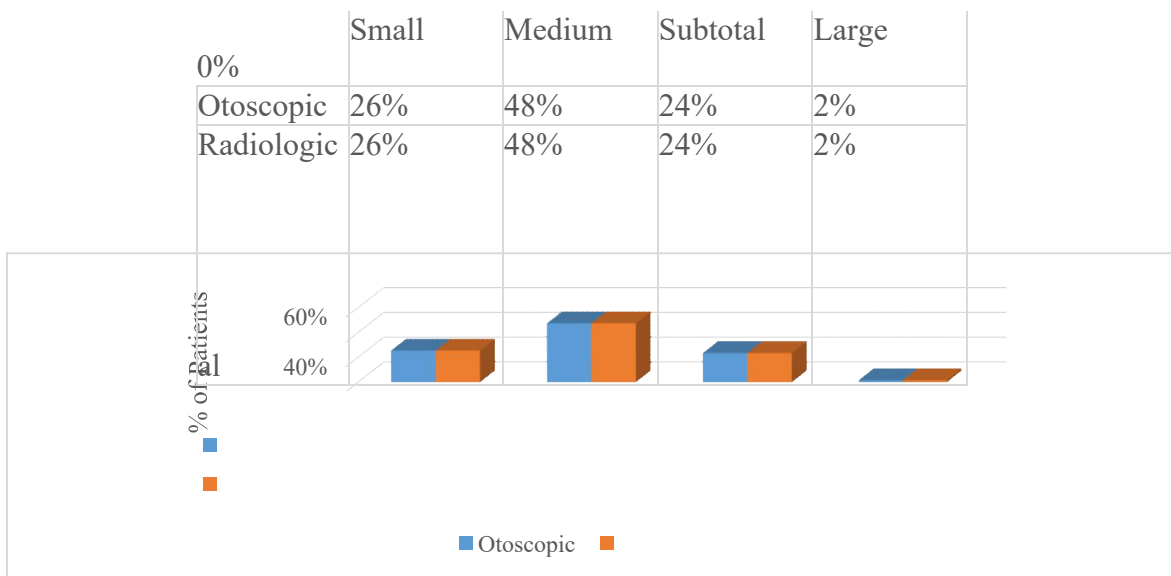


Figure 9: Correlation between Otoscopic and Surgical Findings in Perforation in 50 patients where central perforation is present without any attic pathology.

Type of Atticoantral Pathology	Clinical Findings (N=10)		Surgical Findings (N=10)	
	Number	Percentage	Number	Percentage
Attic cholesteatoma	4	40%	4	40%
Attic Retractions	4	40%	4	40%
Marginal Cholesteatoma	2	20%	2	20%
Granulation tissue	2	20%	7	70%

P-Value – 0.001 (Nil Significant)

Table 12: Atticoantral disease: Correlating Clinical and Surgical Findings in type of atticoantral patholog

