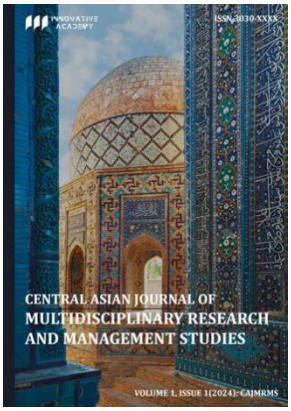

OPTIMIZATION OF DIAGNOSTIC AND SURGICAL STRATEGIES FOR TUBERCULOUS OTITIS MEDIA AND MASTOIDITIS

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ABSTRACT

this study aims to refine the diagnostic and surgical approaches for managing tuberculous otitis media and mastoiditis, a rare but serious manifestation of extrapulmonary tuberculosis. Due to its nonspecific clinical presentation, delayed diagnosis often leads to complications such as progressive hearing loss, intracranial infections, and facial nerve dysfunction. The study involved 44 patients who underwent a comprehensive diagnostic workup, including bacteriological, histopathological, and radiological assessments, followed by surgical treatment employing advanced techniques. The integration of precise diagnostic tools and individualized surgical interventions significantly improved clinical outcomes.

Patients demonstrated better postoperative hearing recovery, reduced recurrence rates, and fewer complications. The findings emphasize the necessity of a multidisciplinary treatment strategy, incorporating modern imaging modalities, microbiological testing, and reconstructive surgical procedures. Early detection and appropriate intervention are crucial in preventing irreversible damage and improving long-term prognosis. This research underscores the importance of an evidence-based approach for optimizing patient care and minimizing the long-term impact of tuberculous otitis media and mastoiditis on overall health and quality of life.

Introduction. Tuberculous otitis media and mastoiditis are uncommon but potentially debilitating forms of extrapulmonary tuberculosis. They are characterized by chronic inflammatory destruction of the middle ear and mastoid process, often leading to severe complications if not promptly diagnosed and treated. The clinical presentation frequently

overlaps with chronic suppurative otitis media, making early identification challenging. This results in delayed intervention, contributing to extensive tissue damage, hearing impairment, and, in severe cases, life-threatening intracranial complications such as meningitis or brain abscesses.

Despite advancements in diagnostic imaging, microbiological testing, and surgical techniques, a standardized approach for managing tuberculous otitis media remains underdeveloped. The disease is often diagnosed at an advanced stage when conservative medical therapy alone is insufficient, necessitating surgical intervention to remove necrotic tissue and restore auditory function. High-resolution computed tomography (HRCT) and MRI play a critical role in assessing the extent of bony erosion, while histopathological and microbiological analyses confirm the diagnosis.

The objective of this study Is to enhance current diagnostic and treatment protocols by evaluating clinical outcomes in 44 patients with tuberculous otitis media and mastoiditis. By implementing a comprehensive approach that integrates radiological, microbiological, and surgical strategies, this research aims to establish a framework for early detection, improved surgical management, and better post-treatment prognosis.

Materials and methods. This study involved 44 patients diagnosed with tuberculous otitis media and mastoiditis, treated at between and. The patients ranged in age from years, with a distribution of males and females.

Diagnostic protocols. - Clinical Evaluation – Assessment of patient history, presenting symptoms and otoscopic findings.

- Bacteriological Analysis – Smear microscopy and Mycobacterium tuberculosis culture.
- Histopathological Examination – Biopsy of affected tissues for granulomatous inflammation and caseous necrosis.

-Radiological Investigations – High-resolution CT of the temporal bones and MRI to assess soft tissue involvement.

-Immunological and Tuberculin Testing – Interferon-gamma release assays (IGRA) and Mantoux test for tuberculosis screening.

