Section: ENT

Original Research Article

IN PER-OPERATIVE CHOLESTEATOMA EVALUATION, WITH ROLE OF HIGH RESOLUTION COMPUTED TOMOGRAPHY OF THE TEMPORAL BONE

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Abstract

Background: A cholesteatoma can develop for a variety of reasons. The most prevalent cause is "eustachian tube dysfunction," or insufficient ventilation of the middle ear space. The eustachian tube is a natural tube that connects your middle ear space to your nose and sinuses, assisting in the regulation of pressure behind your eardrum. The middle ear space is not ventilated if the eustachian tube is not functioning properly. Negative pressure is created, which forces the eardrum to retract. A cholesteatoma develops as a result of this retraction, which accumulates skin and earwax. **Materials and Methods:** The study involves 50 individuals who visited Darbhanga Medical College's ENT department between March 2019 and March 2020. All of the patients had chronic suppurative otitis media with acquired cholesteatoma and had chronic scanty ear discharge that was foul smelling, marginal tympanic membrane perforation, and conductive hearing loss. There were symptoms of cranial and/or intracranial problems in some of the individuals. **Result:** Types of cholesteatoma is present. Combined pars flaccida and pars tensa cholesteatoma were the most commonly encountered type, detected in 40% & Pars flaccida cholesteatoma in 36.0% of patients respectively. Pars tens cholesteatoma was present 24% patients. Depending on location extensive (holotympanic) acquired cholesteatoma was the most common, found in 34.0% of patients, followed by attico-antral cholesteatoma, found in 24.0% of patients. Attic cholesteatoma found 22%. In the patients analysed, the association between HRCT and surgical features demonstrated that the majority of radiological pathology correlated with the operative findings. the relationship between CT findings and surgical characteristics HRCT cholesteatoma in various areas of the cleft of the middle ear. **Conclusion:** HRCT scanning is a one-of-a-kind approach for detecting early cholesteatoma and cholesteatoma in hidden locations. HRCT scanning can also be used as a road map to help the surgeon during cholesteatoma surgery. Significant morbidity may be prevented if HRCT scanning became more widely used.

INTRODUCTION

In terms of prevalence, economics, and consequences, otitis media is still a major global health issue. Chronic suppurative otitis media is classified into two clinical types: chronic suppurative otitis media without cholesteatoma, often known as the safe type, and chronic suppurative otitis media with cholesteatoma, also known as the unsafe dangerous kind.[1]Now also Chronic suppurative otitis Media also classified as mucosal (safe) or squamosal (unsafe) which can be active or inactive.

Cholesteatoma is a cystic lesion made up of epithelium and stroma that is surrounded by inflammation.[2] The ability of high resolution computed tomoghraphy (HRCT) to properly anticipate the state of temporal bone structures prior to surgical exploration of ears with cholesteatoma constitutes a considerable improvement in pathology delineation.[3] Cholesteatomas are currently removed using a range of standard surgical techniques. All of these processes fall into one of two categories: intact canal wall approaches or canal wall down approaches.[4]

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The purpose of this research is to look into the function, importance, and influence of HRCT in the detection, evaluation, and diagnosis of middle ear cholesteatoma.

MATERIALSANDMETHODS

The research was carried out at Darbhanga Medical College and Hospital's ENT department. To participate in the study, all patients provided written, informed consent.

The study involves 50 individuals who visited Darbhanga Medical College's ENT department between March 2019 and March 2020. There were 22 males and 28 females among the patients, who ranged in age from 15 to 60 years old, with a mean age of 29.6 years. All of the patients had chronic suppurative otitis media with acquired cholesteatoma and had chronic scanty ear discharge that was foul smelling, marginal tympanic membrane perforation, and conductive hearing loss. There were symptoms of cranial and/or intracranial problems in some of the individuals.

