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ORIGINAL RESEARCH

Study Of Chronic Otitis Media Active Mucosal Type With Sinusitis As A Focus Of Infection

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Abstract
Background. Chronic Suppurative Otitis Media (CSOM) is the persistent inflammation of the mucosa in the middle ear cleft . Sinusitis, in particular, plays a significant role as a focal sepsis in the majority of cases. The current study aims to investigate the clinical profile and diagnostic techniques for these individuals, specifically focussing on sinusitis as the main source of infection.
Methods. A clinical trial was done at the Department of Otorhinolaryngology, National Institute of Medical Science Research and Hospital, Jaipur, from June 15, 2022, to December 31, 2023, after obtaining clearance from the Board of Studies and Ethical Committee. The main aim was to assess the significance of previous diagnostic nasal endoscopy in these patients.
Results. A total of 300 patients were selected. The most prevalent anatomical alteration seen in the study was a deviated nasal septum, which was found in 118 individuals, representing 39.3% of the entire sample (p=0.002). Seventy patients, accounting for 23.3%, were determined to have a disease that is confined to the ostiomeatal complex at Grade 1. The most predominant characteristic detected in 98 patients was the incomplete opacification of one or more sinuses at Grade 2.
Conclusion. This study clarifies the complex factors involved in chronic otitis media active mucoses, highlighting the importance of thorough clinical, anatomic, and radiological evaluations in determining appropriate treatment approaches. The notable discoveries emphasise the necessity for continuous investigation and improvement of diagnostic and treatment procedures to optimise patient outcomes in this complex ailment.

Introduction

Chronic Suppurative Otitis Media (CSOM) is the persistent inflammation of the mucosa in the middle ear cleft (1). This syndrome is defined by the presence of irreversible damage to the mucosa and a prolonged history of ear discharge lasting over 3 months. It is caused by a persistent flaw in the tympanic membrane (2). Chronic suppurative otitis media can be categorised into two types: tubotympanic, which is distinguished by the involvement of the mucosa, and atticoantral, which is distinguished by the involvement of the squamous tissue. The tubotympanic kind (mucosal) is primarily caused by infection that originates from the oropharynx and nasopharynx. This infection is transmitted to the middle ear via the eustachian tube. Conversely, the atticoantral type (also known as squamous type) is a result of cholesteatomatous lesions (3). The global incidence of chronic suppurative otitis media varies

from 1% to 46%. An estimated 65-330 million individuals are thought to experience otorrhea, a condition characterised by the discharge of fluid from the ears (4).

Chronic otitis media active mucosal type refers to a long-term infection of the mucoperiosteal lining of the middle ear. It is characterised by the presence of discharge from the ears and a permanent perforation (5). A hole remains permanent when its edges are protected by squamous epithelial cells and does not heal naturally. The development of chronic otitis media mucosal type is often associated with chronic sinusitis, adenoiditis, tonsillitis, and allergic rhinitis (6). Sinusitis, in particular, plays a significant role as a focal sepsis in the majority of cases. This interrelationship is well-supported by clinical observations and various literature (7, 8).Baki et al. conducted a study where they analysed the surgical observations made during mastoid exploration of the middle ear cleft. During the investigation, it was frequently seen that active mucosal chronic otitis media (COM) was present (9). Murugesan et al. (10) conducted a study where they evaluated patients with chronic otitis media (COM) utilising high-resolution computerised tomography (HRCT) of the temporal bones. In the context of the comprehensive treatment of patients who suffer from chronic otitis media and active mucosal illness, the current study aims to investigate the clinical profile and diagnostic techniques for these individuals, specifically focussing on sinusitis as the main source of infection.

Methodology

A clinical trial was done at the Department of Otorhinolaryngology, National Institute of Medical Science Research and Hospital, Jaipur, from June 15, 2022, to December 31, 2023, after obtaining clearance from the Board of Studies and Ethical Committee. A cohort of 300 patients was chosen based on certain inclusion and exclusion criteria.

Inclusion criteria

1. All patients aged 15 and older with active mucosal type chronic otitis media who visit the National Institute of Medical Sciences and Hospital OPD.
2. Patients with recurring chronic otitis media following ear surgery.
3. Patients who have experienced failure of tympanoplasty.

