



## RESEARCH ARTICLE

### OUTCOMES OF INTERLAY TYMPANOPLASTY: A PROSPECTIVE STUDY IN SOUTH EASTERN RAJASTHAN

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#### ABSTRACT

**Objective:** To evaluate the success rate, hearing improvement, and complications of interlay tympanoplasty, where the graft is placed between the fibrous and mucosal layers of the tympanic membrane. **Methods:** This prospective study included 50 patients with inactive mucosal type of chronic otitis media having tympanic membrane perforation. All underwent interlay tympanoplasty, and outcomes were assessed at 3 and 6 months postoperatively. The primary outcome was the graft uptake rate, while secondary outcomes included hearing improvement and complications. **Results:** **Graft uptake rate:** 92% at 6 months. Hearing improvement: Pure-tone audiometry (PTA) showed an average improvement of 12 dB ( $p < 0.05$ ). **Complications:** Residual perforation in 6%, transient otorrhea in 4%. No significant cases of lateralization or cholesteatoma were observed. **Conclusion:** Interlay tympanoplasty is a highly effective technique, particularly for anterior tympanic membrane perforations, providing a high graft success rate, significant audiometric improvement, and minimal complications.

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## INTRODUCTION

Tympanoplasty is a surgical procedure aimed at repairing tympanic membrane perforations to restore hearing and prevent recurrent infections. The three primary techniques are:

- **Underlay Technique:** The graft is placed beneath the mucosal layer of the tympanic membrane.
- **Overlay Technique:** The graft is placed between the epithelial and fibrous layers.
- **Interlay Technique:** The graft is placed between the fibrous and mucosal layers, preserving the fibrous layer for better healing.

#### Why Interlay Tympanoplasty Provides a More Physiological Ear

- The fibrous layer is preserved, leading to better sound conduction (1).
- Provides better graft stability than underlay, especially for anterior perforations (2,3).
- Lower risk of lateralization and epithelial ingrowth compared to overlay (4).

- Interlay tympanoplasty had a significantly higher graft uptake rate compared to underlay tympanoplasty due to its anatomical positioning and less risk of graft medicalization (9).

**Several studies have demonstrated the effectiveness of interlay tympanoplasty:** Hay & Blanshard (2014) reported a high graft uptake rate and improved hearing in anterior and subtotal perforations (2). Misale et al. (2014) found better outcomes for large central perforations compared to underlay tympanoplasty (3). Kawatra et al. (2014) demonstrated a 90% success rate, comparable to overlay but with fewer complications (4).

**Study Objective:** This study aims to analyze the graft success rate, hearing improvement, and complications of interlay tympanoplasty in 50 patients in south eastern rajasthan.

## MATERIALS AND METHODS

**Study Design and Patient Selection:** This prospective observational study was conducted at ENT department of Jhalawar medical college, Rajasthan from September 2023 to September 2024. 50 patients with inactive mucosal type of

chronic otitis media having tympanic membrane perforation were selected for interlay tympanoplasty.

**Inclusion Criteria:** Patients of age group 18-60 years having dry tympanic membrane perforation with <40db conductive hearing loss.

#### Exclusion Criteria

History of previous tympanoplasty; Active middle ear infection or cholesteatoma; Sensorineural hearing loss

**Surgical Procedure:** (Interlay Graft Placement Technique):

- **Incision & Flap Elevation:** A postauricular or endaural incision is made. The tympanic annulus is lifted, ensuring the fibrous layer was preserved, as it is crucial for optimal healing.(5)
- **Layer Separation:** The entire tympanic membrane is not lifted; only the fibrous layer is elevated, creating a natural dissection plane between the fibrous and mucosal layers.
- **Graft Placement:** A temporalis fascia graft is inserted between the fibrous and mucosal layers, ensuring smooth placement without folding or excessive tension.(6)
- **Flap Repositioning & Closure:** The fibrous layer is repositioned over the graft, securing it in place. The canal is packed with gel foam, and the incision is closed.

**Outcome Measures:** Primary Outcome: Graft uptake at 3 and 6 months.

**Secondary Outcomes:** Hearing improvement (Pre-op vs. Post-op PTA). Complication rates (infection, lateralization, reperforation)

**Statistical Analysis:** Data were analyzed using SPSS (Version X.X). Pre-op and post-op hearing levels were compared using a paired t-test ( $p < 0.05$  was considered statistically significant).