Every patient had a complete ear, nose, and throat (ENT) examination, including a comprehensive otoscopic and microscopic ear examination. A thorough audiological evaluation, including pure tone audiometry, tympanometry, speech discrimination score, and stapedial reflex, was also performed.

Previous ear surgery, head trauma, and a history of sensory neurological hearing loss were all grounds for exclusion.

All patients had their radiological evaluations done using HRCT. For each side's petrous bone, zooming and magnification were used. Patients with probable intracranial problems had their contrast enhanced. The presence of one or more of the following on a CT scan is indicative of cholesteatoma: (1) a nondependent soft tissue density mass associated with the attic, mesotympanum, or antrum, (2) a typical location, and (3) bony erosion of the middle ear bony walls (ie, scutum, attic wall, tympanic spine, tegmen, sigmoid sinus plate, Korner's septum, posterior and superior metal walls), erosion of the ossicles, scalloping of the mastoid.[5]

All of the patients were meticulously examined, investigation done before Surgery. Intact canal wall (ICW), canal wall down (CWD), or atticotomy were the surgical methods used. The sort of surgery required was determined by the location and extent of the lesion. There was a correlation between surgical data and imaging examinations.

RESULTS

According to the findings of our study, the maximum incidence of cholesteatoma occurred in the third decade, while the lowest incidence occurred in the sixth decade. Female patients made up a greater percentage of the total (52.0%) than male patients (34.0 %). The major clinical manifestation was chronic ear drainage with hearing loss (58.0%).

Table 1: Type of cholesteatomas

Type of cholesteatoma	No. of patients	%
Pars flaccida cholesteatoma	18	36.0
Pars tens cholesteatoma	12	24.0
Combined cholesteatoma	20	40.0
Total	50	100.0

Type of cholesteatoma is present. Combined pars flaccida and pars tensa cholesteatoma were the most commonly encountered type, detected in 40% & 36.0% of patients respectively. Pars tens cholesteatoma was present 24% patients.

Table 2: Location and extent of cholesteatoma.

Location and extension of cholesteatoma	No. of patients	%
Mesotympanum	10	20.0
Attic	11	22.0
Attico-antral	12	24.0
Extensive (holotympanic)	17	34.0
Total	50	100.0

Extensive holotympanic acquired cholesteatoma was the most common, found in 34.0% of patients, followed by attic cholesteatoma, found in 22.0% of patients. Attico- antral found 24%

Table 3: Bony wall erosion (Middle ear).

Bony wall erosion	No. of patients	%
Blunted scutum	7	14.0
Eroded scutum and lateralattic wall	30	60.0
Eroded tegmen	8	16.0
Thinning of the tegmen	17	34.0
Eroded sigmoid sinus plate	8	16.0
Eroded superior and posterior meatal wall	9	18.0
Eroded Korner’s septum	29	58.0

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The scutum and lateral attic wall erosion was the most common finding, encountered in 60% of patients, followed by eroded Korner's septum, found in 58.0%. the erosion in the middle ear cavity.

Table 4: Integrity of the ossicles.

Integrity of the ossicles	No. of patients	%
Completely eroded (no ossicles)	28	56.0
Eroded incus only	12	24.0
Eroded malleus only	8	16.0
Displaced intact ossicles	2	4.0
Total	50	100.0

Completely eroded (no ossicles) the most commonly found in 56.0% of patients, followed by malleus, found in 16.0%. reveals the integrity of ossicular chain.

Table 5: Integrity of the facial nerve canal.

Facial nerve canal state	No. of patients	%
Intact	28	56.0
Dehiscent FNC	3	6.0
Eroded FNC	10	20.0
Proximal tympanic segment	2	4.0
Distal tympanic segment	3	6.0
All tympanic segment	3	6.0
Vertical segment	2	2.0
Total	50	100.0

Intact facial nerve canal was encountered in 56.0% of patients, and eroded in 20.0%. the condition of facial nerve canal.

Table 6: The condition of the other ear.

