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Original Research Article

Retrospective Analysis of the Outcomes of Patients with Chronic Otitis Media Treated with Different Surgical Techniques

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Abstract

Background: Chronic Otitis Media (COM) is a persistent middle ear infection that can lead to hearing loss, recurrent infections, and significant morbidity if left untreated. Surgical intervention remains the primary treatment for managing COM, with techniques including tympanoplasty, mastoidectomy, and modified radical mastoidectomy (MRM). However, the choice of surgical technique depends on disease severity, middle ear pathology, and the need for long-term hearing preservation. This study aims to compare the outcomes of different surgical techniques in terms of hearing improvement, postoperative complications, recurrence rates, and patient quality of life.

Methods: A retrospective observational study was conducted at Patna Medical College & Hospital, Bihar, from February 2023 to August 2024, including 100 patients diagnosed with COM who underwent surgical treatment. Patients were categorized based on the surgical technique used: tympanoplasty (with or without mastoidectomy), MRM, and canal wall up (CWU) vs. canal wall down (CWD) mastoidectomy. Outcomes were assessed using pre- and post-operative audiometric evaluations, postoperative complication rates, and patient-reported quality-of-life measures. Statistical analysis was performed using SPSS to compare surgical outcomes across different groups.

Results: Tympanoplasty without mastoidectomy showed the highest hearing improvement (16.6 dB) and lowest complication rates. MRM and CWD mastoidectomy had lower hearing improvement (11.3 dB and 9.8 dB, respectively) but were more effective in disease eradication. Complication rates, including infection, graft failure, and recurrence, were significantly higher in radical surgeries.

Conclusion: Tympanoplasty is the preferred surgical approach for patients with minimal disease involvement, offering better functional outcomes. Radical procedures are necessary for extensive disease but require long-term postoperative care. The findings underscore the importance of individualized surgical decision-making based on disease severity and patient expectations.

Keywords: Chronic Otitis Media, Tympanoplasty, Mastoidectomy, Modified Radical Mastoidectomy, Hearing Improvement, Postoperative Complications, Recurrence Rates, Quality of Life.

Introduction

Recurrent ear discharge and tympanic membrane perforation are characteristic signs of Chronic Otitis Media (COM), an inflammatory middle ear and mastoid cavity illness [1]. This is a major public health issue, especially in developing countries where it causes hearing loss and affects quality of life. Squamous COM (unsafe or atticoantral) and mucosal COM (safe or tubotympanic) are the usual classifications [2]. Mucosal COM has pars tensa perforation and intermittent discharge, while squamous COM has cholesteatoma development. The latter can induce severe ossicular erosion, facial nerve damage, and brain infections [3]. Pathogenesis of COM involves chronic inflammation. Interfering with middle ear epithelial and mucosal integrity causes structural damage and infection [4]. The disease progresses due to repeated acute otitis media, eustachian tube malfunction, low socioeconomic position, insufficient healthcare access, and upper respiratory tract infections [5]. Untreated or inadequately treated acute otitis media can induce middle ear mucosal changes, chronic infection, hearing loss, and, in severe cases, meningitis and brain abscesses. COM symptoms include aural fullness, conductive hearing loss from disrupted ossicular chains, and recurrent otorrhea [6]. Cholesteatoma-associated COM is more dangerous and may

require surgery if the patient develops tinnitus and vertigo, which indicate inner ear involvement [7]. The severity of symptoms and problems depends on whether the disease has spread intracranially or extracranially, as well as its type and duration. The treatment for COM depends on illness severity and consequences [8].

Conservative care—aural toileting, topical and systemic antibiotics, steroids, and others—helps reduce active infections. When medical treatment fails or structural damage develops, surgery is the major treatment. Surgery aims to restore hearing, eliminate sickness, and prevent recurrence [9]. Tympanoplasty, mastoidectomy, and ossiculoplasty are the most common COM surgeries, depending on the patient's pathology and illness severity. Post-tympanoplasty mastoidectomy depends on mastoid involvement [10]. The technique fixes tympanic membrane holes. If you have cholesteatoma or severe mastoid disease, you should get a mastoidectomy. CWU or CWD operations depend on the patient's wishes, the surgeon's experience, and the condition's severity. Long-term surgical efficacy depends on graft uptake, hearing restoration, recurrence rates, and post-surgical issues.

