Original Research Article

Comparative Study Between CT Findings And Intra-Operative Findings In Patients With Unsafe CSOM.

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Abstract:
Background: Atticoantral (unsafe) chronic suppurative otitis media is one of the common conditions in otorhinolaryngology practice in developing countries. Its importance lies in the fact that it is associated with high morbidity and at times even with mortality.
Method: Prospective comparative study conducted From July 2021 to June 2023 at tertiary care hospital .70 patients presenting to ENT OPD and casualty and getting operated for unsafe CSOM are included in the study. Demographic data, nature of ear discharge, and presence or absence of symptoms showing complications, otoscopic examination, hearing assessment by Pure tone Audiometry was noted. HRCT TEMPORAL BONE were advised to all the patients.
Results: In our study the patients were between 5 to 66 years of age with mean age of 26.2 years, showed a male preponderance. the commonest complaint was otorrhoea (100%) Most, 68(97.14%) patients, presented with complaints of foul smelling discharge, Blood- stained discharge is often noted with granulation tissue or polyps and was presented by 31 (44.29%) patients, Tympanic membrane pathology was noted in 34 (48.57%) patients with perforation in 15 (21.42%) patients and retraction pockets in 19(27.14%) patients. Pre operative HRCT could diagnose soft tissue density suspicious of cholesteatoma in all 70 patients (100%).Bony erosion, an additional sign for the presence of cholesteatoma was identified in 25(35.71%) cases. HRCT was 100% sensitive for cholesteatoma in petrous apex followed by mastoid antrum 97.1 %, aditus 97 %,and epitympanum 94.9 %, HRCT to be 80% sensitive and 86.7 % specific in identifying ossicular destruction.
Conclusions: Most common type of unsafe CSOM clinically found to have retraction pockets on otoscopy (primary acquired cholesteatoma.) Invention of HRCT has made remarkable improvements in the preoperative diagnosis of unsafe CSOM and its complications. But still false positive and false negative findings prevent complete dependence and reliability on HRCT**.**

Keywords: Cholesteatoma; mastoidectomy; attico-antral.. HRCT temporal bone

Introduction

Middle ear infection is the commonest cause of tympanic membrane perforation. Other causes are traumatic as foreign bodies through the external auditory canal and iatrogenic post-tympanostomy tube insertion[1]. Unsafe chronic suppurative otitis media (atticoantral) is one of the common conditions in otolaryngologic practice in developing countries. Its importance lies in the fact that it is associated with high morbidity and at times even with mortality. The diagnosis of CSOM is made clinically by otoscopic examination, in addition to microscopic and endoscopic evaluation. Special imaging as computed tomography (CT) and magnetic resonance imaging (MRI), may suggest the presence of cholesteatoma within the temporal bone, and may be used to complement the clinical diagnosis[2]. With the availability of antibiotics, operating microscope, the microsurgical operating instruments and advanced radiological imaging, it has become easier to successfully treat atticoantral type of chronic suppurative otitis media. It can be with or without cholesteatoma. It is one of the most fascinating and challenging task in otology when studying its various aspects in depth. This has stimulated much research and debates worldwide[3,4]. The most common locations of cholesteatoma are the attic, posterior mesotympanum; although they may develop anywhere within the pneumatized portions of the temporal bone. Cholesteatoma may be acquired or congenital, with a similar morphologic appearance[5]. In attic cholesteatoma, erosion of the scutum (the first sign of aural cholesteatoma) in the coronal view can be assessed clearly. Bony erosion occurs more commonly in the long process of the incus, the body of the incus, and the head of the malleus. Cholesteatoma of the pars tensa extends to the long process of the incus and the suprastructure of the stapes. Expansion of aditus ad antrum increases the probability of attic cholesteatoma[6].

HRCT Temporal bone is a common modality available in diagnosing and knowing the extent of the disease, and can inform the surgeon of its extent, severity, and associated pathologies. It's fairly cheap and easily available. HRCT has proved to be better than plain CT and can visualize areas that cannot be visualized by the endoscope.

This study was done to evaluate clinical presentation and to find correlation between pre-operative HRCT findings and intra-operative findings in patients with unsafe chronic suppurative otitis media.

Materials and Method

This is a prospective study conducted From July 2021 to June 2023 at tertiary care hospital. After obtaining approval from the institutional ethical committee this study was done on 70 patients with CSOM. Written informed consent was obtained from patients. Each case was assessed for following parameters-age, sex, socioeconomic strata, laterality of ear complaints, nature of ear discharge (profuse, scanty, foul smelling, blood stained), presence or absence of symptoms showing complications (otalgia, vertigo, headache, vomiting, post-aural swelling, facial weakness), otoscopic examination, hearing assessment by Pure tone Audiometry. Standard temporal bone CT involving 1.5 mm sequential cuts in both the axial and coronal projections was done. The axial images extended from the arcuate eminence superiorly to the jugular fossa inferiorly. The coronal images extended from the bony portion of the eustachian tube anteriorly to the posterior semicircular canal posteriorly. Parameters like Presence or absence of soft tissue density lesion ,Presence or absence of bone erosion, Presence or absence of ossicular erosion, Extent of disease at various sites of temporal bone and Involvement of ear ossicles due to disease were noted.