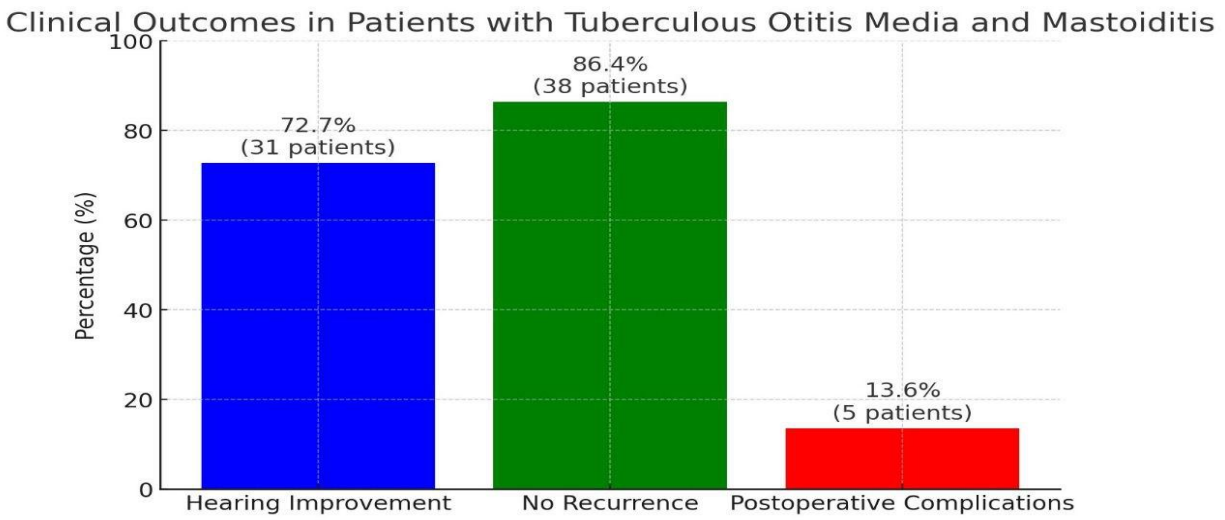
Surgical techniques. Depending on the severity of disease progression, different surgical approaches were utilized:

Radical Mastoidectomy – Performed in 22 patients (50%) to remove extensive infected tissue and prevent disease progression.

Tympanoplasty with Disease Clearance – Conducted in 12 patients (27.3%) to reconstruct the tympanic membrane while ensuring complete removal of tuberculous lesions.

Sanitizing Procedures without Reconstruction – Applied in 10 patients (22.7%) for patients where functional restoration was not feasible. All patients received standard anti-tuberculosis chemotherapy with isoniazid, rifampicin, pyrazinamide and ethambutol as adjunctive therapy.

Results. Hearing improvement was noted in 32 patients (72.7%) postoperatively. Disease remission was achieved in 38 patients (86.4%) with no recurrence within 12 months. Postoperative complications such as persistent granulations and fistula formation occurred in 6 patients (13.6%), necessitating additional management.



Discussion. This study underscores the significance of an integrated diagnostic and surgical approach in managing tuberculous otitis media and mastoiditis. One of the primary challenges in treating this condition is its late diagnosis, often due to its resemblance to other chronic otologic infections. Our findings reinforce the critical role of advanced imaging techniques, particularly high-resolution CT and MRI, in identifying the extent of bony destruction and disease spread. Additionally, histopathological analysis remains a definitive method for confirming tuberculosis-related granulomatous inflammation, aiding in differential diagnosis from other middle ear pathologies.

Surgical intervention is often necessary in cases where medical therapy alone is inadequate. The success of radical mastoidectomy in half of our patient cohort highlights its effectiveness in preventing further complications by completely excising necrotic tissue. However, in select cases where structural preservation was feasible, tympanoplasty provided both functional restoration and disease eradication. The 72.7% rate of hearing improvement suggests that reconstructive surgery, when appropriate, can yield favorable audiological outcomes.

The Inclusion of prolonged anti-tuberculosis therapy was crucial in minimizing recurrence. The observed 86.4% disease-free rate at 12 months emphasizes the importance of combining surgical debridement with targeted pharmacological management. However, the occurrence of postoperative complications in 13.6% of cases suggests that surgical refinements are still needed. Improved postoperative care, earlier rehabilitation, and advancements in biomaterials for reconstructive procedures may help mitigate these issues.

Another essential takeaway from this study is the necessity for heightened clinical suspicion in diagnosing tuberculous otitis media, particularly in endemic regions. Patients presenting with chronic otorrhea unresponsive to conventional treatments should be promptly evaluated for tuberculosis. Future research should explore the use of molecular diagnostic tools, such as PCR-based assays, to facilitate earlier detection and improve treatment timelines.

Conclusion. The findings of this study provide valuable insights into improving the diagnosis and surgical management of tuberculous otitis media and mastoiditis. The integration of advanced imaging techniques, microbiological and histopathological assessments, and tailored surgical interventions has significantly enhanced treatment outcomes. The high rate of hearing improvement and disease remission highlights the effectiveness of a comprehensive, multidisciplinary approach.

Nonetheless, challenges remain in further reducing postoperative complications and optimizing long-term disease control. Future studies should focus on refining minimally invasive surgical techniques, incorporating bioengineered materials for tympanic reconstruction, and developing novel pharmacological therapies for tuberculosis affecting the ear. Clinically, there is a pressing need for increased awareness among healthcare

professionals regarding the early signs of tuberculous otitis media to facilitate timely diagnosis and intervention.

By implementing a standardized and evidence-based approach to diagnosis and treatment, the prognosis for patients with tuberculous otitis media and mastoiditis can be significantly improved, reducing the long-term impact on hearing and overoll quality of life.

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