Although surgical procedures have improved, COM treatment remains controversial. Since surgical methods have variable clinical outcomes, the best one must eliminate illness, restore hearing, and minimise adverse effects. COM type, cholesteatoma, Eustachian tube function, middle ear pathology, and patient factors like age, comorbidities, and postoperative care affect surgical success [11]. COM surgery faces a major challenge in reducing recurrence, especially in cholesteatoma cases.

Because it keeps the posterior canal wall and provides a more natural anatomical structure, the CWU method improves hearing and reduces postoperative care. The main drawback is a higher risk of sickness recurrence needing long-term follow-up [12]. Recurrence is decreased with CWD, which eliminates the posterior canal wall. It can also open the mastoid cavity, causing lifelong cavity maintenance issues, infections, and hearing loss. We need to compare these outcomes to make better surgical decisions.

Hearing restoration is a key aspect of COM surgery. Tympanic membrane and ossicular chain repair with mastoidectomy or tympanoplasty alone restores hearing. How successfully the treatment restores hearing depends on the ossicles, graft material, surgeon expertise, and patient recovery. Studies have demonstrated contradictory hearing gain findings among surgical methods, making it important to evaluate therapy efficacy in a well-defined patient population. This study would examine COM patients who underwent various surgical procedures at Patna Medical College & Hospital in Bihar between 2023 and 2024 to take advantage of these aspects. This study evaluates surgical outcomes in a large cohort to contribute to the COM surgical treatment debate. To enhance patient outcomes, analyse postoperative hearing improvement, complication profiles, and recurrence rates.

Compare results after tympanoplasty, mastoidectomy (CWU vs. CWD), and both. Assess the long-term disease elimination, graft uptake, and stability of different surgical procedures. List and quantify the risks of each surgery, including postoperative infections, graft failure, residual or recurring illness, conductive or sensorineural hearing loss, and infection. Use pure-tone audiometry to evaluate the patient's hearing before and after surgery to determine how effectively various techniques restore hearing. Assess cholesteatoma and infection recurrence after each surgery. Based on self-reported outcomes, learn how happy patients are with their procedure, how much better their hearing is, and how much easier their lives are. Comparing CWD and CWU surgeries requires considering postoperative care load, follow-up frequency, open cavity maintenance, and long-term auditory care. Based on the study, offer patient-centered surgical decision-making improvements. By carefully assessing sickness symptoms, patient needs, and long-term surgical success, otologic surgeons can determine the best technique for their patients. This research aims to improve COM surgical clinical decision-making.

Chronic otitis media causes significant hearing loss and lowers quality of life for millions worldwide. Despite several surgical therapies for COM, each has pros and cons, making it difficult to choose the best. The optimum surgical method depends on patient and disease-specific factors, although tympanoplasty and mastoidectomy are still the gold standard. Patna Medical College & Hospital in Bihar will retrospectively assess 100 surgery patients' results after 18 months.

By assessing surgical procedures' efficacy, hazards, and long-term prognosis, the results will improve patient care. Better surgical findings can generate more individualised therapy regimens for COM patients, improving functional recovery and disease management.

Materials and Methods

Study Design and Setting: The Patna Medical College & Hospital (PMCH) retrospective observational study ran from February 2023 to August 2024. COM patients who had surgery at the facility are the subject of this retrospective review.

COM surgery methods are tested in this study. It analyses hearing improvement, postoperative complications, recurrence rates, and quality of life in COM patients, taking into account the ongoing public health burden and surgical variability.

Sample Size and Patient Selection: The study included 100 COM surgery patients after explicit inclusion and exclusion criteria. Patients were selected from hospital records using surgical, clinical, and audiological data. This verified the results.

Inclusion Criteria: Patients diagnosed with Chronic Otitis Media (COM) based on clinical, otoscopic, and audiological findings.

1. Underwent surgical treatment at PMCH between February 2023 and August 2024.
2. Patients with complete medical records, including preoperative assessment, surgical details, and postoperative follow-up data.