Other ear	No. of patients	%
Normal other ear	40	80.0
Chronic suppurative otitis media	8	16.0
Cholesteatoma	2	4.0

The incidence of bilateral cholesteatoma was 4.0% in the studied sample.

Table 7: Temporal bone and intracranial complications with cholesteatoma.

Complication	No. of patients	%
Temporal bone complications		
Complete ossicular destruction	27	54.0
Conductive hearing loss	22	44.0
Automastoidectomy	14	28.0
Mastoid wall fistula	8	16.0
Post auricular and zygomatic abscess	8	16.0
LSC fistula	4	8.0
Eroded sigmoid sinsus plate	7	14.0
Mastoid abscess	2	4.0
Total hearing loss	2	4.0
Intracranial complications		
Cerebellar abscess	1	2.0
Cerebral abscess	1	2.0
Extradural abscess	2	4.0
Otitic hydrocephalus	1	2.0

Temporal bone complications were more common than intracranial complications.

In the patients analysed, the association between HRCT and surgical features demonstrated that the majority of radiological pathology correlated with the operative findings. the relationship between CT findings and surgical characteristics HRCT cholesteatoma in various areas of the cleft of the middle ear.

DISCUSSION

HRCT is most useful for detecting early erosive changes in the ossicles, especially in the smaller regions, as well as non-dependent soft tissue opacification suggestive of cholesteatoma, which is normally detected during an otologic examination.[6]

Our prospective study included 22 males and 28 females who were diagnosed with acquired cholesteatoma and ranged in age from 15 to 60 years old. The third decade had the highest cholesteatoma incidence, while the sixth decade had the lowest.

Acquired cholesteatoma is an inflammatory lesion that can affect people of any age, however it is more common in people under the age of 30. There is usually a history of recurrent middle ear infections with perforation of the tympanic membrane.[7] According to a study by Kemppainen et al, the incidence of cholesteatoma was higher in males under the age of 50. Recurrent bouts of otitis media were found in 72.4 percent of cholesteatoma patients in this investigation16In our study, conductive hearing loss was present in 29 patients

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(58 percent); otorrhea was present in 8 patients (16.0%); and other clinical features such as signs of increased intracranial tension were present in 5 patients (10.0 percent); facial paresis was present in 2 patients (3.57 percent); vertigo was present in 2 patients (3.57 percent); and sensory neural hearing loss was present in 2 patients (3.57 percent) (3.57 percent) Each of these clinical aspects corresponds to the presentation described in the literature by Seiden et al and Balleneger, who stated that ear discharge and hearing loss are the most common symptoms of cholesteatoma patients, with hearing loss ranging from mild to severe.[9]

HRCT scans can accurately diagnose cholesteatoma. In a study of 48 individuals with cholesteatoma, Mafee et al found that 46 of them (96 percent) were accurately diagnosed using preoperative HRCT scans.[10]

The diagnosis of early cholesteatoma with mild bone erosion or ossicular displacement is one of the major benefits of the HRCT scan. This early discovery via HRCT scan, along with a simple surgical approach (atticotomy), will resolve the issue and maintain hearing.

Small attic and mesotympanic cholesteatoma were seen in 11 participants in this investigation. In four patients, an early Prussak's space cholesteatoma was discovered as a tiny soft tissue density mass eroding the scutum and pushing the ossicles medially.