Exclusion criteria

1. Patients with chronic otitis media who have active squamous, inactive mucosal, inactive squamous, or adhesive otitis media.
2. Patients who are unwilling to provide consent for this study

Study Investigations

A clinical proforma was completed for each patient, including information about the patient's details, a thorough clinical examination, and investigations. A comprehensive clinical assessment involved an Otological examination, Anterior rhinoscopy, examination under the microscope and endoscopic examination. Standard blood tests, such as complete blood count (CBC), erythrocyte sedimentation rate (ESR), renal function tests (RFT), liver function tests (LFT), bleeding time (BT), clotting time (CT), viral indicators, and radiographic tests including X-Ray PNS Water's view and, if necessary, CT paranasal sinuses, were performed. The specific examinations conducted were swab culture and sensitivity, as well as pure tone audiometry.

Statistical Analysis

The statistical analysis was performed using the statistical software SPSS version 25.0, after the importation of the data into a Microsoft Excel spreadsheet. The mean and standard deviation were used to present numerical data, while the frequency and percentage of each category were used to display categorical data.

The mean values of the two groups were compared using the student t-test, while the chi-square test was employed to assess the frequency differences between the two groups. A p-value less than 0.05 signifies statistical significance.

Result

This study presents a detailed description of the clinical characteristics of patients who have chronic otitis media with active mucosal type and sinusitis as the primary site of infection. The main aim was to assess the significance of previous diagnostic nasal endoscopy in these patients. The research was carried out in the Department of Otorhinolaryngology at the National Institute of Medical Science Research and Hospital in Jaipur. This investigation involved the selection of 300 patients who had been diagnosed with chronic otitis media active mucosal illness.

The average age of the patients was 27.3 years and most commonly affected age group was between 20-30 years (Graph 1). There was a greater occurrence of the condition in males, accounting for 67% of the cases. A deviated nasal septum was the most prevalent anatomical alteration, observed in 148 individuals, making up 49.3% of the entire group. 99 patients, accounting for 33% of the total, exhibited middle turbinate hypertrophy. Enlarged ethmoid bulla and hypertrophied uncinate process were observed in 23 (7.7%) and 25 (8.3%) individuals, respectively. The paradoxical middle turbinate was the rarest variation, observed in only 5 individuals, accounting for 1.7% of the total (Graph 2). The observed anatomical variations showed statistical significance, as evidenced by a p-value of 0.014, suggesting a significant difference in the occurrence of these diseases among the participants of the study. The predominant kind of discharge was mucoid, which was detected in 137 individuals, representing 45.7% of the entire sample (p value=0.032). The most prevalent variable seen in the study was a deviated nasal septum, which was found in 118 individuals, representing 39.3% of the entire sample (p=0.002).

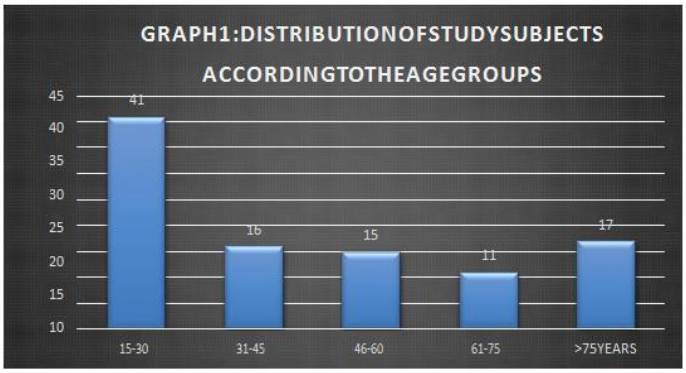
The study evaluated the distribution of subjects according to the features of sinusitis as observed in CT scans (Graph 4), revealing significant findings. Twenty-two patients, or 7.3% of the total sample, had normal findings (Grade 0). Seventy patients, accounting for 23.3%, were determined to have a disease that is confined to the ostiomeatal complex (OMC) at Grade 1. The most prevalent characteristic detected in 98 patients, accounting for 32.7%, was the incomplete opacification of one or more sinuses at Grade 2. Opacification of one or more sinuses (Grade 3) was observed in 87 individuals, accounting for 29% of the total. Twenty-three individuals, or 7.7% of the total, exhibited complete opacity in all sinuses (Grade 4). The observed differences in the characteristics of sinusitis were found to be statistically significant, with a p-value of 0.001.

Out of the entire sample, 176 participants, which makes up 58.7% of the sample, had a Lund-Mackay score of 12 or lower ($p<0.001$) (Graph 5). The study analysed the distribution of patients based on the kind of middle ear mucosa and identified noteworthy findings. The most common form of mucosa detected in the study was congested mucosa, which was found in 156 patients, making up 52% of the overall sample.