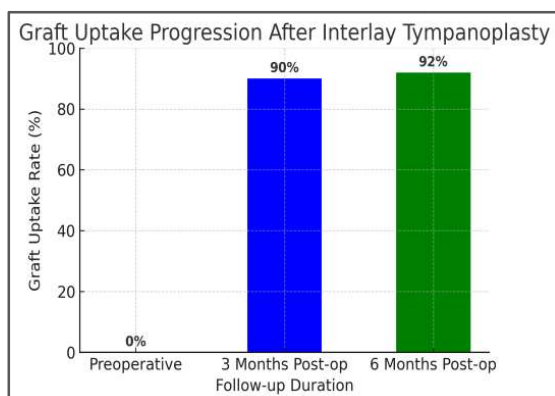
## RESULTS

### Surgical Outcomes

#### Graft Uptake Rate

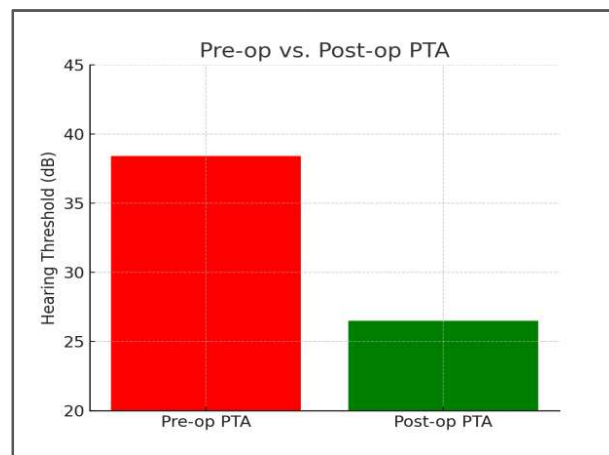
3 months: 90%  
6 months: 92%

Graph: Graft Uptake Rate Over Time



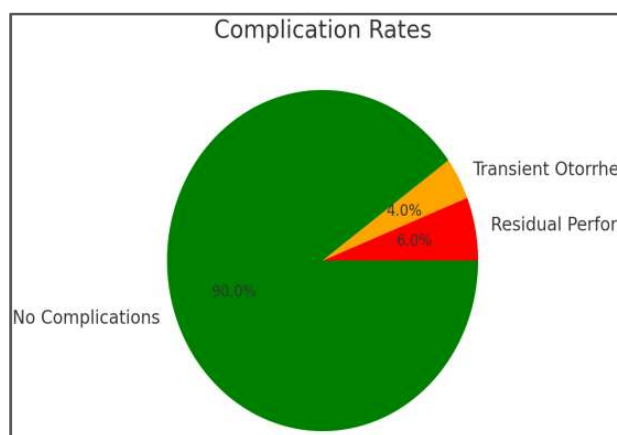
**Hearing improvement:** 12 dB ( $p < 0.05$ , statistically significant): Pre-op PTA:  $38.4 \pm 6.2$  Db; Post-op PTA:  $26.5 \pm 5.7$  dB

Graph: Pre-op vs. Post-op PTA



### Complications

Residual perforation: 3 cases (6%)  
Transient otorrhea: 2 cases (4%)  
Lateralization/Cholesteatoma: None  
Graph: Complication Rates



## DISCUSSION

The present study demonstrates that interlay tympanoplasty is a highly effective surgical approach for the management of tympanic membrane perforations in patients with inactive mucosal chronic otitis media. With a graft uptake rate of 92% at 6 months and an average hearing improvement of 12 dB, the interlay technique proves to be a reliable and physiologically favorable method, particularly in cases involving anterior or subtotal perforations. These results align closely with prior research. Hay and Blanshard (2014) observed similarly high uptake rates in anterior perforations, attributing the success to the stability and anatomic alignment offered by interlay placement (2). Misale et al. (2014) also reported better outcomes in large central perforations using the interlay technique compared to the underlay approach (3). In terms of auditory outcomes, the observed 12 dB improvement in pure-tone average (PTA) is clinically significant and comparable to findings in other interlay tympanoplasty studies (4,6). This audiometric gain may be attributed to the preservation of the

fibrous layer, which plays a critical role in sound conduction and tympanic membrane biomechanics (1,5). Complication rates in our study were low, with only 6% of patients developing residual perforations and 4% experiencing transient otorrhea. Importantly, no cases of graft lateralization, epithelial pearls, or cholesteatoma were observed, which are complications more frequently encountered in overlay tympanoplasty (8). The lower incidence of such issues in our cohort supports the notion that interlay tympanoplasty offers a safer postoperative course with faster epithelialization and fewer long-term complications. When compared to the underlay technique, which may be technically simpler but often fails in anterior perforations due to difficulty in anchoring the graft anteriorly (7), interlay tympanoplasty provides a more stable graft bed by utilizing the natural plane between the fibrous and mucosal layers. Unlike overlay tympanoplasty, which carries a higher risk of lateralization and delayed healing due to manipulation of the epithelial layer (8), the interlay method preserves both the epithelial and fibrous continuity, promoting more physiologic healing. However, our findings must be interpreted in light of certain limitations. This was a single-center study with a moderate sample size (n=50) and a relatively short follow-up duration of 6 months. Furthermore, the absence of a direct comparison group (e.g., underlay or overlay) limits the generalizability of our conclusions. Despite these constraints, our results provide a solid foundation for further research. Future studies should aim to include randomized controlled trials (RCTs) comparing interlay, underlay, and overlay tympanoplasty techniques across diverse populations. Additionally, longer follow-up periods ( $\geq 2$  years) are essential to assess the durability of graft success and the sustainability of hearing improvement.

## CONCLUSION

Interlay tympanoplasty is a highly effective and preferred technique for tympanic membrane repair, particularly for anterior perforations. It offers:

- High graft uptake rates (92%)
- Significant hearing improvement (12 dB on average)
- Minimal complications

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