Results

In this comparative type of prospective study a total number of 70 cases were studied in detail.

In our study the patients were between 5 to 66 years of age with mean age of 26.2 years (Table1). The overall sex distribution showed a male preponderance. Overall 62.86 % were males while 37.14 % were females (Table2). The commonest complaint was otorrhoea (100%) Most, 68(97.14%) patients, presented with complaints of foul smelling discharge.58 (82.85%) patients present with scanty ear discharge. Blood- stained discharge is often noted with granulation tissue or polyps and was presented by 31 (44.29%) patients, which were supported by the presence of granulation tissue

with or without cholesteatoma on otoscopic examination and all these cases correlates well with surgical findings. In 18(25.71%) patients findings were misleading as profuse discharge was seen which is not a characteristic of atticoantral CSOM. (Table3). There were 11 (15.71%) cases which showed characteristic cholesteatoma flakes on examination, with or without granulation tissue or polyp. All these were in agreement with the surgical findings. 12 (17.14%) cases showed granulation tissue on examination (Table4). Pre-operative HRCT could diagnose soft tissue density suspicious of cholesteatoma in all 70 (100%). (Table 5). Bony erosion, an additional sign for the presence of cholesteatoma was identified in 25(35.71%) cases.(Table6). HRCT was 100% sensitive for cholesteatoma in petrous apex followed by mastoid antrum 97.1 %, aditus 97 %,and epitympanum 94.9 %.For posterior tympanum, mastoid air cells and mesotympanum sensitivity varied from 83-87%. HRCT was 100% specific for petrous apex and perilabyrinthine cells followed by EAC 98.1 %, retrofacial 94.4%, protympanum 90.4%, For cholesteatoma in hypotympanum, tip cells and posterior tympanum specificity varies from 81-87%.Dehiscence of the horizontal part of the facial canal was accurately diagnosed in 8 cases (sensitivity 72.7% and specificity 98.3%) and there were 1 false positive and 3 false negative interpretations. HRCT is most sensitive (100%) in diagnosing mastoid cortex dehiscence and sinus plate erosion. This is in agreement with studies with most authors. Specificity of HRCT is 98.4% and 93.7% for diagnosis of sinus plate erosion and mastoid cortex dehiscence respectively. Dural plate erosion was diagnosed with 84.6% specificity and 93% sensitivity.

Discussion:

This study was based on 70 patients who underwent mastoid exploration for cholestematous ear disease during a period of two years From July 2021 to June 2023.

In our study the mean age of 26.2 years. In a study by Jose Evandro Andrade Prudente de Aquino et al comprised of 960 adults Patients aged 16 complete years were considered as adults[7]. In our study, the overall sex distribution showed a male preponderance. Overall 62.86 % were males while 37.14 % were females. Nelson et al divulged the incidence of cholesteatomas as being about 1.4 times higher in men compared to women[8]. The diagnosis of cholesteatoma is usually made on otologic examination. Our study results are comparable to the studies done by Glasscock et al[9] and Triglia.[10], but were not agreeable with the studies performed by Sheahan P**[11],** which showed 70% cases with otorrhoea. In our study 3 (4.28%) patients presented with intracranial complications. Marco Algarra J. et al (1991) in their study of 52 patients (55 ears) showed that the commonest presenting symptoms were otorrhoea plus hearing loss (54%), otorrhoea only (29%), hearing loss only (7.6%), mastoiditis (5.4%),pain (13%), dizziness (3.8%),tinnitus (3.8%), fever (1.9%) ,none presented with any facial nerve involvement or any intra cranial complications.[12] Our Pre operative HRCT could diagnose soft tissue density suspicious of cholesteatoma in all 70 (100%). Mafee[13] and O'Rilley [14] have similar results, where as Jackler[15] and Garber[16] found it to be less sensitive in differentiating cholesteatoma from granulations. Most authors are in agreement with these findings. Bony erosion, an additional sign for the presence of cholesteatoma was identified in 25(35.71%) cases. Jackler et al[15]. and O'Donoghue et al.[17], found cholesteatoma to be present in 80% of the explored cases with bony erosion. Most authors had problems with visualization of stapes except O'Donoghue who reported that they could diagnose destruction of stapes suprastructure in 86% of the cases. Thus our findings are similar to that of Joselito L. Gaurano et al.They had 59 (92.19%) cases with ossicular erosions, the incus was mostly affected (n=48, 75%) (The long process of the incus was the most commonly eroded). Dehiscence of the horizontal part of the facial canal. Our findings are not in agreement with that of Mafee et al who found CT to be very accurate in the diagnosis of erosion of facial canal.

