Lateral cartilage graft tympanoplasty for refractory perforations

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Abstract

Objective: To describe a variation of the lateral graft tympanoplasty technique useful in cases of refractory perforations or significant Eustachian tube dysfunction.

Methods: Case series with chart review of pediatric and adult patients treated at a tertiary care university hospital between 2011 and 2016.

Results: Thirty-nine consecutive patients underwent a lateral cartilage graft tympanoplasty. The mean age was 27.0 years old (range 5 – 76). Eighteen patients (46%) were female and twenty-one patients (54%) were less than 18 years old. Surgical indication was a tympanic membrane perforation in 37 patients (95%) and severe atelectasis with otitis media in 2 patients (5%). Nineteen patients (49%) had total or subtotal perforations, 15 patients (38%) had failed a prior tympanoplasty, 12 patients (31%) had cholesteatoma, and 9 patients (23%) had history of a cleft palate. All patients were reconstructed with a bisected tragal cartilage-perichondrium shield graft. Concurrent ossicular chain reconstruction was performed on eight patients (21%). The mean follow-up length was 19.6 months (SD 15.8). In total there were five perforations (13%) and one graft lateralization (3%). Four patients (10%) underwent a revision surgery, two for residual cholesteatoma and two for persistent perforation. The perforations were both closed leaving a final closure rate of 92%. Overall, pure-tone average improved by 6.0 dB, the air-bone gap improved by 5.1 dB, and the speech discrimination score did not change (95%).

Conclusion: Lateral cartilage graft tympanoplasty is a safe and effective technique for management of refractory tympanic membrane perforations and patients with significant Eustachian tube dysfunction.

Introduction

Tympanic membrane reconstruction can be accomplished via multiple surgical techniques with a variety of reconstructive materials. Perforations that have failed prior tympanoplasty or demonstrate persistent Eustachian tube dysfunction need a reproducible technique and a robust material to ensure successful long-term closure.

There is considerable evidence to support cartilage tympanoplasty. Its rigidity has potential to better resist negative middle ear pressure with significant detriments to the hearing outcomes.

Temporals fascia for tympanoplasty is also well supported in the literature with closure rates commonly reported between 80% – 97.5%. Recent prospective studies with at least 2-years of follow-up show a long-term closure rates may fall to 60% – 84.2%. This decline can be attributed to graft atrophy and retraction in the setting of chronic negative middle ear pressure.

The aim of this study is to report on the use of a bisected tragal cartilage-perichondrium shield graft combined with a lateral graft technique for refractory and challenging perforations.

Methods and Materials

Retrospective review of adult and pediatric patients who underwent lateral cartilage graft tympanoplasty at UT Southwestern Medical Center and Children’s Medical Center from 2011-2015.

Lateral graft technique was used in cases of total or subtotal perforation, poor visualization, or extensive myringitis at the time of surgery.

Primary outcome is perforation closure rate. Secondary outcomes are graft lateralization rate, audiometric outcomes, and persistent otitis media.

Patient Characteristics

| Number of patients | 39 |
| Age at surgery (years) | 27.0 (5-76) |
| Pre-operative Perforation | 37 (95%) |
| Severe Atelectasis w/Ototohrhea | 2 (5%) |
| Total or Subtotal Perforations | 19 (49%) |
| Failed Tympanoplasty | 15 (38%) |
| Cholesteatoma | 12 (31%) |
| Cleft Palate | 3 (23%) |

Surgical Technique

The lateral graft technique is performed as described by House et al. This includes a post-auricular incision with a long vascular strip, en bloc removal of the canal skin and remnant tympanic membrane, and canaoplasty for improved visualization. Tragal cartilage is harvested through a separate incision.

Results

Mean Follow-Up (months) 19.6 (SD 15.8)
Concurrent OCR 8 (20%)
Residual Perforation 5 (13%)
Graft Lateralization 1 (3%)
Persistent Otorrhea/Mycetoma 8 (20%)
Revision surgery 4 (10%)
Improvement in PTA 6.0 dB
Improvement in ABG 5.1 dB
Final Closure Rate 92%

Discussion

While the literature is mixed, there is evidence that both lateral graft tympanoplasty and cartilage graft tympanoplasty both are efficacious for repairing perforations at high-risk of failure.

Donhofer et al. reported successful medial cartilage graft tympanoplasty results in 98.6%, 95.8%, and 99.0% of cases performed for cholesteatoma, high risk perforations, and atelectatic ears, respectively. A recent systemic review and prospective randomized trial failed to find a statistically significant difference between perforation closure rates and hearing outcomes in fascia versus cartilage graft tympanoplasties.

Other reports have showed a higher long-term failure rate when fascia is used rather than cartilage. Presumably these failures occur secondary to atrophy of the fascia graft and continual negative middle ear pressure.

This study demonstrates that bisected tragal cartilage-perichondrium shield grafts can be combined with a lateral graft technique to close difficult tympanic membrane perforations. The 85% success rate after initial surgery and 92% final closure rate after a mean follow-up of 19.6 months is comparable with the reported literature. Given the patient characteristics, this success rate speaks to the robustness of this technique and graft material.

There were no major complications. Surgeries should be aware of the theoretical risk for sensorineural hearing loss during the canaoplasty, post-operative otorrhea/myringitis (20%), and graft lateralization (3%).

Limitations of this study include its retrospective nature, need for long-term follow-up, small sample size, and lack of a comparison group.

Conclusions

Lateral cartilage graft tympanoplasty is an effective technique for management of patients with refractory tympanic membrane perforations and significant Eustachian tube dysfunction. The approach offers good visualization and the graft thickness may prevent future retraction and perforation. Further studies with long-term follow-up and direct comparison against other techniques are needed to compare efficacies.

References