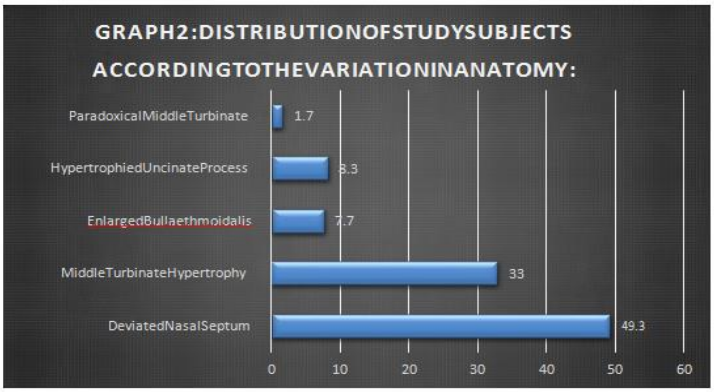
132 participants underwent only Functional Endoscopic Sinus Surgery (FESS), which accounted for 44% of the entire group (Graph 6). The treatment that involved combining FESS with septoplasty was performed on 168 participants, which accounted for 56% of the total (p=0.02).

The study examined the distribution of patients based on the condition of the mucosa after clearance (Graph 7), uncovering remarkable results. Out of the participants with swollen mucosa, 121 (40.3%) saw improvement, whereas 26 (8.7%) did not. The p-value of 0.01 indicates a substantial improvement.

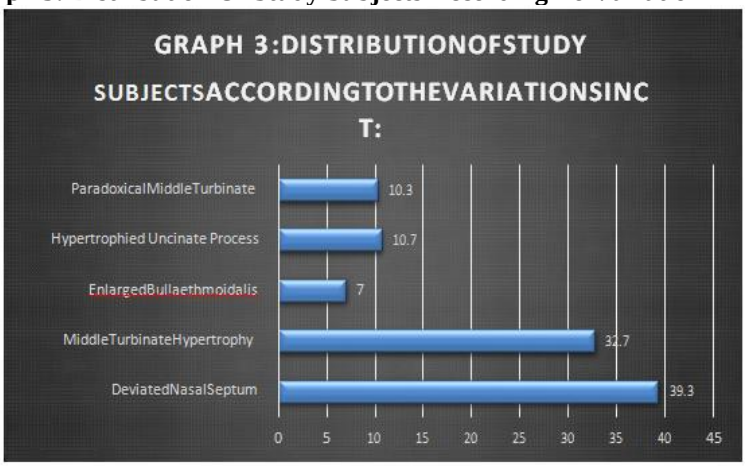
Graph 1: Distribution Of Study Subjects According To The Age Groups



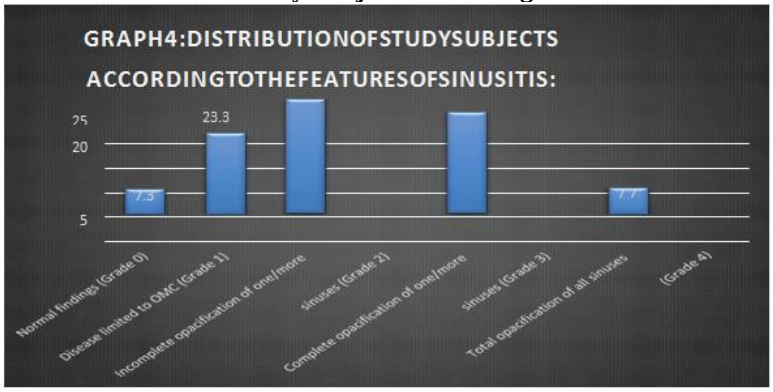
Graph 2: Distribution Of Study Subjects According To Variation In Anatomy:



