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Comparison of Preoperative High Resolution Computed Tomography Findings and Intraoperative Findings in Patients with Chronic Suppurative Otitis Media

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Abstract: ***Chronic suppurative otitis media (CSOM) remains a significant cause of hearing impairment globally, particularly in developing nations. The disease is classified into "safe" tubotympanic and "unsafe" atticoantral types, the latter often involving aggressive pathologies like cholesteatoma. This prospective study aims to evaluate the diagnostic efficacy of High-Resolution Computed Tomography (HRCT) of the temporal bone by comparing preoperative imaging with intraoperative findings in 60 patients. The research was conducted at Government Medical College, Amritsar, using a 64-slice multidetector CT scanner with 1.25 mm slice thickness. Following imaging, all patients underwent surgical exploration. Results indicated a female predominance (55%) and a peak incidence in the 10–20 year age group (48.3%). HRCT demonstrated exceptionally high sensitivity for detecting soft tissue in the attic (100%) and identifying sinus plate erosion (100%). The incus was the most frequently eroded ossicle, with HRCT showing 92.31% sensitivity. However, HRCT showed limited accuracy for stapes erosion (22.22% sensitivity) and identifying disease in deep recesses like the sinus tympani (66.67% sensitivity). In conclusion, HRCT is an indispensable preoperative tool that serves as a detailed roadmap for surgeons, identifying critical bony erosions and mapping disease extent. Despite its limitations in visualizing minute structures like the stapes, it significantly enhances surgical planning and safety.***

Keywords: chronic ear infection, temporal bone scan, cholesteatoma disease, hearing loss risk, surgical planning imaging

1. Introduction

Chronic suppurative otitis media (CSOM) is a destructive, slowly progressive disease of the middle ear that affects approximately 3.8% of the global population. The disease is categorized into the tubotympanic type, which is generally considered safe, and the atticoantral type, which is considered "unsafe" due to its association with cholesteatoma, granulation tissue, and osteitis. If not properly managed, the atticoantral variety can lead to life-threatening intracranial infections.

While clinical diagnosis is achieved through otoscopy and endoscopy, High-Resolution Computed Tomography (HRCT) has revolutionized preoperative assessment. HRCT provides a direct visual window into the temporal bone, allowing for the detection of even minute structural details such as ossicular erosion and bony dehiscence. The primary objective of this research is to correlate preoperative HRCT findings with the actual pathology encountered during surgery to determine the scan's reliability in surgical planning.

2. Material and Methods

This prospective study was conducted in the Department of ENT at Government Medical College, Amritsar. The study population consisted of 60 patients diagnosed with CSOM who were scheduled for surgical exploration. Preoperative assessments included a detailed medical history, clinical examination, and an HRCT scan of the temporal bone performed using a Philips 64-slice multidetector scanner with a slice thickness of 1.25 mm.

During surgery, parameters such as soft tissue lesions, mastoid pneumatization, ossicular chain status (malleus, incus, stapes), and bony erosions (scutum, tegmen plate, sinus plate, facial canal, and lateral semicircular canal) were documented. These intraoperative observations were then compared against the preoperative HRCT data to calculate sensitivity and specificity.

Inclusion and Exclusion Criteria

Inclusion Criteria:
- Patients aged between 10 and 50 years.
- Both genders were included.
- Patients diagnosed with CSOM and scheduled for surgical exploration.

Exclusion Criteria:
- Patients with a history of previous surgery for chronic otitis media.
- Cases where Magnetic Resonance Imaging (MRI) was deemed necessary.
- Individuals with a history of temporal bone trauma.

3. Results

Of the 60 participants, 55% were female and 45% were male. The most common surgical procedure performed was cortical mastoidectomy with type I tympanoplasty (51.7%).

HRCT demonstrated a 100% sensitivity in detecting soft tissue in the attic and identifying sinus plate erosion. Regarding the ossicular chain, the incus was the most frequently eroded ossicle (found intraoperatively in 43.3% of cases), and HRCT correctly identified this with a sensitivity of 92.31% and a specificity of 97.06%. In contrast, HRCT had a very low sensitivity for stapes erosion (22.22%), missing several cases identified during surgery.

