International Journal of Research in Health and Allied Sciences
Journal home page: www.ijrhas.com
Official Publication of "Society for Scientific Research and Studies" [Regd.]
ISSN: 2455-7803

ORIGINAL RESEARH

A Study of Correlation between Clinical Features, Radiological, Audiological and Operative Findings in unsafe Chronic Suppurative Otitis Media

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ABSTRACT:
Background: Chronic suppurative Otitis Media (COM) is the term used to describe any chronic inflammatory pathology of the middle ear. The present study was conducted to study the sensitivity and specificity of pre-operative HRCT temporal bone, clinical features and audiological profiles of patients of squamous type chronic suppurative otitis media. **Materials & methods:** All patients attending the E.N.T outpatient as well as casualty, paediatric, and medical units with complaints of ear discharge, ear ache, deafness, vertigo, tinnitus, swelling or discharge in the post-aural region, headache, fever and neurological signs were screened thoroughly and those in whom attico-antral type of CSOM with or without complication were suspected, were taken for the study with a sample size of fifty patients. Otological examination, along with examination under microscope and hearing evaluation by tuning forks was also done.A pure tone audiogram for both air and bone conduction were obtained. All cases were thoroughly examined and investigated before taking them up for the surgery. All cases were subjected to routine pre- anesthetic check-up and requisite clearance was obtained. Findings were recorded in the proforma attached. The data from the present study was systematically collected, compiled and statistically analysed to draw relevant conclusions. **Results:** In present study according to PTA we found conductive hearing loss with ABG average 37.84±10.02 Db and AC average 49.35±12.24 Db that is moderate conductive hearing loss. Big hearing loss with ABG average 32.49±4.17 Db and AC average 50.83±4.56 Db which is moderately severe. In present study because of chronic suppurative otitis media mastoid was found as sclerosed in 84%, diploeic in 12% and well pneumatised in 4%. **Conclusion:** The sensitivity, specificity and positive predictive value of HRCT scans depend on the anatomical structure implicated in squamous COM damage.
Key words: Audiological profile, Chronic suppurative otitis media.

Received: 14 February, 2019 Revised: 24 February, 2019 Accepted: 27 February, 2019

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This article may be cited as: Sandhu KS, Kaur S, Singh J, Kaur A, Kaur P. A Study of Correlation between Clinical Features, Radiological, Audiological and Operative Findings in unsafe Chronic Suppurative Otitis Media. Int J Res Health Allied Sci 2019; 5(2):11-14.

INTRODUCTION

Chronic suppurative Otitis Media (COM) is the term used to describe any chronic inflammatory pathology of the middle ear.[1] Cholesteatoma is a non-malignant destructive lesion of the middle ear cleft that's short and long term sequelae may be devastating, the reason being the strategic location of the tympanomastoid compartment, separated from the middle and posterior cranial fossa by the thinnest of bony partitions. Hearing loss associated with chronic suppurative otitis media is a matter of concern globally, particularly in children because of its long term effect on development of essential skill in speech, language and social interaction. Hearing disability in adults also has its bearing on the individual and on the society.[2-4]

Since a considerable number of patients with squamous chronic suppurative otitis media, with/without cholesteatoma attend services of our hospital, it was felt necessary to study in detail, the HRCT evaluation of squamous chronic suppurative otitis media. In this study, we evaluated the role of HRCT in squamous chronic suppurative otitis media, and compared the peroperative findings on surgery with the preoperative HRCT findings, thereby implicating the usefulness of HRCT as an important tool for preoperative assessment of patients of squamous type chronic suppurative otitis media and yielding anatomical details imperative for surgery.[5-7]

To this objective, the present study was conducted to evaluate how accurately HRCT scanning could define the extent and severity of the underlying disease in patients with squamous type chronic suppurative otitis media, thereby altering the surgical plan and outcome. Thus, this study aims to study the sensitivity and specificity of pre-operative HRCT temporal bone, clinical features and audiological profiles of patients of squamous type chronic suppurative otitis media.