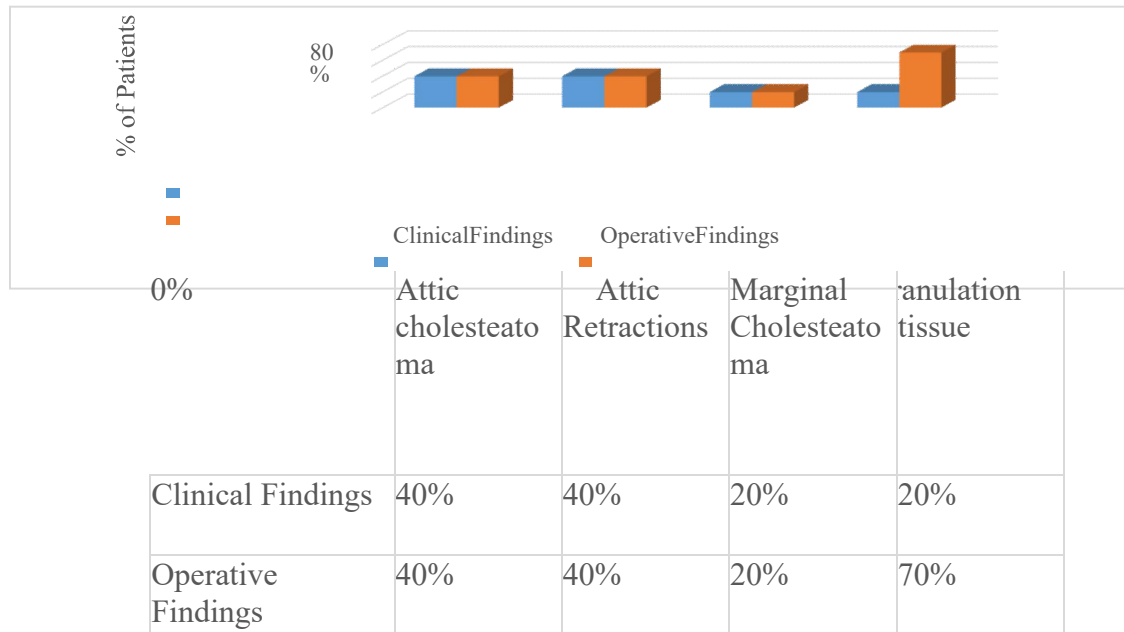


Figure 10: Showing Correlation between Clinical and Operative Findings in Atticoantral pathology.

Finding	Radiological Finding(N=35)		Surgical Finding (N=35)	
	Number	Percentage	Number	Percentage
Erosion of Malleus Handle	3	9%	3	9%
Malleus absent	3	9%	3	9%
Erosion of Incus Long Process	15	43%	19	54%
Incus absent	4	11%	4	11%
Erosion of Stapes Supra Structure	3	9%	2	6%
Erosion of Sinus Plate	1	3%	1	3%
Erosion of Dural Plate	2	6%	2	6%

Granulations in Facial Recess	3	9%	3	9%
Granulations in Sinus Tympani	2	6%	2	6%
Facial Canal Dehiscence	1	3%	2	6%
Granulations in Antrum	28	80%	28	80%
Granulations in Aditus	26	74%	26	74%
Granulations in Epitympanum	4	11%	4	11%

P-VALUE - 0.285 (Nil Significant)