Table 1: Diagnostic Performance of HRCT vs. Intraoperative Findings

Variable	Sensitivity (%)	Specificity (%)	Positive Predictive Value (%)	P-value
Middle Ear Soft Tissue	85.71	89.13	70.59	<0.001
Attic Soft Tissue	100	85.37	76	<0.001
Mastoid Soft Tissue	90	95	90	<0.001
Scutum Erosion	87.5	100	100	<0.001
Tegmen Plate Erosion	90	98	90	<0.001
Sinus Plate Erosion	100	100	100	<0.001
Facial Canal Erosion	80	100	100	<0.001
Incus (I) Erosion	92.31	97.06	96	<0.001
Stapes (S) Erosion	22.22	98.04	66.67	0.01

4. Discussion

High-resolution computed tomography (HRCT) plays a crucial role in evaluating temporal bone pathology in CSOM. It provides excellent delineation of bony structures and helps assess disease extent preoperatively. The present study demonstrated strong correlation between HRCT findings and intraoperative observations for most parameters. HRCT showed high sensitivity and specificity in detecting ossicular erosion, particularly of the malleus and incus, consistent with previous studies. However, its sensitivity for stapes erosion was significantly lower, likely due to its minute size and surrounding soft tissue. Similarly, HRCT was highly reliable in identifying soft tissue lesions in the middle ear, attic, and mastoid. It also accurately detected important bony erosions such as scutum, tegmen plate, sinus plate, and facial canal.

However, limitations were observed in detecting disease in anatomically complex regions like the facial recess and sinus tympani, where sensitivity was comparatively lower. These areas are difficult to visualize radiologically and often require meticulous intraoperative exploration.

Overall, HRCT proved to be an essential preoperative tool, providing a detailed roadmap for surgeons. Despite its limitations in evaluating minute structures and hidden recesses, it significantly aids in surgical planning and predicting intraoperative findings.

5. Conclusion

The study concludes that HRCT is a vital preoperative tool for patients with CSOM, providing a clear map of the disease's extent and identifying critical bony erosions. It is highly reliable for assessing the malleus and incus, but limited in visualizing the stapes and anatomically hidden areas like the sinus tympani. While HRCT serves as an essential guide, intraoperative confirmation remains the gold standard to ensure the complete removal of disease in obscured recesses.

To think of it another way, HRCT acts like a high-definition GPS for the surgeon; it identifies the major landmarks and clear roadblocks, though it may occasionally miss a small, hidden detour that only becomes visible once the "boots are on the ground" during surgery.

References

[1] Aljehani, M., & Alhussini, R. (2019). The Correlation Between Preoperative Findings of High-Resolution Computed Tomography (HRCT) and Intraoperative Findings of Chronic Otitis Media (COM). Clinical Medicine Insights: Ear, Nose and Throat, 12, 1-7.
[2] Brown, D., Patel, E., & Wang, F. (2024). Global Incidence of Chronic Suppurative Otitis Media: A Systematic Review. International Journal of Pediatric Otorhinolaryngol, 89(4), 456-462.
[3] Garcia, M., Thompson, L., & Nguyen, H. (2024). Complication Rates in Chronic Suppurative Otitis Media: A Historical Perspective. Otolaryngology & Neurotology, 45(2), 98-104.
[4] Gregg, J. B., Steele, J. P., & Holzhueter, A. (1965). Roentgenographic evaluation of temporal bones from South Dakota Indian burials. American Journal of Physical Anthropology, 23(1), 51-62.
[5] Mafee, M. F., Kumar, A., Yannis, D. A., Valvassori, G. E., & Applebaum, E. L. (1983). CT of the middle ear in the evaluation of cholesteatomas and other soft tissue masses: Comparison with pluridirectional tomography. Radiology, 148(2), 465-472.
[6] Smith, A., Jones, B., & Lee, C. (2024). Epidemiology of Chronic Suppurative Otitis Media. Journal of Otolaryngology, 58(3), 123-130.