Exclusion Criteria

1. Patients with incomplete or missing medical records that precluded meaningful analysis.
2. Patients with comorbid conditions that could significantly alter surgical outcomes, such as uncontrolled diabetes, immunosuppressive disorders, or severe neurological impairments affecting postoperative healing and recovery.

Surgical Techniques Studied: This study compares COM surgery outcomes. Tympanoplasty is tympanic membrane reconstruction with ossicular chain rebuilding. Mastoidectomy adjuvantity determined tympanoplasty categorisation. MRM removes many harmful mastoid air cells while preserving critical elements like the ossicular chain to treat cholesteatoma-associated COM. Canal Wall up (CWU) Mastoidectomy, which preserves the posterior canal wall and ear structure, increases sickness recurrence. Canal Wall down (CWD) Mastoidectomy improves recurrence rates but may affect postoperative hearing and require long-term cavity management thanks to the posterior canal wall removal, which opens the mastoid cavity. We examined how well these surgeries reversed disease, restored hearing, and prevented complications.

Outcome Measures: The study examined key outcomes to evaluate surgical treatments. The researchers measured patients' hearing before and after surgery using Pure-Tone Audiometry (PTA). We identified the approaches that improved hearing by comparing it to air-bone gap (ABG) closure. The study collected surgical method-related complications and severity. Especially for mastoidectomy patients with cholesteatoma, disease recurrence was important. We examined for illness recurrence with follow-up otoscopic tests and radiological imaging. We assessed how surgical intervention influenced patients' quality of life by reviewing their daily living, auditory experiences, and satisfaction with the outcome. Patient data included subjective evaluations of otitis media, chronic discharge, and postoperative medical care.

Data Collection and Analysis: PMCH's medical, surgical, and audiological records provided preliminary data. We rigorously classified the data to compare surgical methods. We analysed the data with SPSS. To summarise patient demographics, surgical procedures, and outcome indicators, we used descriptive statistics (mean, standard deviation, frequency distribution). Before and after the operation, we compared hearing outcomes using paired t-tests.

Using chi-square testing, we examined the relationship between surgical procedures and post-op complications. We established independent determinants of surgical success or failure using multivariate analysis to eliminate confounding factors including age, illness severity, and surgical technique selection. All analyses were statistically significant when $p < 0.05$.

Ethical Considerations: Since the study is retrospective, institutional ethical approval was obtained from Patna Medical College & Hospital's Ethics Committee before data collection.

As patient data were retrieved from existing medical records, direct patient consent was not required; however, patient confidentiality was strictly maintained. No identifiable patient data were used in the study, ensuring compliance with ethical guidelines for medical research**.**

Results

Table 1: Patient Demographics

Characteristic	**n = 100 (%)**
Age Group (years)	
10-20	15 (15%)
21-40	45 (45%)
41-60	30 (30%)
>60	10 (10%)
Gender	
Male	58 (58%)
Female	42 (42%)

Duration of Disease	
<1 year	20 (20%)
1-5 years	50 (50%)
>5 years	30 (30%)
Comorbidities	
Diabetes Mellitus	18 (18%)
Hypertension	12 (12%)
No Comorbidities	70 (70%)

The majority of patients (45%) were in the 21-40 years age group, indicating that COM is prevalent in younger adults. Male patients (58%) outnumbered female patients (42%), suggesting a higher incidence in men. Most patients (50%) had 1-5 years of disease duration, emphasizing the chronic nature of the condition before surgical intervention. Diabetes mellitus (18%) was the most common comorbidity, which could influence postoperative outcomes.

Table 2: Surgical Techniques Used

Surgical Procedure	**Number of Patients (n=100)**	**Percentage (%)**
Tympanoplasty (without Mastoidectomy)	40	40%
Tympanoplasty with Mastoidectomy	25	25%
Modified Radical Mastoidectomy (MRM)	20	20%
Canal Wall Up (CWU) Mastoidectomy	10	10%
Canal Wall Down (CWD) Mastoidectomy	5	5%

Tympanoplasty (40%) was the most commonly performed procedure, likely due to its less invasive nature and effectiveness for non-complicated COM cases. Tympanoplasty with Mastoidectomy (25%) was performed in cases where mastoid involvement was present. Modified Radical Mastoidectomy (MRM) (20%) was used for cholesteatoma-associated COM. Canal Wall Up (10%) and Canal Wall Down (5%) were less frequently used, typically reserved for cases requiring aggressive disease removal.

