Myringoplasty — A Modified Technique

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An application of a modified myringoplasty technique using 'dura' as a homograft is described. It is simple and does not require much experience to perform. It does not involve much trauma to the external or middle ear. Therefore, it shortens the period of exposure to anaesthesia and hospitalization to a great extent. The chance of postoperative complications is small and it is a less-invasive surgical procedure.

Tympanoplasty is the surgical reconstruction of the middle ear, in part or whole, anatomically or functionally or both. It is classified into different types. The first type is called myringoplasty which involves tympanic membrane repair only. There are different surgical approaches and techniques to achieve this goal. The permeatal and postauricular approaches are the commonly practised ones. The site and size of the tympanic membrane perforation and the suspected intratympanic structure disorders play an important role in choosing the surgical approach in each individual case.

In this article, a simple modified technique for tympanic membrane perforation repair is described and recommended. It was found that this technique is very suitable for repair of small, dry central perforations with no suspected intratympanic structure disorder or as a first stage for ossiculoplasty. A prepared dura 'Lyodura' (B. Braun Melsungen AG, 3508 Melsungen, W. Germany) was used in all the patients as a homograft.

Materials

Eighty-four patients with dry, small central tympanic membrane perforations were selected for this technique. All these patients were free of nasal or throat problems. The age range was 18-52 years (mean 33.6 years). All had conductive or mixed deafness. The air-bone gap was between 15 and 45 dB. These patients had a history of chronic suppurative otitis media. Those patients who had an active disease were treated until the ear became dry for at least 4 weeks prior to the surgery. Seventy-two patients had a unilateral perforation which was repaired in all of them. Twelve patients had bilateral tympanic membrane perforations. All of these twelve had one tympanic membrane repaired, but only five patients had both tympanic membranes repaired in two different sessions. The same technique was applied in all of these cases. A prepared duramater 'Lyodura' was used in all the patients as a homograft. The total number of tympanic membranes repaired by this method was 89 (72 + 12 + 5). Although the left ear in the bilateral perforation group was chosen for the first operation to obtain an equal number of right and left ears for comparison, still the right ear represented the majority 55% (49 ears), and the left ear represented 45% (40 ears).

Method

Although this technique can be performed under local anaesthesia, general anaesthesia was chosen for this study. The patient was prepared as usual and under a general anaesthesia and with the help of a surgical microscope, an aural speculum was introduced and the external meatus cleansed. The tympanic membrane perforation was
visualized well. The rim of the perforation was removed to freshen the edges as usual.

The skin of the tympanic membrane superior and inferior to the edges of the perforation was raised for 1–2 mm and rolled superiorly and inferiorly respectively as flaps (Fig. 1). This can be achieved by a curved needle. The under surface of the tympanic membrane, anterior and posterior to the perforation was scratched by a hook to create a raw area (Fig. 1). A piece of the prepared dura 'Lyodura' of a suitable size equal to the perforation plus the raw areas around it, was designed by cutting its edges at four sites. These four cuts were directed to the centre but only for 1–2 mm. A central part of the graft, equal to the actual size of the perforation was left intact.

No gel-foam was needed in the middle ear cavity. The graft was inserted in such a way that its superior and inferior edges were lateral to the tympanic membrane (against the raw areas) and the anterior and posterior edges of the graft were medial to the tympanic membrane (against the scratched areas), so the graft was suspended and filling the perforation. The superior and inferior skin flaps were put back to cover the superior and inferior edges of the graft (Fig. 2). The graft and the remnant of the tympanic membrane were covered with gel-foam and...
the external meatus was packed with a small gauze impregnated with BIPP for 2 weeks. The patient was discharged from the hospital on the next day.

The audiological assessment of these patients was performed using an Amplaid 161 pure tone audiometer in a sound-proof room. 125 Hz to 8000 Hz frequencies were tested for air-conduction and 250 Hz to 4000 Hz frequencies were tested for bone conduction.

**Results**

The 6-week postoperative assessment showed that in 79.7% (71 ears) the grafts had taken and there were intact tympanic membranes. Pure tone audiograms showed a closed air–bone gap in 73% (65 ears) and improved hearing in five ears with an air–bone gap of 10–20 dB. Eighteen ears (20.3%) still had perforated tympanic membranes. Eleven ears (of the 18) had grafts which had taken but which were displaced to one side with mainly an anterior perforation. Six of these 11 ears showed improved hearing but still had an air–bone gap of 10–25 dB. No trace of the graft could be found in the remaining seven perforated ears. Three of these seven developed postoperative infection with purulent aural discharge (Table 1).

All patients reported for 3-month postoperative follow-up except two; one was from ‘taken displaced graft’ and the other from the ‘no trace of graft’ group.

The intact grafted tympanic membranes remained as they were. Two patients with intact grafted tympanic membrane who did not show hearing improvement previously, showed some hearing improvement but still had an air–bone gap of 10–20 dB. No significant audiological changes could be found in the other patients.

Two left ears developed infections; one was otomycotic and the other was a bacterial infection. Both were treated and cleared up (Table 1).

Three more patients failed to appear for 6-month follow-up; two were from the ‘no trace of graft group’ and the other was from the ‘intact grafted tympanic membrane group’. It was also found that one perforated displaced taken graft had healed with hearing improvement and a closed air–bone gap. The other audiological results remained the same as they were previously. No significant changes could be noticed in the intact grafted tympanic membranes. Two left ears with perforated tympanic membranes developed bacterial infection (Table 1).

**Discussion**

Different approaches are used to repair perforated tympanic membranes. The postauricular and the transcanal approaches are commonly practised. In spite of the lesser trauma the permeal approach causes to the ear, both approaches involve more trauma to the ear than a small perforation may require. This modified technique described here minimizes the trauma to a very great extent. Indeed, there is no trauma apart from de-epithelizing the perforation rim and some part of the remnant of the tympanic membrane.

Different graft materials have been tried for tympanic membrane perforation repair. Temporalis fascia, vein, duramater, perichondrium and fibrin, all have been tried for grafting. Autogenous fibrin was used in tympanoplasty but it involves some blood loss from the patient to prepare the fibrin. Much effort has been spent to find an alternative material for autografts. Palva used duramater in tympanoplasty. Collagen film made of bovine Achilles tendon was tried to repair tympanic membrane perforation but it was not recommended due to the intense inflammatory reaction.

Autograft temporalis fascia is the best and commonly used graft, but it cannot be reached without making an incision or extending the postauricular incision superiorly. The modified technique saves the patient from these incisions. Also, it saves the temporal fascia. There is no rejection for the graft. The healing and fate of the duragraft should not differ from the fate of other autografts used for repair of the tympanic membrane perforation. It was shown that the autograft and homograft fascia work equally well in experimental work on tympanoplasty. It was also reported that tympanic membrane grafts are replaced by fibrous tissue, lose their cellular structure and remain as amorphous matrix covered on each side by fibrous tissue and epithelium.
There are several advantages for the modified technique described in this article. The most obvious ones are:
1. It saves the patient more surgical trauma such as a postauricular, transcanal or an end-aural incision and dissecting the skin of the external auditory canal.
2. The chorda tympani nerve is always kept intact.
3. It minimizes the operating time and exposure to general anaesthesia considerably.
4. It gives less chance for complications as the middle ear is not exposed.
5. Minimum hospitalization.
6. It can be used as a first stage for tympanoplasty; i.e. to be followed by ossiculoplasty.
7. No gel-foam is required in the middle ear cavity.
8. Less experience is required in this modified technique than in the usual techniques.

References
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