



A COMPARATIVE STUDY BETWEEN HIGH RESOLUTION COMPUTED TOMOGRAPHY FINDINGS AND OPERATIVE FINDINGS OF SQUAMOUS TYPE OF CHRONIC OTITIS MEDIA

**Dr. Laxman
Bhattacharjee**

PGT, Dept. of ENT, TMC & Dr. BRAM Teaching Hospital

Mr. Sandipan Paul

Statistician Of TMC & Dr. BRAM Teaching Hospital.

ABSTRACT

Aim: To evaluate the role of high-resolution computed tomography (HRCT) temporal bone in patients with squamous chronic otitis media (COM).

Materials and Methods: Totally, 40 patients with squamous COM underwent preoperative HRCT temporal bone followed by surgery. Their intra-operative findings were compared and correlated with the radiological findings, to calculate the sensitivity, specificity, positive negative predictive value & P value of HRCT temporal bone.

Results: According to the present study, HRCT was highly sensitive for detecting mastoid pneumatization, soft tissue extension, ossicular erosion, tegmen and sigmoid sinus erosion, and less sensitive for fallopian canal erosion and lateral sinus fistula. It was specific for all these parameters & P- value indicates that there is statistically significant association between different findings of 2 methods except stapes.

Conclusion: The present study concludes that HRCT 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.

KEYWORDS :

INTRODUCTION-

Chronic otitis media (COM) has been an important cause of middle ear disease since prehistoric times.¹ COM equates with the classic term chronic 'suppurative' otitis media (CSOM) that is no longer advocated. COM is classified as- Inactive (mucosal), Inactive (squamous) COM, Active (mucosal) COM, Active (squamous) COM & Healed COM. A perforated tympanic membrane is an open door for all micro-organisms, making the middle ear vulnerable to recent attacks of otitis media. Radiological evaluation of the temporal bone is difficult owing to complicated anatomical structure of the middle ear and inner ear. A major advance in imaging of the ear structures has occurred with the development of High Resolution Computed Tomography (HRCT).^{2,3} HRCT has the advantage of excellent topographic visualization devoid of artefacts from superimposition of structures. In patients requiring surgery, temporal bone computed tomography (CT) is used to assess the disease and to develop the treatment strategy.^{4,5} Having preoperative comprehensive knowledge of the anatomy and anomalies of the different structures is crucial for preventing postoperative morbidity in patients who require surgery due to middle ear disorder.⁸⁻¹⁰

MATERIAL AND METHODS:

40 Cases suffering from squamous type of COM who attended in the Department of Otorhinolaryngology, Tripura Medical college, aim to study any normal variation in the structure of temporal bone and to evaluate various infective pathologies of temporal bone and their complications with HRCT between the period from March 2017 to August 2018.

The criteria for selection of cases was:

Patients having Squamous COM with clinical evidence of cholesteatoma, granulation or both (unilateral and bilateral) disease.

The criteria for exclusion of cases:

1. Clinical suspicion of malignant ear pathology
2. Congenital ear disease
3. Clinically mucosal and healed COM
4. Patients unfit for surgery or anesthesia
5. Pregnancy
6. Revision cases

Method-

The selected cases of Squamous COM were evaluated by taking detailed history, clinical examination, audiological investigation by PTA, routine investigation of blood, urine & radiological investigation by x-ray mastoid & in all the cases.

A temporal bone HRCT without contrast (axial and coronal view) was

performed before surgery in all cases and findings recorded and tabulated.

All patients underwent surgery & intraoperative findings were noted. Finally a comparison was done between HRCT & intraoperative findings.

RESULTS:

The results of our study showed age distribution of the patients ranges from 7 to 60 years. Commonest age group was 21-30 years with 21 patients & there is a little predominance of females than to male & ratio was 1:1.23. The study recorded history of ear discharge as the most common and consistent presenting symptom which was found in all cases (100%).

1. Pneumatization of Mastoid: In our study, 38 (95%) cases were sclerotic; in the remaining two (5%) case were pneumatic. Same findings were true on both CT and operatively.

2. Soft Tissue Mass: On preoperative CT, soft tissue masses were found in all 40 cases. Out of these, 13 (32.5%) cases found to have cholesteatoma, 7 (17.5%) cases were associated with granulation and 20 (50%) cases were associated with both cholesteatoma and granulation.

3. Distribution Of Soft Tissue Mass: On CT the soft tissue was present in 31 (77.5%) cases in both middle ear and mastoid, in 9 (22.5%) cases it was confined to middle ear only. Peroperatively soft tissue was present in middle ear and mastoid in 33 (82.5%) cases and confined to middle ear in 7 (17.5%) cases.

4. Ossicular status: Regarding ear ossicles, on CT malleus, incus & stapes appeared eroded in 30 (75%), 32 (80%) & 14 (35%) cases, per operatively these were found to be eroded in 31 (77.5%), 35 (87.5%) & 12 (30%) cases respectively.

5. Dural and Sinus Plate: Dural plate erosion was seen in 7 (17.5%) cases on CT, but peroperatively erosion was found in only 4 (10%) cases. Sinus plate erosion was seen in 4 (10%) cases, the same findings were confirmed peroperatively.