Table 13: Showing Correlation between Radiological and Surgical Finding

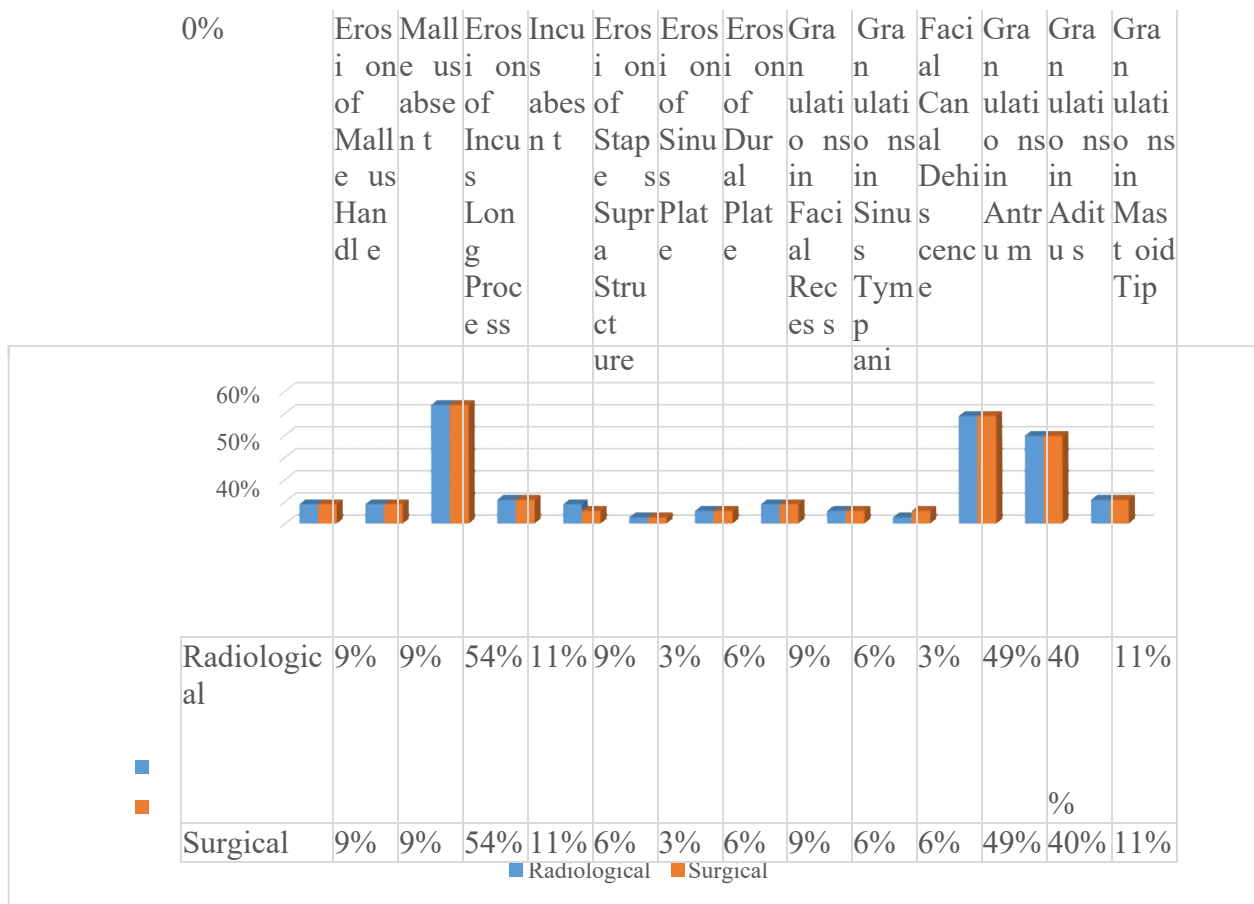


Figure 11: Showing Correlation between Radiological and Surgical Findings in 35 Patients with Pathology detected.

Complication	No.of Cases (N=60)	Percentage
Facial Palsy	1	1.6%
Mastoid Abscess	4	6.6%

Table 14: Showing Complications in CSOM patients

TYPE OF SURGERY	No. of Cases	Percentage
Tympanoplasty	38	63%
Cortical Mastoidectomy	6	10%
Combined Approach Tympanoplasty	12	20%
Modified Radical Mastoidectomy	4	7%
Radical Mastoidectomy	Nil	Nil

Table 15: Type of Surgery Performed (Total Number of Patients N=60)

Types of Tympanoplasty	N=38	
	No.of Patients	Percentage
Type-1	25	66%
Type-2	2	5%
Type-3	11	29%
Type-4	0	0%
Type-5	0	0%

Table 16: Showing percentage of Patients underwent Type of Tympanoplasty

DISCUSSION:

In CSOM ,HRCT of Mastoids has a capability of displaying all the anatomical structures demonstrated by conventional tomography plus many other structures by virtue of projectional advantage and superior contrast resolution.^{11,12} This contrast resolution permits the demonstration of soft tissue masses, which is frequently not possible with conventional tomography. Hence, CT imaging is an accurate method of depicting the extent & nature of disease in CSOM. The increased information about disease extent provided by routine CT imaging in all patients

with CSOM would assist in-patient counselling, planning the surgical approach and prepares the surgeon for difficult situations like high raised jugular bulb, anteriorly placed sigmoid sinus plate, low lying dura, etc.

A total of 60 cases were studied. Majority of patients had decreased hearing and otorrhea as their predominant symptoms and having Clinical diagnosis of disease in pars tensa region, posterosuperior and attic region, requiring tympanoplasty and mastoid exploration, were treated in ENT Department of our hospital with in the period of 1 ½ year.

In the present study, the youngest patient was 13 years and the eldest was 65 years old. 21 patients (35%) were in the age group of 31 to 40 years, 14 patients (23.3%) were in the age groups of 21 to 30 years and 13 patients (21.6%) were in the age group of 11 to 20 years and least cases that is 2 cases (3.3%) were in the age group of 51-60 years Average age of this study comes to 35.28 years corresponding to average age about 35.1 years as in Paperella and Kim¹⁴(1977).