Conclusion

Most common type of unsafe CSOM clinically found to have retraction pockets on otoscopy (primary acquired cholesteatoma). Considering only presence or absence of disease in diagnosing

unsafe CSOM, HCRT was accurate in comparison with intraoperative findings. HRCT could diagnose petrous apex cholesteatoma most accurately. Disease at perilabyrinthine, external auditory canal, tip cells ,hyotympanum as well as ossicular involvement and facial canal dehiscence was underdiagnosed and sinus plate erosion, dural plate erosion and mastoid cortex dehiscence was overdiagnosed by HRCT. Invention of HRCT has made remarkable improvements in the preoperative diagnosis of unsafe CSOM and its complications. But still false positive and false negative findings prevent complete dependence and reliability on HRCT**.** This may be because- the disease pathology cannot always be detected accurately due to limitations of HRCT in differentiating the type of pathology.

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TABLE 1-AGE INCIDENCE

Age groups	Number	Percentage
1-10	4	5.71
11-20	23	32.86
21-30	24	34.29
31-40	7	10
41-50	7	10
> 50	5	7.14

TABLE 2-SEX INCIDENCE

Sex	Number	Percentage
Male	44	62.86
Female	26	37.14

TABLE 3-SIGNS AND SYMPTOMS SUGGESTIVE OF COMPLICATIONS OF UNSAFE OTITS MEDIA

Symptom	Number	Percentage
Otalgia	7	10
Headache	6	8.57
Giddiness	2	2.86
Projectile Vomiting	4	5.71
Postural swelling	8	11.43
Facial weakness	4	5.71
Neck pain	5	7.14

TABLE 4-FINDINGS OF OTOSCOPIC AND OTOMICROSCOPIC EXAMINATION

Otoscopic and otomicroscopic findings	Number	Percentage
Perforation /retraction	34	48.57
Cholesteatoma flakes	11	15.71
Granulations	12	17.14
Aural polyp	5	7.14
Post canal wall sagging	1	1.43
Scutum erosion	7	10

TABLE 5-COMPARISON OF INTROPERATIVE FINDINGS AND RADIOLOGICAL FINDINGS

Temporal bone findings	HRCT	Surgery	Cases in agreement (True +ve)	False +ve	False -ve	Sensitivity	Specificity
Soft tissue density	70	70	70	0	0	100%	100%
Bone erosion	25	23	20	5	3	87%	89.4%
Ossicular erosion	46	55	44	2	11	80%	86.7%

TABLE 6-COMPARISON OF INTRA-OPERATIVE VS RADIOLOGICAL FINDINGS

INTRA-OPERATIVE FINDINGS		SOFT TISSUE DENSITY		TOTAL
YES (%)			NO (%)	
RADIOLOGICAL FINDINGS	YES	70 (100)	0 (0)	70 (100)
NO		0 (0)	0 (0)	0 (100)
TOTAL		70 (100)	47 (100)	70 (100)

SENSITIVITY – 100%
SPECIFICITY – 0%

TABLE 7-COMPARISON OF INTRA-OPERATIVE VS RADIOLOGICAL FINDINGS (BONE EROSION)

INTRA-OPERATIVE FINDINGS		BONE EROSION		TOTAL
YES (%)			NO (%)	
RADIOLOGICAL FINDINGS	YES	20 (87)	5 (10.6)	25 (35.7)
NO		3 (13)	42 (89.4)	45 (64.3)
TOTAL		23 (100)	47 (100)	70 (100)
CHI-SQUARE TEST VALUE – 39.17; P VALUE < 0.01; SIGNIFICANT DIFFERENCE				
SENSITIVITY – 87% SPECIFICITY – 89.4%				

TABLE 8- COMPARISON OF HRCT FINDINGS AND INTRA-OPERATIVE FINDINGS-(EXTENT OF DISEASE)

Extent of disease	HRCT	Surgery	Cases in agree-ment (True +ve)	False +ve	False -ve	Sensitivity	Specificity
EAC	12	17	11	1	6	64.7%	98.1%
Pro tympanum	19	18	14	5	4	77.8%	90.4%
Meso tympanum	45	45	39	6	6	86.7%	76%
Post tympanum	42	47	39	3	8	83%	87%
Epi tympanum	59	59	56	3	3	94.9%	72.7%
Hypo tympanum	18	12	7	11	5	58.3%	81%
Antrum	67	68	66	1	2	97.1%	50%
Aditus	66	67	65	1	2	97%	66.7%
Mastoid Air cells	51	53	45	6	8	84.9%	64.7%
Peri-labyrinthine cells	8	13	8	0	5	61.5%	100%
Petrous apex	2	2	2	0	0	100%	100%
Retrofacial	15	16	12	3	4	75%	94.4%
Tip cells	23	25	17	6	8	68%	86.7%

TABLE 9-COMPARISON OF HRCT AND INTRAOPERATIVE FINDINGS OSSICULAR INVOLVEMENT

Ossicle absent	HRCT	Surgery	Cases in agree ment (True +ve)	False +ve	False –ve	Sensitivity	Specificity
Malleus handle	33	31	25	8	6	80.6	79.5
Malleus partial head	32	29	24	8	5	82.8	80.5
Malleus complete head	38	38	32	6	6	84.2	81.2
Incus long process	42	53	40	2	13	75.5	88.2
Incus short process	4	5	2	2	3	40	96.9
Incus body	35	32	28	7	4	87.5	81.6
Stapes head	22	20	15	7	5	75	86
Stapes supra-structure	20	17	13	7	4	76.5	86.8