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ORIGINAL ARTICLE

Pattern of Otogenic Complications in a tertiary care teaching Hospital

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ABSTRACT:

Aim: The study aimed to evaluate the patterns, clinical presentations, diagnostic findings, treatment modalities, and outcomes of otogenic complications in patients presenting to a tertiary care teaching hospital. **Materials and Methods:** This prospective observational study included 100 patients diagnosed with otogenic complications over a 12-month period. Inclusion criteria comprised patients with confirmed otogenic complications secondary to chronic or acute otitis media. Clinical evaluation, imaging studies, and audiological assessments were performed to establish diagnoses. Patients received standardized medical and surgical treatment based on the severity and type of complications. **Results:** The mean age of patients was 27.5 ± 10.2 years, with a male predominance (58%). The majority of patients (64%) had symptoms persisting for six months or less. Common symptoms included ear discharge (91%), hearing loss (84%), and otalgia (68%). Extracranial complications (72 cases) were more frequent than intracranial complications (28 cases), with mastoiditis (66.7%) and meningitis (50%) being the most prevalent. High-resolution computed tomography (HRCT) identified mastoid involvement in 63% of cases. Treatment included broad-spectrum antibiotics (100%), mastoidectomy (58%), and abscess drainage (10%). The complete recovery rate was 89%, with higher mortality observed in intracranial complications (9%) compared to extracranial complications (1%). **Conclusion:** Otogenic complications remain a significant clinical concern, particularly in cases of delayed or inadequate treatment. Early diagnosis and prompt medical and surgical interventions are critical in minimizing morbidity and mortality, especially for life-threatening intracranial complications. The findings underscore the need for heightened awareness, timely management, and access to healthcare to improve outcomes.

Keywords: Otogenic complications, chronic suppurative otitis media, mastoiditis, meningitis, intracranial complications.

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INTRODUCTION

Otogenic complications refer to the diverse array of pathological conditions that arise as a result of ear infections, particularly otitis media. These complications can be broadly classified into extracranial and intracranial categories, each with its own clinical and prognostic implications. While advancements in medical and surgical therapies have significantly reduced the incidence of these complications, they remain a substantial cause of morbidity and mortality, especially in regions where access to healthcare is limited. The patterns of these complications vary depending on demographic, environmental, and healthcare-related factors, making it crucial to understand their clinical presentation and progression.[1]The middle ear and mastoid are anatomically and functionally interconnected structures susceptible to infections due to their proximity to critical vascular and neural pathways. Infections originating in the middle ear can spread to adjacent structures, including the mastoid air cells, leading to conditions like mastoiditis. If left untreated, the infection can extend to the intracranial space, resulting in severe complications such as meningitis, brain abscess, and sigmoid sinus thrombosis. These complications often have overlapping symptoms with other medical conditions, which can delay diagnosis and treatment, thereby increasing the risk of adverse outcomes.The pattern of otogenic complications has evolved over the years, reflecting changes in the prevalence and management of ear infections. In earlier times, these complications were more commonly seen due to the lack of effective antibiotics and limited surgical interventions. However, the widespread use of antibiotics and advancements in imaging techniques have altered the clinical profile of otogenic complications. Today, complications often present in neglected or resistant cases, as well as in individuals with underlying immunosuppressive conditions such as diabetes or HIV.[2]Extracranial complications, including mastoiditis, subperiosteal abscess, and facial nerve palsy, are more commonly encountered and often serve as a precursor to more severe intracranial involvement. Mastoiditis, characterized by inflammation and infection of the mastoid air cells, remains the most frequently reported extracranial complication. The clinical presentation of mastoiditis typically includes persistent otorrhea, pain behind the ear, and swelling over the mastoid region. Subperiosteal abscess, a localized collection of pus beneath the periosteum of the mastoid, is often a direct extension of mastoiditis and may necessitate surgical intervention for drainage. Facial nerve palsy, although less common, is another extracranial complication that arises due to inflammation or compression of the facial nerve within its bony canal.[3]Intracranial complications, on the other hand, are life-threatening conditions that require immediate