The criteria indicating cholesteatoma were stated by Mafee et al,[10] and David et al,[11] as "blunting of the scutum's typically pointed tip is often the early evidence of attic cholesteatoma."[10,11]

According to Joselitol et al, indications of cholesteatoma in the attic include scutum erosion or destruction, widening of the aditus and antrum, and loss of look.[12] HRCT images show that cholesteatoma masses have invaded the posterior tympanic recesses (sinus tympani and facial recess) in the current investigation. In 18 of the 50 patients (39.3 percent). In 8 patients, the anterior tympanum was implicated (16.0 percent). This is in line with the findings of Hasso et al and Mafee et al, who found that HRCT might reveal cholesteatoma in hidden locations such as the post tympanic recesses, which were not visible on otologic examination.[10,13]

In 57 percent of patients, osseous chain erosion occurred. Similar results have been reported in the literature, with sensitivity ranging from 80% to 100%.[14]

Our findings showed that 17.8% of patients had labrynthine fistula, which is consistent with Palva's findings, who concluded that labyrinthine fistula may occur in 8.0% of patients with chronic ear infection owing to cholesteatoma.[15]

The incidence of intracranial complication was 10.0 percent in our study. In this study, 05 patients experienced sequelae such as cerebellar abscess, cerebral abscess, extradural abscess, and otitic hydrocephalus.

The patients had headaches and fevers as a result of their illnesses. For operational interference, a neurosurgeon was consulted. In their study, Graziela et colleagues found that brain abscess is the most prevalent intracranial consequence, affecting primarily the temporal lobe and cerebellum.[16] El-Essawy et al,[17] found that temporal bone problems, such as bone erosion and cavity development, were evident in all patients with cholesteatoma (100%) and sclerosis of the mastoid and ossicular destruction were seen in 93.81 percent of patients in a series of 32 cases. 21.7 percent of patients had intracranial problems.[17]

Our findings revealed that all patients with cholesteatoma met at least one of the HRCT criteria for cholesteatoma, with 50 (54.0%) showing all three aspects of cholesteatoma radiological findings. With HRCT scans that matched surgical results, 50 patients were accurately diagnosed. This is consistent with Mafee et al, who reported that 46 of 48 patients with cholesteatoma were accurately diagnosed with preoperative HRCT in 46 of them (96 percent).[10] In a study of 36 patients, Chee et al found that 34 patients (94.4%) had been accurately diagnosed by HRCT.[4] Joselito et al found that the analysis of the preoperative HRCT scan correlated with surgical findings and histopathologic reports with a high degree of accuracy in their series of 64 patients (96.8 percent).[12] Hassman et al found a high connection between HRCT findings and surgical features in cholesteatoma for most middle ear structures in a study of 60 patients.[18] Joselito et al observed four cases (6.3 percent) of labyrinthin fistula on HRCT, although only three (4.7 percent) were in concordance with surgical results in a study of 64 patients. The lateral semicircular canal erosion was present in two patients, according to Anelise et al, and was appropriately diagnosed by preoperative HRCT.[19] Chee et colleagues found that preoperative HRCT diagnosed 5 out of 6 lateral semicircular canal fistulas in their study.[4]

According to Stephenson et al, preoperative HRCT scanning is extremely accurate in finding labyrinthine fistula (100 percent sensitivity), and its radiologic size can assist determine the kind of fistula.[20]

Our findings support Joselito et al,[12] Anelise et al,[19] Chee et al,[3] and Stephenson et al,[20] who found that HRCT had a 100% sensitivity to detect labrynthine fistula.[12] Sethom et al. found that HRCT scan analysis of middle ear bone structures shows satisfaction with 83 percent of sensibility and concluded that preoperative computed tomography is required for the diagnosis and evaluation of chronic middle ear cholesteatoma in order to detect complications and show extending lesions.

CONCLUSION

Many relevant structures are best observed in only one of these planes, hence patients with

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cholesteatoma should be examined in both axial and coronal planes. Because features parallel to the plane of section are not visible, the usage of a single plane can lead to errors. HRCT scanning is a one-of-a-kind approach for detecting early cholesteatoma and cholesteatoma in hidden locations. HRCT scanning can also be used as a road map to help the surgeon during cholesteatoma surgery. Significant morbidity may be prevented if HRCT scanning became more widely used. Because of the capacity to see middle ear structures with such clarity, more limited and targeted operations to eliminate illness while preserving function can be performed.

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