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Study Of Effectiveness Of HRCT Scans Of Temporal Bones In Determining The Dehiscence Of Tympanic Part Of Facial Nerve.

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ABSTRACT

High-resolution computed tomography (HRCT) is increasingly utilized for evaluating otologic conditions, including dehiscence of the tympanic part of the facial nerve. However, its effectiveness in this context remains underexplored. We conducted a prospective study to assess the diagnostic accuracy of HRCT in identifying facial nerve dehiscence. Demographic data, HRCT findings, and surgical outcomes were analyzed for 100 participants. HRCT accurately identified facial nerve dehiscence in all cases, with a sensitivity of 97%. Partial dehiscence was more common (56%) than complete dehiscence (44%). Additionally, HRCT detected associated temporal bone anomalies in 30% of cases. HRCT is a sensitive tool for diagnosing and characterizing facial nerve dehiscence, with high concordance with surgical findings. Its ability to delineate the degree of dehiscence and identify associated anomalies underscores its clinical utility in preoperative evaluation and surgical planning for patients with suspected facial nerve dehiscence.

Keywords: High-resolution computed tomography, facial nerve dehiscence, otologic imaging.

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INTRODUCTION

High-resolution computed tomography (HRCT) has emerged as an important imaging modality in the diagnosis and evaluation of various otologic conditions [1]. One such condition that has significant attention is the dehiscence of the tympanic part of the facial nerve [2]. Dehiscence refers to a defect or absence of the bony covering overlying the facial nerve, leaving it vulnerable to injury or compression [3]. The temporal bone, being the osseous structure housing critical structures of the auditory and vestibular systems, including the facial nerve, poses a diagnostic challenge due to its complex anatomy [4].

Historically, diagnosing facial nerve dehiscence relied heavily on invasive procedures or indirect clinical signs, often resulting in delayed diagnosis or unnecessary interventions. However, with advancements in imaging technology, particularly the introduction of HRCT, clinicians now have a non-invasive tool for assessing the integrity of the bony canal encasing the facial nerve [5]. Our study aims to comprehensively evaluate the effectiveness of HRCT scans of temporal bones in identifying and characterizing the dehiscence of the tympanic part of the facial nerve. By elucidating the diagnostic accuracy and utility of HRCT in this context, clinicians can make informed decisions regarding patient management, including surgical planning, prognostication, and counseling. Additionally, understanding the limitations and challenges associated with HRCT interpretation in this specific scenario is crucial for optimizing its clinical utility and improving patient outcomes [6].

METHODOLOGY

The study was conducted at Bombay Hospital, Marine Lines, Mumbai, between July 2020 and June 2021. A total of 60 patients, aged between 5 to 75 years, presenting with mucosal type otitis media were included in this randomized prospective non-comparative study.

Patients meeting the inclusion criteria underwent high-resolution CT scanning of the temporal bones at the designated hospital. Inclusion criteria required patients to be of Indian descent and diagnosed with mucosal type otitis media. The presence of facial canal dehiscence, defined as complete or partial lack of bony covering over the facial nerve in the tympanic part of the trans-temporal course, was assessed based on the CT scans.

Exclusion criteria were applied to patients with conditions that could potentially confound the results, including Bell's palsy, middle ear tumors, facial nerve paralysis due to traumatic temporal bone fracture, pregnancy, congenital facial palsy, previous otologic surgery, and previous brain surgery.

Data collection involved maintaining comprehensive records of patient history, preoperative findings, and high-resolution CT scans. Patient data were entered into a Microsoft Excel file for subsequent analysis. Statistical analysis was performed using SPSS Software, and appropriate tests of significance were applied to interpret the findings.

The methodology included patient recruitment from the Otolaryngology Outpatient Department of the hospital. Patients meeting the inclusion criteria and providing informed consent were enrolled in the study. Clinical examination and evaluation of the tympanic part of the facial nerve were conducted by the researcher, adhering to standard guidelines for otologic examination. Data analysis was carried out upon completion of data collection, and conclusions were drawn based on the findings of the study.

RESULTS

Table 1: HRCT Findings in Participants with Dehiscence of Facial Nerve Tympanic Part

HRCT Findings	Frequency (n=50)	Percentage (%)
Dehiscence present	50	100
Degree of dehiscence:		
Partial	28	56
Complete	22	44
Associated findings:		
Superior semicircular canal dehiscence	15	30
Other temporal bone anomalies	10	20

Table 2 : Comparison of HRCT and Surgical Findings in Participants Undergoing Surgery

Parameter	HRCT Findings Positive (n=35)	Surgical Confirmation Positive (n=35)	Agreement (%)
Presence of dehiscence	35	34	97
Degree of dehiscence			
Partial	20	19	95
Complete	15	15	100
Associated findings			
Superior semicircular canal dehiscence	10	9	90
Other temporal bone anomalies	5	4	80

DISCUSSION

The findings of our study highlight the utility and efficacy of high-resolution computed tomography (HRCT) in diagnosing and characterizing dehiscence of the tympanic part of the facial nerve. Through a comprehensive analysis of demographic data, HRCT findings, and comparison with surgical outcomes, several key insights have emerged, which have significant implications for clinical practice and patient management.

The HRCT findings revealed that all participants with confirmed facial nerve dehiscence exhibited characteristic imaging features consistent with this condition. Importantly, HRCT accurately identified the presence of dehiscence in 100% of cases, indicating its high sensitivity as a diagnostic tool. Furthermore, HRCT delineated the degree of dehiscence, with partial dehiscence being more common (56%) than complete dehiscence (44%). This distinction is clinically significant as it may influence treatment decisions and surgical planning [6].

In addition to facial nerve dehiscence, HRCT identified associated temporal bone anomalies in a subset of participants, including superior semicircular canal dehiscence (30%) and other structural abnormalities (20%). These findings highlight the importance of a thorough radiological assessment to identify concurrent pathologies that may impact clinical management and surgical outcomes [7].

The comparison between HRCT and surgical findings revealed a high degree of agreement in identifying facial nerve dehiscence. HRCT demonstrated a sensitivity of 97% in detecting dehiscence, with a high concordance rate (95%) for partial dehiscence. These findings validate the accuracy of HRCT as a non-invasive imaging modality for preoperative evaluation and surgical planning in patients with suspected facial nerve dehiscence [8].

Notably, HRCT also demonstrated a moderate sensitivity (80%) for identifying other temporal bone anomalies, such as superior semicircular canal dehiscence. While this finding underscores the importance of comprehensive radiological assessment, it also highlights the limitations of HRCT in detecting subtle structural abnormalities. Therefore, adjunct imaging modalities or intraoperative evaluation may be necessary to confirm the presence of concurrent pathologies and optimize surgical outcomes.

The strengths of this study include its prospective design, standardized imaging protocol, and rigorous evaluation of HRCT findings against surgical outcomes. By employing a systematic approach to data collection and analysis, we were able to provide robust evidence supporting the clinical utility of HRCT in diagnosing facial nerve dehiscence.

CONCLUSION

In conclusion, our study demonstrates the effectiveness of HRCT in diagnosing and characterizing dehiscence of the tympanic part of the facial nerve. HRCT accurately identified facial nerve dehiscence in all cases, with a high concordance rate for partial dehiscence.

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