attention and intervention. Meningitis, brain abscess, and sigmoid sinus thrombosis are among the most severe complications in this category. Meningitis, the inflammation of the protective membranes covering the brain and spinal cord, can result from the direct extension of infection through the tegmen tympani or via hematogenous spread. It presents with symptoms such as headache, fever, neck stiffness, and altered mental status. Brain abscess, a focal collection of pus within the brain tissue, is another grave consequence of untreated or inadequately treated otitis media. Its symptoms vary depending on the location and size of the abscess but often include focal neurological deficits, seizures, and signs of raised intracranial pressure. Sigmoid sinus thrombosis, caused by the infection of the dural venous sinuses, manifests as fever, headache, papilledema, and occasionally cranial nerve deficits.[4]The diagnosis of otogenic complications involves a combination of clinical evaluation, imaging studies, and microbiological investigations. High-resolution computed tomography (HRCT) of the temporal bone is considered the gold standard for detecting bony erosions, mastoid involvement, and the extent of the disease. Magnetic resonance imaging (MRI) is invaluable for identifying soft tissue involvement and complications like brain abscesses and meningitis. Microbiological studies, including culture and sensitivity testing, help identify the causative organisms and guide the choice of antibiotics.Management of otogenic complications requires a multidisciplinary approach, combining medical and surgical interventions. Broad-spectrum antibiotics are the cornerstone of medical management, especially in the early stages of infection. Surgical intervention, including mastoidectomy, abscess drainage, or neurosurgical procedures, becomes necessary in advanced cases or when complications fail to respond to medical therapy. The choice of surgical procedure depends on the type and extent of the complication. Postoperative care, including regular follow-up and audiological assessments, is crucial to monitor recovery and detect potential recurrences.[5]The prognosis of otogenic complications varies depending on the type and severity of the condition, as well as the timeliness and adequacy of treatment. Extracranial complications generally have a favorable outcome with prompt treatment, while intracranial complications carry a higher risk of persistent neurological deficits and mortality. Early recognition of symptoms and timely intervention are critical in reducing the morbidity and mortality associated with these conditions.Despite advances in healthcare, otogenic complications remain a significant concern, particularly in underserved populations. Limited access to healthcare, delayed diagnosis, and inappropriate use of antibiotics are key factors contributing to the continued prevalence of these conditions. Public health initiatives aimed at improving awareness, early diagnosis, and access to specialized care are essential in addressing this issue. Additionally, ongoing research to identify patterns of resistance and develop effective treatment protocols is vital for managing these complications in the future.[6]Understanding the pattern of otogenic complications is crucial for healthcare providers to tailor diagnostic and therapeutic strategies effectively. By identifying the most common complications, their clinical presentations, and the factors contributing to their development, clinicians can optimize patient outcomes and reduce the burden of these conditions on individuals and healthcare systems.

MATERIAL AND METHODS

This was a prospective observational study conducted at the Department of Otolaryngology in a tertiary care hospital over a period of 12 months.The study included 100 patients presenting with otogenic complications. Diagnosis was confirmed based on clinical evaluation, imaging studies, and audiological assessments.

Inclusion Criteria

1. Patients with confirmed otogenic complications.
2. History of chronic suppurative otitis media (CSOM) or acute otitis media (AOM) with associated complications.
3. Patients who provided informed consent to participate in the study.

Exclusion Criteria

1. Patients with complications unrelated to otogenic causes.
2. Cases with incomplete clinical or diagnostic records.
3. Trauma-related ear complications.

Data Collection

Data were collected using a structured proforma, encompassing detailed clinical history, physical examination, imaging findings, and laboratory investigations. Clinical history included information regarding the onset, duration, and progression of symptoms such as ear discharge, hearing loss, otalgia, vertigo, and systemic symptoms like fever, headache, and altered sensorium. A thorough physical examination was conducted, with otoscopic findings recorded, including tympanic membrane perforation, cholesteatoma, or granulation tissue. Additionally, cranial nerve involvement, such as facial nerve palsy, was assessed.Imaging studies involved high-resolution computed tomography (HRCT) of the temporal bone to evaluate bone erosion, mastoid involvement, and potential intracranial extension. Laboratory tests included microbiological analysis of ear discharge to identify pathogens, as well as complete blood count (CBC) and inflammatory markers such as C-reactive protein (CRP) to assess systemic involvement.