MATERIALS & METHODS

The present study of 'Correlation of clinical features, radiological, audiological and operative findings in chronic suppurative otitis media with cholesteatoma' was conducted in the Department of E.N.T, Govt. Medical College, Amritsar. All patients attending the E.N.T outpatient as well as casualty, paediatric, and medical units with complaints of ear discharge, ear ache, deafness, vertigo, tinnitus, swelling or discharge in the post-aural region, headache, fever and neurological signs were screened thoroughly and those in whom attico-antral type of CSOM with or without complication were suspected, were taken for the study with a sample size of fifty patients. The patients were enrolled in the study after obtaining written informed consent and approval of Institutional Ethics Committee, Government Medical College, Amritsar were obtained after selection, a complete history was obtained from each patient. General physical and systemic examination was carried out in all the patients. Otological examination, along with examination under microscope and hearing evaluation by tuning forks was also done. A pure tone audiogram for both air and bone conduction were obtained. All cases were thoroughly examined and investigated before taking them up for the surgery. All cases were subjected to routine pre- anesthetic check-up and requisite clearance was obtained. Findings were recorded in the proforma attached. The data from the present study was systematically collected, compiled and statistically analysed to draw relevant conclusions. The 'p' value was determined to finally evaluate the levels of significance. The p value of < 0.05 was considered as significant at 5% significance level; $p < 0.01$ was considered significant at 1% significance level and a p value of < 0.001 was considered as highly significant. Chi square, ANOVA and t-test are used for the statistical analysis. The above mentioned parameters and patient's characteristics were compared using appropriate statistical tests. The results were analyzed.

RESULTS

The most common age group of presentation was the 31-40 years group. 36% patients (18 out of 50 patients) were found to be in this category followed by 26% patients of 21-30 age group then 14% each in groups of 11-20 and 41-50 age group then 6% of patients presented in age group upto 10 year and least were enrolled <50 years of age group of 4% valve. In present study, males were affected more silently than females. 56% of our patients were males. The female to male ratio was 1:1.3. Duration of discharge presented with 1-5 yrs were maximum in number (23 patients) followed by duration of 6-10 yrs (13 patients) followed by duration of less than 1 yrs (7 patients) followed by duration of more than 10 yrs (5 patients).

In present study according to PTA we found conductive hearing loss with ABG average 37.84±10.02 Db and AC average 49.35±12.24 Db that is moderate conductive hearing loss. Big hearing loss with ABG average 32.49±4.17 Db and AC average 50.83±4.56 Db which is moderately severe. In present study because of chronic suppurative otitis media mastoid was found as sclerosed in 84%, diploeic in 12% and well pneumatised in 4%.

In present study during surgery we found mastoid sclerosis in 42 patients while 39 patients had sclerosed mastoid in high resolution computer tomography. HRCT reported soft tissue density in the middle ear cleft in 40 patients, all correctly diagnosed i.e. there were no false positives. Soft tissue in the middle ear cleft was found in 45patients intra-operatively which infers that HRCT missed 5 cases i.e. there were 5 false negative cases bringing the true positive count to 40. During surgery, we found an eroded scutum in 40 patients. 39 patients were diagnosed by HRCT. Tegmen erosion was seen in 6 patients intra-operatively and was diagnosed in 10 patients on HRCT. In present study intraoperatively we observed korner's septum in 10% (4 patients), anteposed sigmoid sinus 6% (3 patients) and high jugular bulb in 2% (1 patient) of value.

Table 1: Duration Of Discharge (in Years)

DURATION OF DISCHARGE (in years)	NUMBER OF PATIENTS
<1 year (GROUP 1)	7
1-5 year (GROUP 2)	23
6-10 year(GROUP 3)	13
>10 year (GROUP 4)	5

Table 2: PTA average in patients with pure conductive and mixed hearing loss

Type of hearing loss	ABG average Average of diseased ear	AC average of diseased ear
Conductive hearing loss	37.84±10.02 Db	49.35±12.24 Db
Mixed hearing loss	32.49±4.17 Db	50.83±4.56 Db

Table 3: On Mastoid Schuller's View

Well Pneumatised	Sclerotic	Diploeic
4%	84%	12%

TABLE 4: Anatomical Variations in Temporal Bone (Intra Operative)

Korner's septum	Anteposed sigmoid sinus	High jugular bulb
10%	6%	2%

Table 5: Correlation between High Resolution Computed Tomography And Intra-Operative Findings

S. No	Feature	On high resolution Computed tomography n = 50	Intra-operative n = 50	False positives	False negatives	Sensitivity	Specificity	Positive predictive value	Negative predictive value	p value
1	Mastoid air cells sclerosis	39	42	0	3	92.85%	100%	72.73%	100%	
2.	Soft tissue in me cleft	40 (80%)	45 (90%)	0	5	94.59%	60%	100%	50%	0.157
3	incus Necrosis	37 (74%)	42 (84%)	5	10	76.19%	37.5%	86.48%	23.07%	0.317
4	malleus Necrosis	28 (56%)	30 (60%)	4	6	80%	80%	85.71%	72.73%	0.655
5	Stapes necrosis	20 (40%)	25 (50%)	8	13	48%	68%	60%	56.67%	0.040
6	Lateral scc erosion	4 (8%)	3 (6%)	2	1	75%	95.74%	50%	97.82%	0.317
7	Facial nerve dehiscence	5 (10%)	10 (20%)	0	5	31.57%	100%	100%	88.89%	0.078
8	Tegmen erosion	10 (20%)	6 (12%)	8	4	33.33%	81.82%	20%	90%	0.257
9	Scutum erosion	39 (72%)	40 (80%)	4	5	87.5%	60%	89.74%	54.54%	0.754