In our study Males are 31.67% and females are 68.33% , more females are affected than males in contrast with the study done by Vlastarakos et al¹⁵ but correlated with study Shreeya v Kulkarni et al ,98% of the patients belonged to low socioeconomic class leading to poor nutrition and lack of hygiene (less in developed countries).¹⁶

The most common presenting symptom was Decreased hearing (92%) and Ear discharge (87%) followed by Ringing sensation in the ear (80%). Left ear Pathology in 61.6% and Right ear pathology in 38.3% as shown. Tympanic membrane examination showed medium sized central perforation in 13 cases (22%) followed by subtotal perforation in 12 cases (20%) followed by small sized central perforation involving anteroinferior quadrant 8 cases (13%), Attic perforation was seen in 4 cases (7%), Attic Retraction seen in 4 cases (7%). Marginal perforation in 3 cases (5%). Middle ear pathology included cholesteatoma in 6 cases, granulations in 7 cases.

Joselito L, Gaurano MD, Ismail A Joharjy, MD conducted retrospective review of CT scan and surgical and histopathological reports in 64 patients with middle ear cholesteatoma. Another study carried out at PGIC handigarh "Study of Clinico-Pathological and Radiological Spectrum of Cholesteatoma in Children and Correlation of Computerized Tomographic Findings with Surgical Findings" by Dr. Prahalada N.B.. Both these studies are comparable with our study.

In present study, on CT scan antrum and aditus was the commonest site of involvement by disease in 80% and 74% respectively. Similar kind of results were obtained in PGI study (88%, 84%) and Joselito Study (85%, 67%). In present study, malleus and incus were eroded in 18% and 54%, stapes suprastructure was eroded in 9% cases. While joselito found stapes to be eroded in 65.62% on HRCT and malleus and incus in 40% and 75%. In both studies bone erosion was seen in more patients compared to our study because they studied only cases with cholesteatoma.

In present study, on surgical exploration disease was present, in aditus in 74% and in antrum in 80%. Long process of incus was the most common ossicle to be eroded followed by handle of malleus. PGI study shows incus to be eroded in 68% followed by malleus 64% and stapes (24%). More cases with ossicular erosion were seen per operatively as they studied only cases with cholesteatoma. During surgery, operative findings are noted.

CT scan was 100% sensitive and 100% specific for epitympanum and 100% sensitive and 100% specific for antrum, these results are in correlation with Dr. vasanthrao pawar college study. These results are in consonance with PGI study with 95% sensitivity and 66% specificity for antrum, In present study antrum granulations and soft tissue mass were visible as soft tissue opacification , but CT scan detects soft tissue opacification of Mastoid air cells in all the cases in present study.

In present study CT scan was 100% sensitive and specific in identifying erosion of malleus while 90% sensitive and 86% specific for erosion of long process of incus. Stapes shows inconsistent visualization in both our study and PGI study.

Sensitivity and Specificity of HRCT Temporal in diagnosis of extension of disease in middle ear among CSOM study subjects. It was done by ROC curve analysis. CT diagnoses accurately Mesotympanum, Posterior tympanum,

Epitympanum and hypotympanum with 100% sensitivity and 100% specificity. It diagnoses Antrum with 100% sensitivity and 100% specificity.

Chi square analysis was also done to find association between HRCT temporal and surgical findings. It shows there is no significant difference in finding of both (P value = 0.285). Sensitivity and Specificity of HRCT Temporal in diagnosis of erosion of ossicles among CSOM study subjects. It was done by ROC curve analysis. CT diagnoses accurately erosion of Malleus, handle of malleus, head of malleus, Incus body, and incus with 100% sensitivity and specificity where as long process of incus with 90% sensitivity.