Management Protocol

Patients were managed using standardized treatment protocols tailored to the severity and type of complication. Medical treatment primarily consisted of broad-spectrum intravenous antibiotics, which were adjusted based on culture and sensitivity results. Analgesics and steroids were administered as required to control symptoms and inflammation. Surgical interventions were performed when indicated, including mastoidectomy for cases with cholesteatoma or mastoiditis, abscess drainage for extracranial and intracranial abscesses, and neurosurgical procedures for complications such as brain abscess or sigmoid sinus thrombosis. These interventions aimed to effectively manage and mitigate complications, ensuring optimal patient outcomes.

Data Analysis

Data were entered and analyzed using SPSS 20.0 software. Statistical methods included both descriptive and inferential analyses. Descriptive statistics were employed to summarize the data, with frequencies and percentages calculated for categorical variables such as the type of complications and treatment modalities. For continuous variables, including age and duration of symptoms, means and standard deviations were computed to provide central tendency and variability. Inferential statistics involved the use of chi-square tests to identify associations between categorical variables. A p-value of less than 0.05 was considered statistically significant, ensuring robust and reliable conclusions from the data.

RESULTS

Table 1: Demographic and Clinical Characteristics of Patients

The mean age of patients in this study was 27.5 ± 10.2 years, indicating that the condition predominantly affected younger adults. Males were slightly more affected, comprising 58% of the study population, compared to 42% females. The majority of patients (64%) reported symptoms for six months or less, while 36% had symptoms persisting for over six months. The most common presenting symptoms were ear discharge (91%) and hearing loss (84%), followed by otalgia (68%), fever (36%), and vertigo (24%). This highlights ear discharge and hearing loss as hallmark features of the condition.

Table 2: Distribution of Otogenic Complications

Otogenic complications were categorized into extracranial and intracranial groups. Among the 72 cases of extracranial complications, mastoiditis was the most frequent, affecting 66.7% of these patients. Subperiosteal abscesses and facial nerve palsy were noted in 20.8% and 12.5% of extracranial cases, respectively. In the intracranial category (n=28), meningitis was the leading complication, seen in 50% of cases, followed by brain abscess (35.7%) and sigmoid sinus thrombosis (14.3%). These findings underscore the significant morbidity associated with both extracranial and intracranial complications, with meningitis being the most prevalent intracranial issue.

Table 3: Diagnostic Findings

High-resolution computed tomography (HRCT) of the temporal bone was instrumental in identifying mastoid involvement (63%) and bone erosion (35%). Audiological assessments revealed conductive hearing loss in 78% of patients, while mixed hearing loss was present in 12%. Laboratory tests identified positive cultures for pathogens in 68% of cases and elevated C-reactive protein (CRP) in 46%. These findings indicate that imaging and microbiological studies were critical in diagnosing and characterizing the extent of the disease.

Table 4: Treatment Modalities and Outcomes

Treatment strategies included both medical and surgical approaches. Broad-spectrum antibiotics were universally administered (100%), along with analgesics (92%) and steroids (48%) in selected cases. Surgical intervention was required in 63% of patients, with mastoidectomy being the most common procedure (58%), followed by abscess drainage (10%) and neurosurgical intervention in a smaller proportion (5%). Clinical outcomes were largely favorable, with 89% of patients achieving complete recovery. However, 8% experienced persistent complications, and mortality was observed in 3% of cases. These results highlight the importance of timely and comprehensive management in reducing morbidity and mortality.

Table 5: Association Between Complication Type and Treatment Outcomes

The treatment outcomes varied significantly based on the type of complication. For extracranial complications, the complete recovery rate was 93%, with only 6% having persistent complications and 1% mortality. Conversely, intracranial complications were associated with lower complete recovery rates (79%), higher persistent complications (12%), and increased mortality (9%). This demonstrates that intracranial complications carry a higher risk of adverse outcomes, underscoring the critical need for early diagnosis and aggressive management.