DISCUSSION

In present study of 50 patients, 80% cases (40 patients) showed a non-dependant homogenous soft tissue in the Middle Ear Cleft on HRCT whereas 90% patients (45 patients) were found to have soft tissue in middle ear cleft intra-operatively, thus proving the HRCT specificity of 60% while a sensitivity of 94.59% in detecting a soft tissue mass pre-operatively .A similar prospective study done by Garg et al[10] in 2012 showed similar results of HRCT sensitivity of 89.65% and specificity of 100% in detecting soft tissue in the middle ear cleft. Sirigiri et al[11] in 2011, in his study, also showed HRCT sensitivity of 92% which is compatible with present study. Our results are also comparable with studies conducted by O'Reilly et al[12] in 1991 and Shaffer et al[13] in 1980 who found HRCT to be 100% sensitive in detecting soft tissue mass pre-operatively. Present study, thus indicates that HRCT is an excellent investigation for those without disease and if HRCT has said that a mass was present, then it was always so. After statistically analyzing and comparing HRCT and intra-operative findings for soft tissue density in the middle ear cleft in our patients, the p value was calculated which came out to be p = 0.157 It was not significant, making HRCT a good modality for diagnosing soft tissue in the middle ear cleft by HRCT pre-operatively. The positive predictive value of HRCT for the same was 100%and negative predictive value was 50%.

Pre-operative erosion of incus was seen in 74% cases (37 patients) while 84% cases (42 patients) showed incus necrosis intra-operatively so there were 10 false negative cases , hence the HRCT sensitivity after calculation was 76.19% while specificity dropped to 37.5% . The findings of present study are comparable to a study by Shah et al[14] in 2014 who also quoted a sensitivity and specificity of 90% and 66.7% respectively. The calculated p value for incus necrosis was p =0.317. It was not significant. We can thus infer that HRCTis a good investigation for diagnosing incus necrosis pre-operatively. The positive predictive value of HRCT for this entity was 86.48% and negative predictive value was 23.07%.

Labyrinthine fistula continues to be one of the most common complications of squamous Chronic suppurative otitis media. In nearly 90% of the patients, the labyrinthine fistula is located in the lateral semicircular canal. An extensive clinical examination supported by imaging studies is essential for its pre-operative diagnosis. O' Reilly et al[12] have stated that axial scans are more satisfactory in depicting LSCC in its entirety. Nevertheless, useful information can also be obtained

from coronal scans, hence making the necessity of both the planes - coronal and axial, to be employed for detecting LSCC fistula. Gerami et al[15]in 2009 too have reported a specificity of 95% for LSCC erosion which is comparable with our study. Statistical evaluation was carried out and p value was calculated for lateral SCC erosion in present study. P=0.317 was insignificant.Thus HRCTwas a good pre-operative diagnostic modality to look for lateral SCC erosion. The positive predictive value was 50% and negative predictive value was 97.82% in present study.

After the above discussion with reference to national and international studies, it is our impression that HRCT has a role in evaluation of cases of squamous chronic suppurative otitis media but must be interpreted with caution in view of its certain limitations. Both axial and coronal sections should be done as important structures are best seen after evaluating them in both the planes. This HRCTanalysis and surgical correlation has shown that sensitivity, specificity and positive predictive value of HRCT scans depend on the anatomical structure implicated in squamous chronic suppurative otitis media damage. Hence HRCTis valuable in diagnosing and in guiding the surgical management of squamous chronic suppurative otitis media and its use by otologist is to be encouraged, especially in patients who are suspected of having complex problems and in whom maximum information is desirable, as an adjunct to better pre-operative assessment and better surgical outcome, thus reducing disease morbidity. Limitations of HRCT should be considered and improved by newer radiological modalities. In short, we can say that HRCT serves as a road map to assist the surgeon during surgery.

CONCLUSION

The sensitivity, specificity and positive predictive value of HRCT scans depend on the anatomical structure implicated in squamous COM damage. HRCT Temporal bone is not a good diagnostic modality for stapes necrosis evaluation as stapes is not consistently visualized on HRCT Temporal Bone.

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