6. Status Of Semicircular Canal, Facial Canal And Lateral Cortical Wall:

LSCC & LCW erosion was depicted in 2 (5%) & 3 (7.5%) case on CT respectively and the same was confirmed peroperatively. Facial nerve canal appeared eroded in 7 (17.5%) cases in tympanic segment on CT and it was confirmed peroperatively but one more case found with erosion of the vertical segment of facial nerve.

7. Statistical analysis-

Null hypothesis: There is no association between Surgical & HRCT Findings. Alternative hypothesis: There is association between Surgical & HRCT Findings.

Table-1

	Sensitivity (% age)	Specificity (%age)	PPV (%age)	NPV (%age)	Accuracy(%age)
Dural Plate	100	91.67	57.14	100	92.5
Sinus Plate	100	100	100	100	100
Semicircular Canal	100	100	100	100	100
Facial Canal	88	100	100	96.97	97.5
Lateral Cortical Canal	100	100	100	100	100
Pneumatization of Mastoid	100	100	100	100	100
Ossicular status (Incus)	91	100	100	62.5	92.5
Ossicular status (Malleus)	94	88.89	96.67	80	92.5
Ossicular status (Stapes)	80	81.25	72.73	86.67	80.77

Table 2

	Kappa Value(K)	K-value interpretation	P-Value of Fisher's Exact Test	P-Value Interpretation at 5% level of sig.
Dural Plate	0.69	Substantial agreement	0.003	Associated
Sinus Plate	1	Perfect agreement	0.0007	Associated
Semicircular Canal	1	Perfect agreement	0.0008	Associated
Facial Canal	0.92	Almost agreement	0.001	Associated
Lateral Cortical Canal	1	Perfect agreement	0.0009	Associated
Pneumatization of Mastoid	1	Perfect agreement	0.0006	Associated
Ossicular status (INCUS)	0.73	Substantial agreement	0.002	Associated
Ossicular status (MALLEUS)	0.79	Substantial agreement	0.003	Associated
Ossicular status (STAPES)	0.60	Moderate agreement	0.06	Not Associated

DISCUSSION:

In the present study, the highest number of patient belonged to the 3rd decade of life with 52.5% followed with a female preponderance was seen in the present study with 22(55%) females and 18(45%) males. Similar female preponderance was seen by *Bates GJEM et al.*¹¹

Mastoid cavity:The most common finding was of hypopneumatization, which was present in 95% cases. Findings are consistent with *Seetana Ragavoodoo et al.*¹²

Soft tissue mass: In the present study it was noted that all 40 cases, soft tissue density mass was depicted by HRCT and was confirmed in all 40 cases preoperatively i.e. 100%, among those 50% was cholesteatoma and granulation both followed by 32.5% cholesteatoma only. This finding is in agreement with that of *Reilly et al.*¹⁴

Ossicles: Our study, The Incus was the most frequently eroded ossicle followed by the malleus and the stapes. This is consistent with the findings of *Chee et al.*¹⁵ The stapes was not consistently visualized by CT, but when seen usually appeared as a structure of soft tissue density in the oval window niche, findings are consistent with the findings of *Jackler et al.*¹³

Dural plate and Sinus Plate: In the present study it was noted that dural plate was found to be intact in 33(82.5%) cases and erosion was present in 7 (17.5%) cases on CT. Preoperatively dural plate was found to be intact in 36 (90%) cases and eroded in 4 (8%) cases. *Jackler et al.*¹³ detected all their cases but also had eight false positive cases.

Facial nerve canal: In our study the tympanic segment of the facial

nerve was the most susceptible to erosion. In the study by *Ozbay et al.*¹⁶ who assessed 50 patients, one out of four patients who was reported as having FCD with CT was confirmed during the surgery.

Semicircular canals: Lateral semicircular canal was eroded in 2 cases (95%) on CT and it was confirmed preoperatively. Variable results have been reported in literature like *Rogha et al.*¹⁷

Statistical Analysis:-

The kappa value of sinus plate, LSCC, LCW and pneumatization of mastoid is 1(one) which indicates perfect agreement between 2 major methods. The kappa value of dural plate, ossicular status of incus and malleus shows the substantial agreement. The facial canal and ossicular status of stapes shows almost and moderate agreement respectively.

The P- value (Fisher's exact test) of the different findings between 2 major methods are near about zero, which is less than 0.05(5% level of significance) except stapes which is 0.06. So we conclude that there is statistically significant association between two methods except stapes.

CONCLUSION:

HRCT of the temporal bone has significantly enhanced the preoperative evaluation of squamous type of COM. This study has shown that CT imaging for COM accurately depicts of soft tissue mass, integrity or erosion of dural plate, sinus plate, lateral semicircular canal and lateral cortical wall. The ear ossicles malleus and incus are well depicted in the study. However, we could not effectively depict the integrity or erosion of stapes. Being crucial in preventing potential complications during surgery, the preoperative identification of anatomical variations is highly possible with the use of HRCT.



FIG A-Squamous COM with mastoid abscess , **B-** HRCT Rt Temporal bone showing Soft tissue shadow with ossi. Erosion, **C-** Full of Cholesteatoma in mastoid cavity .

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