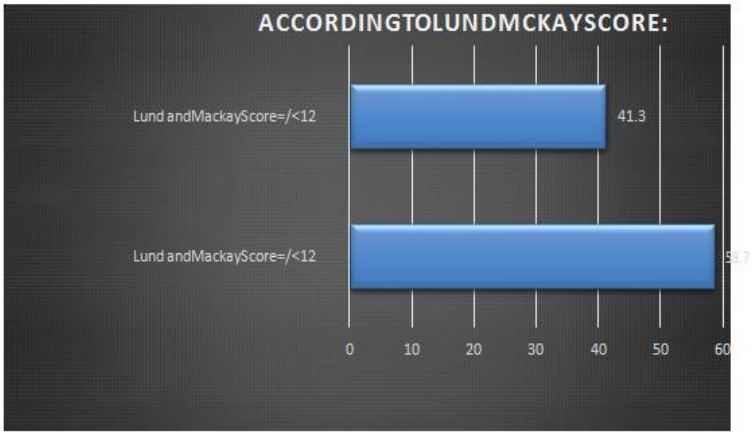
Graph 3: Distribution Of Study Subjects According To Variation In Ct:



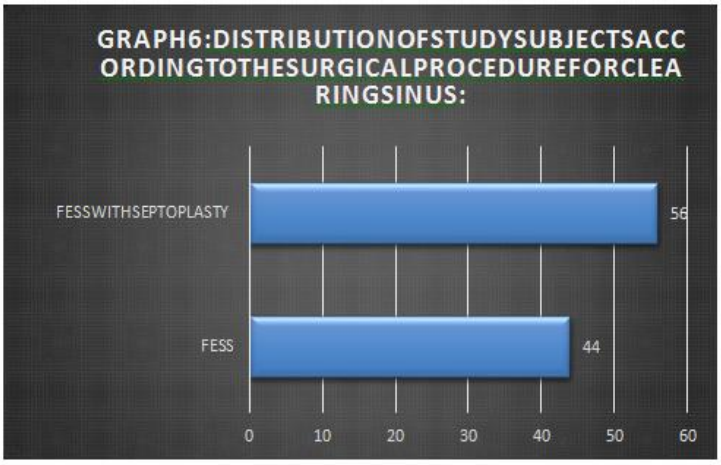
Graph 4: Distribution Of Study Subjects According To Features Of Sinusitis:



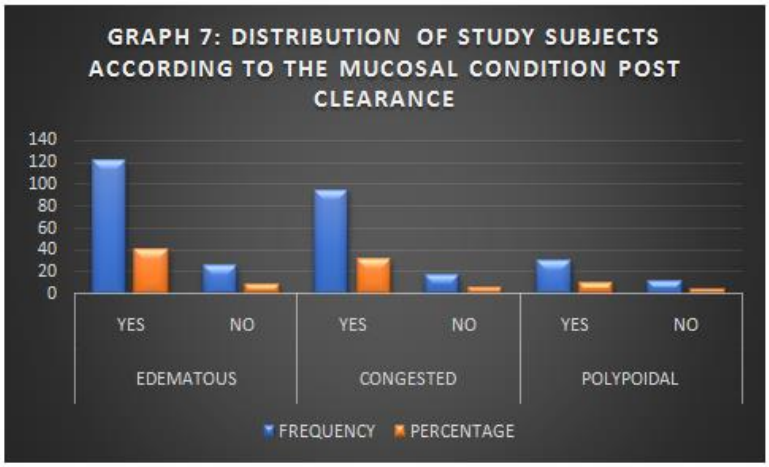
Graph 5: Distribution Of Study Subjects According To Lund Mckay Score:



Graph 6: Distribution Of Study Subjects According To Surgical Procedure For Clearing Sinus



Graph 7: Distribution Of Study Subjects According To Mucosal Condition Post Clearance.



Discussion

Otitis media is a widespread illness of the middle ears and poses a significant global health issue. Identifying the underlying pathology is the crucial initial step in diagnosing Chronic Otitis Media. Once the pathology is determined, the subsequent therapy can be significantly simplified (11).The main aim of the present study was to assess the significance of previous diagnostic nasal endoscopy in these patients. The research was carried out in the Department of Otorhinolaryngology at the National Institute of Medical Science Research and Hospital, located in Jaipur. This investigation included a cohort of 300 patients who were diagnosed with chronic otitis media active mucosal disease. Our study found that the largest group of patients with chronic otitis media active mucosal type with sinusitis were between the ages of 15 and 30, making up 41% of the overall sample. Additionally, males were more typically affected, accounting for 67% of the cases. In their study, Dudapaka et al. (2024) (11) discovered that adults can experience a high occurrence of chronic sinusitis, which is a significant contributor to chronic otitis media, as a result of long-term exposure to environmental contaminants. Revai et al. (2007) (12) found that there was a higher occurrence of otitis media in males. Ito et al. (1995) (13) discovered that males have a greater occurrence of chronic otitis media, which they attributed to potential anatomical and hormonal disparities between genders.