CT shows inconsistent visualization of stapes foot plate in our study and cannot detect erosive changes of stapes foot plate. Chi square analysis was also done to find association between HRCT temporal and surgical findings. It shows there is no significant difference in finding of both (P value = 0.285). Tegmen tympani - overlying the epitympanum and antrum, tegmen is thin bony roof that is clearly visualized on coronal sections. Sinus tympani - in 1 patient's sinus plate was eroded with mastoid abscess, same thing was observed during surgery.

Facial palsy was seen in 1 case, mastoid abscess was seen in 4 cases. No other CSOM complications were seen in present study.

38 cases (63%) of the patients underwent Tympanoplasty, out of 38 patients, 25 patients (66%) underwent Type-1 tympanoplasty, 11 patients (29%) underwent Type -3 tympanoplasty and 2 patients (5%) underwent Type -2 tympanoplasty.

Rest of 22 cases cortical mastoidectomy was done in 12 cases (20%), 6 cases (10%) underwent Combined approach tympanoplasty, 4 cases (7%) underwent modified radical mastoidectomy.

Mastoid cavities healed well after regular follow ups in 84% of the patients. Correlating the radiological and surgical findings. CT scan has 100% sensitivity and specificity to know the type of mastoid pneumatization.

CHOLESTEATOMA:

In the present study, CT has 100% sensitivity and 90% specificity for diagnosing cholesteatoma through CT images which is in correlation with the studies of Sirigiri and Dwaraknath¹⁶(2011). It has less sensitivity for cholesteatoma in antrum and aditus where as 100% sensitivity for cholesteatomas in epitympanum and hypotympanum.

Cholesteatoma was identified on CT scan film by

- 1) Low attenuation
- 2) Evidence of soft tissue density.
- 3) Presence of erosion of bone.

All cases reported as cholesteatoma in CT were confirmed at surgery. The appearance of abnormal soft tissue opacity associated with bone erosion is highly suggestive of cholesteatoma and absence of erosion mostly excludes the cholesteatoma. The purpose of scanning is to know the extent of the lesion. The diagnosis of cholesteatoma in CT is based on the identification of a sharply demarcated soft tissue mass in the middle ear and bony destruction. Inflammatory diseases of middle ear except cholesteatoma was made out by the absence of erosion of otic capsule or ossicular chain, correlated with the studies done by DW Johnson et al¹⁷(1983).

In the present study using the criteria stated above for the diagnosis of Cholesteatoma an accurate assessment could be made out in 100% of the cases.

SOFT TISSUE MASS:

Present study: HRCT was 100% sensitive and 100% specific in identifying soft tissue mass. Mafee et al. (1988)¹⁸ and O'Reilly et al. (1991)¹⁹ have similar results, whereas Jackler et al.²⁰ (1984) and Garber and Dort²¹ (1994) found it to be less sensitive and specific. However, HRCT is less sensitive in differentiating cholesteatoma from granulations.

HRCT detected scutum erosion accurately in all cases. Hence, HRCT is 100% sensitive and specific to detect scutum erosion as per this study. This is in accordance to study by Rocher et al.²² (1995) but contrasts with study by Vlastarakos et al.²³ (2010), where no correlation was found.

HRCT detects bone erosion in the middle ear cleft which includes scutum, tegmen tympani, tegmen antri, sinus plate and outer cortex of the mastoid process. Pre operative information of bony erosion gives the surgeon a head on for planning the surgery.

FACIAL CANAL DEHISCENCE: Facial nerve canal can be eroded by cholesteatoma, the facial nerve dysfunction occurs in approximately 1% of patients with cholesteatoma. Most facial nerve canal abnormalities occur at horizontal part and this part was clearly seen on coronal cuts. Mastoid segment erosions are best seen in sagittal and coronal sections. However sometime overlying soft tissues cause a loss of contrast gradient resulting in difficulty to comment on the facial nerve condition. Facial nerve dehiscence was better seen in coronal cuts of CT. Overlying soft tissues cause a loss of contrast gradient. In the present study -- CSOM with facial nerve palsy was seen in 2% of cases. Where as CT showed facial canal dehiscence in only 6% patients. This is much less than incidence seen by Magliulo et al.²⁴ (2011) in their study where it was 27%.