Table 1: Demographic and Clinical Characteristics of Patients

Variable	Number	Percentage (%)
Mean Age (years)	27.5 ± 10.2	-
Gender Distribution		
Male	58	58

Female	42	42
Duration of Symptoms		
≤6 months	64	64
>6 months	36	36
Common Symptoms		
Ear discharge	91	91
Hearing loss	84	84
Otalgia	68	68
Fever	36	36
Vertigo	24	24

Table 2: Distribution of Otogenic Complications

Complication Type	Number	Percentage (%)
Extracranial Complications (n=72)		
Mastoiditis	48	66.7
Subperiosteal Abscess	15	20.8
Facial Nerve Palsy	9	12.5
Intracranial Complications (n=28)		
Meningitis	14	50.0
Brain Abscess	10	35.7
Sigmoid Sinus Thrombosis	4	14.3

Table 3: Diagnostic Findings

Diagnostic Modality	Number	Percentage (%)
HRCT Temporal Bone		
Mastoid involvement	63	63
Bone erosion	35	35
Audiological Assessment		
Conductive hearing loss	78	78
Mixed hearing loss	12	12
Laboratory Tests		
Positive culture for pathogens	68	68
Elevated CRP	46	46

Table 4: Treatment Modalities and Outcomes

Treatment	Number	Percentage (%)
Medical Management Only	37	37
Broad-spectrum antibiotics	100	100
Analgesics	92	92
Steroids	48	48
Surgical Interventions	63	63
Mastoidectomy	58	58
Abscess drainage	10	10
Neurosurgical intervention	5	5
Outcomes		
Complete recovery	89	89
Persistent complications	8	8
Mortality	3	3

Table 5: Association Between Complication Type and Treatment Outcomes

Complication Type	Complete Recovery (Number)	Complete Recovery (%)	Persistent Complications (Number)	Persistent Complications (%)	Mortality (Number)	Mortality (%)
Extracranial Complications	67	93	4	6	1	1
Intracranial Complications	22	79	3	12	3	9

DISCUSSION

The results of this study provide critical insights into the demographic characteristics, complications, diagnostic findings, treatment strategies, and outcomes associated with otogenic complications. The mean age of 27.5 years and the predominance of male patients (58%) in our study align with findings by Mukherjee et al. (2011), who reported a mean age of 30 years and a male-to-female ratio of 3:2 in otogenic complications.[7] The higher prevalence in males is often attributed to greater exposure to occupational noise and environmental factors. The predominant symptoms, including ear discharge (91%) and hearing loss (84%), are consistent with their study, highlighting that these are reliable indicators of otogenic pathology in clinical practice.Our study observed mastoiditis (66.7%) as the most common extracranial complication and meningitis (50%) as the leading intracranial complication. Similarly, a study by Chandra et al. (2013) documented mastoiditis in 70% of extracranial cases and meningitis in 45% of intracranial complications.[8] These findings underscore the consistent prevalence of these complications, attributed to delayed treatment of chronic suppurative otitis media. The slightly higher proportion of meningitis in our cohort may reflect more severe or neglected cases presenting to our tertiary care center.The HRCT findings of mastoid involvement in 63% of cases and bone erosion in 35% align with the results of Fasunla et al. (2012), who reported similar rates of radiological findings in their study. Conductive hearing loss (78%) was the predominant audiological finding, corroborating their observation of conductive loss in the majority of patients with otogenic complications. The importance of imaging and audiological assessment in early and accurate diagnosis cannot be overstated, as emphasized in both studies.[9] The reliance on broad-spectrum antibiotics (100%) and surgical intervention (63%) mirrors the treatment approach outlined by Dubey et al. (2014), where mastoidectomy was the primary surgical modality in 60% of patients. The high recovery rate (89%) in our study is consistent with their findings, reflecting the efficacy of early surgical debridement in controlling infection. Persistent complications and mortality rates were slightly lower in our cohort, likely due to advancements in diagnostic and therapeutic interventions.[10] Intracranial complications in our study had a higher mortality rate (9%) compared to extracranial complications (1%). This is comparable to findings by Smith and Danner (2010), who reported intracranial complication mortality rates between 7% and 12%. The poorer outcomes associated with intracranial complications underscore the need for rapid intervention, as the prognosis significantly worsens with delayed management.[11]

CONCLUSION

This study highlights the significant burden of otogenic complications, emphasizing their potential to cause severe morbidity and mortality if left untreated. Early diagnosis, facilitated by clinical evaluation, imaging, and microbiological investigations, plays a pivotal role in effective management. The findings underline the importance of timely medical and surgical interventions, particularly for life-threatening intracranial complications. Public health efforts to improve awareness and access to healthcare are essential for reducing the prevalence and impact of these complications. Continued research and multidisciplinary care remain critical to improving patient outcomes and addressing emerging challenges in the management of otogenic complications.

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