Postoperative Outcomes: Hearing Improvement (Pure-Tone Audiometry Pre- vs. Post-Operative)

Table 3:

Surgical Technique	**Pre-op ABG (dB)**	**Post-op ABG (dB)**	**Mean Improvement (dB)**
Tympanoplasty (without Mastoidectomy)	35.2 ± 5.4	18.6 ± 3.9	16.6 ± 2.1
Tympanoplasty with Mastoidectomy	38.7 ± 6.1	22.4 ± 4.3	16.3 ± 2.6
Modified Radical Mastoidectomy (MRM)	42.1 ± 6.5	30.8 ± 5.2	11.3 ± 2.9
Canal Wall Up (CWU) Mastoidectomy	40.5 ± 5.9	28.1 ± 4.8	12.4 ± 3.1
Canal Wall Down (CWD) Mastoidectomy	44.3 ± 7.2	34.5 ± 6.1	9.8 ± 3.4

The greatest hearing improvement was seen in Tympanoplasty (16.6 dB gain) and Tympanoplasty with Mastoidectomy (16.3 dB gain). Modified Radical Mastoidectomy (11.3 dB gain) and Canal Wall Up Mastoidectomy (12.4 dB gain) showed moderate improvement. Canal Wall Down Mastoidectomy (9.8 dB gain) had the least hearing improvement, likely due to the extensive surgical approach affecting middle ear mechanics.

Table 4: Postoperative Complication Rates

Complication	**Tympanoplasty (n=40)**	**Tymp + Mastoid (n=25)**	**MRM (n=20)**	**CWU (n=10)**	**CWD (n=5)**
Infection	3 (7.5%)	2 (8%)	3 (15%)	1 (10%)	2 (40%)
Graft Failure	2 (5%)	3 (12%)	5 (25%)	2 (20%)	3 (60%)
Disease Recurrence	1 (2.5%)	2 (8%)	4 (20%)	3 (30%)	2 (40%)
Facial Nerve Injury	0 (0%)	0 (0%)	1 (5%)	1 (10%)	1 (20%)

Tympanoplasty had the lowest complication rates, making it the safest procedure. Graft failure was highest in Canal Wall Down (60%) and MRM (25%), indicating the complexity of these procedures. Recurrence rates were highest in CWU (30%) and CWD (40%), emphasizing the importance of regular follow-ups. Facial nerve injury (5-20%) was observed in mastoidectomy procedures, highlighting the risk of nerve damage in extensive surgeries.

Table 4: Patient Satisfaction and Quality of Life

Surgical Technique	Patient Satisfaction (%)
Tympanoplasty (without Mastoidectomy)	92%
Tympanoplasty with Mastoidectomy	85%
Modified Radical Mastoidectomy (MRM)	72%
Canal Wall Up (CWU) Mastoidectomy	65%
Canal Wall Down (CWD) Mastoidectomy	50%

Highest patient satisfaction (92%) was reported in Tympanoplasty, correlating with better hearing improvement and lower complication rates. CWD had the lowest satisfaction (50%) due to higher complications and maintenance difficulties. MRM and CWU had moderate satisfaction levels (72% and 65%), reflecting their balance between disease eradication and functional outcomes.

Table 5: Comparative Analysis (Statistical Significance)

Parameter	p-Value	Significance
Hearing Improvement	**<0.001**	Significant
Complication Rates	**0.002**	Significant
Patient Satisfaction	**0.005**	Significant

Statistically significant differences were found between surgical techniques in terms of hearing improvement, complications, and satisfaction ($p < 0.05$)**.** Tympanoplasty showed the best functional and patient-reported outcomes**,** while CWD had the highest complications**.**

Discussion

Interpretation of Results: The goal of this study was to compare surgical treatments for Chronic Otitis Media (COM). Tympanoplasty without mastoidectomy improves hearing and has the fewest problems, according to the results. Tympanoplasty improved mean hearing by 16.6 dB, consistent with other study showing 15–18 dB improvements. Those without extensive mastoid involvement and undamaged ossicular chains can nevertheless have tympanoplasty, as this shows. The research indicated that Canal Wall Down (CWD) (11.3 dB) and Modified Radical Mastoidectomy (MRM) (9.8 dB) surgeries improved hearing less. These therapies were efficient in clearing disease but had increased complications such graft failure (25% in MRM cases) and postoperative infections (18% in CWD cases). CWD therapies remove the infection better, but they impair middle ear function, resulting in less excellent hearing following surgery and more rehab time.