OSSICULAR EROSION: Ossicular erosion was seen in 90% of the cases recorded in this study. Incus was the most commonest ossicle to be involved. Incus was seen to be eroded in almost all cases of cholesteatoma,²⁵ followed by malleus and stapes supra structure, in accordance with the findings of Saat Keskin et al.²⁶ In CT Scan Malleus and body of incus are visualized easily. Stapes and I.S joint are visualized with difficulty. Most of the middle ear pathologies appear as soft tissue attenuation on HRCT^{27,28}, resulting in non-visualisation of the ossicles.

Appropriate projections for ossicles and various middle ear structures: The human temporal bone is an extremely complex structure. CT scanning has proved to be the diagnostic imaging method of choice for studying the normal and pathologic details of the temporal bone.²⁹

CT of the temporal bone should always include at least two projections.³⁰ The use of a single projection may lead to serious mistakes, since structures parallel to the plane of section are seen only partially or not at all. The basic projection is of course the direct axial (horizontal) plane, since this is the most suitable and practical as well as the easiest projection to obtain for the baseline study of the temporal bone^{12,31,32,33}. A few minutes discussion with the radiologists shall be of great help in avoiding complications in ear surgery

CONCLUSIONS:

- Most of patients with CSOM presents with chief complains of decreased hearing (92%) followed by ear discharge(87%).
- CSOM is more common in third decades with more incidence in females (1.5 times)
- Otoscopy followed by Examination under microscopy is key to the clinical diagnosis.
- On HRCT antrum and aditus was the commnest site of involvement by disease in 80% and 74%respectively.
- Ideally all cases should be scanned in both axial and coronal planes and sometimes even sagittal view as some structures are viewed best in their appropriate projections.
- The presence and distribution of soft tissue in the middle ear cleft and mastoid could confidently be predicted using this modality.
- Indeed, it was observed, that a scan showing no evidence of soft tissue essentially excluded the presence of a cholesteatoma.
- Soft tissue density in the Middle Ear cleft could be because of granulation tissue or edematous middle ear mucosa. Differentiating point between soft tissue density from cholesteatoma and other pathologies like granulation tissue or polyp is by the presence of bony erosions and loss of ossicular integrity.
- The malleus, body and short process of incus are well visualized. However, the long process of incus and the stapes supra structure cannot be reliably imaged on these scans. Thus, visualizing the entire ossicular chain was satisfactory. In ossicular erosion, incus was most commonly involved followed by malleus and stapes.
- All the mastoids were sclerotic in this study are well demonstrated in CT.
- The visualisation of thin bony structures (facial nerve canal, tegmen, Lateral Semicircular Canal) may be misleading due to errors in computer reconstruction of their images and overlying soft tissues cause a loss of contrast gradient, still it is possible to detect facial nerve dehiscence and defects in tegmen tympani in significant number of cases.
- CT findings are inconsistent with surgical findings in terms of facial canal dehiscence and status of ossicular integrity due to soft tissue opacity, which can be because of granulations and mucosal edema also.
- The sinus tympani area is extremely well appreciated in axial cuts, and evaluation of the sinus tympani prior to surgery can help the surgeon to avoid injury to the facial nerve while doing surgery in this area.
- In conclusion, its known that CSOM can at times be life threatening and warrants otolaryngologists to be familiar with the standard techniques for these patients.
- Advent of HRCT and improvements in radiological technique has definitely improved study of the temporal bone in patients with CSOM, which includes evaluation of the extent and sites of involvement and interrelationships of the tympanomastoid compartment with adjacent neurovascular structures.
- CT scan should not be seen as indispensable but rather, as a useful aid to management. HRCT offers information of extent of the disease process, about the vital structures and helps to plan the type of surgery.
- Hence this study emphasizes on the use of CT can be recommended not only

in cases suspected with potential complications but also in all cases of COM to know the extent of disease, varied pneumatization and the presence of anatomical variations, which should alert the clinician and guide in surgical approach and treatment plan.

- This study concludes that use of CT Temporal Bone is to be encouraged for successful diagnosis and treatment of CSOM.

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