The results of our study indicate that a deviated nasal septum was the most prevalent morphological variation, accounting for 49.3% of cases. This was followed by middle turbinate hypertrophy, which was observed in 33% of cases. Furthermore, there was a significant correlation between these two conditions, as indicated by a p-value of 0.014. Ito et al. (1995) (13) provided evidence that supports this claim, as they saw identical results in patients suffering from chronic sinusitis and otitis media. The study observed that 45.7% of patients exhibited mucoid discharge, 43.7% had mucopurulent discharge, and 10.7% had purulent discharge, with a notable variation ($p=0.032$). These results align with the research conducted by Dhanasekaran et al. (2016) (14), who also noted comparable distribution patterns in the types of discharges among individuals with chronic otitis media. Morris et al. (2009) (15) emphasised that chronic patients often have a prevalent mucoid discharge. The study revealed notable variability in CT scan results, with 39.3% of patients having a deviated nasal septum and 32.7% showing middle turbinate hypertrophy ($p=0.002$). Ito et al. (1995) (13) and Windsor et al. (2017) (16) also documented comparable results, observing that these structural deviations can impede the regular flow of sinuses, resulting in persistent infections.

The study found that 32.7% of patients had partial opacification of one or more sinuses (Grade 2) and 29% had total opacification (Grade 3), with a significant variation ($p=0.001$). Bartel et al. (2023) (17) observed that there is a direct correlation between the severity of chronic otitis media and the amount of sinus opacification. Our study found that 58.7% of patients had a Lund-Mackay score of 12 or lower, suggesting mild severity of sinus illness. This distribution was statistically significant ($p<0.001$). This discovery aligns with the research conducted by Bartel et al. (2023) (17), which indicated that a notable fraction of individuals with chronic otitis media have scores within this range. According to Windsor et al. (2017) (16) and Dhanasekaran et al. (2016) (14), the Lund-Mackay score is a valuable tool for assessing the severity of a disease and aids in the planning of surgical procedures. Our investigation revealed that big central perforations were the most prevalent, accounting for 47.7% of cases. This was followed by tiny central perforations at 42.7%, and subtotal perforations at 9.7%. The statistical analysis showed a significant association between the kind of perforation and the p-value of 0.021. Ito et al. (1995) (13) observed similar results, indicating that larger holes are frequently linked to more severe and long-lasting infections.

The study found that congested mucosa was the most common (52%), followed by oedematous mucosa (41.3%) and polypoidal mucosa (6.7%) ($p=0.003$). Dhanasekaran et al. (2016) (14) and Ito et al. (1995) (13) observed comparable patterns, noting that congested and oedematous mucosa are frequently observed in cases of chronic otitis media. Our analysis found that the combination of FESS with septoplasty was more prevalent, accounting for 56% of cases, compared to FESS alone, which accounted for 44% of cases ($p=0.02$). Dhanasekaran et al. (2016) (14) and Windsor et al. (2017) (16) found that combining septoplasty with FESS can improve surgical outcomes by treating several anatomical abnormalities, supporting similar conclusions. Ito et al. (13) (1995) also discovered that a combination of surgical methods is frequently required to effectively treat chronic otitis media with sinus involvement. After the clearance procedure, 40.3% of patients with swollen mucosa, 31.3% with congested mucosa, and 10% with polypoidal mucosa showed improvement, and these results were statistically significant ($p=0.05$). According to Windsor et al. (2017) (16) and Dhanasekaran et al. (2016) (14), surgical clearance frequently results in a notable enhancement of the mucosal state. However, a fraction of patients may still experience persistent

inflammation. Ito et al. (1995) (12) also highlighted the significance of post-operative monitoring to efficiently handle any remaining mucosal disease.

Conclusion

This study conducted a thorough investigation of chronic otitis media active mucosal type with sinusitis as the main source of infection, covering a wide range of demographic, anatomical, and clinical factors. The surgical outcomes, specifically the increased occurrence of combination FESS and septoplasty procedures, have highlighted the intricate nature of these patients and the necessity for diverse surgical strategies to attain the best possible results. In summary, this study clarifies the complex factors involved in chronic otitis media active mucosal type with sinusitis, highlighting the importance of thorough clinical, anatomical, and radiological evaluations in determining appropriate treatment approaches. The notable discoveries emphasise the necessity for continuous investigation and improvement of diagnostic and treatment procedures to optimise patient outcomes in this complex ailment.

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