Comparison with Existing Literature: This study confirmed previous COM surgical results findings. Tympanoplasty improves hearing, while mastoidectomy only helps if the infection is severe, according to [13] and [14]. The current study supports this claim because the group that got both tympanoplasty and mastoidectomy had slightly reduced recurrence rates. Studies of MRM and CWD surgeries suggest a compromise between treating the illness and retaining hearing. According to [15] CWD surgeries reduce recurrence rates, although cavity-related issues require lifelong follow-up. Our study found that CWD patients were less satisfied and needed more postoperative care.

Clinical Implications: In this study, each patient's circumstances determine the best surgical method. Great for non-deteriorating middle ear issues. Ensures maximum hearing restoration with minimal problems. Be selective when adding it to cases with severe infection. Moderately reduces recurrence but does not improve hearing.

Effectively treats cholesteatoma and other dangerous infections. Reduced hearing improvement and more problems. Over time, requires careful patient expectation appraisal and monitoring. These results may require more invasive procedures to remove the condition, but only if the risk of recurrence exceeds the risk of hearing loss.

Patient-Reported Outcomes and Quality of Life: This study focused on audiological outcomes, patient satisfaction, and quality of life. Tympanoplasty patients were happier since they could hear better and had less postoperative issues. Patients who had CWD surgeries had lower quality-of-life scores. These patients likely needed postoperative care and took longer to recuperate. The results of this study emphasise the need of patient counselling before invasive surgery. CWD procedures may require hearing aids or frequent ear cleaning, so discuss these issues before surgery.

Limitations of the Study: Since it leverages prior medical data, the study may miss valuable clinical and patient-reported data. Prospective studies can clarify surgery findings. Location (Patna Medical College & Hospital) limits the investigation. Surgical expertise and postoperative care may affect outcomes among facilities. Surgical patients

had varying illness severity. More serious instances may have required more invasive procedures, which may have affected hearing outcomes and complications. The study followed individuals briefly after surgery. Functional outcomes and long-term recurrence rates are unknown.

Future Recommendations: Trials at multiple hospitals improve generalisability. Standardise surgical and post-care processes. Follow patients for 5–10 years to track hearing and recurrence. Consider long-term patient-reported hearing aid dependency and quality of life outcomes. Compare surgical methods in a controlled environment to eliminate selection bias. Randomise surgical treatments for patients. CT or MRI scans before surgery improve patient selection. Use advanced audiometric testing to detect even minor hearing problems following surgery.

Conclusion

As this study reveals, Chronic Otitis Media (COM) patients' results depend on surgical methods. Tympanoplasty without mastoidectomy improved hearing the most and had the lowest complication rates for patients with mild disease involvement. MRM and CWD surgeries removed the disease, however also caused problems, hindered hearing recovery, and raised long-term care needs.

These findings emphasise the importance of balancing disease eradication with hearing preservation when selecting surgical techniques for patients. This study emphasises the significance of pre-surgery counselling about outcomes, risks, and rehabilitation.

Patients who experience severe quality of life changes after invasive surgeries like CWD mastoidectomy may need ear cleaning and hearing aids for life. Due to the vast range of surgical results, healthcare providers must use a consistent approach when selecting patients and during follow-up sessions. The findings suggest that healthcare officials should improve audiological diagnostics, postoperative rehabilitation, and surgeon training to improve surgical outcomes. Future research should focus on large-scale, multicenter prospective trials with longer follow-up to improve COM surgery. Following evidence-based suggestions can improve patient recovery, recurrence rates, and treatment results. Individualised, patient-centered COM therapy resolves the problem and preserves hearing.

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