Myringoplasty: A Comparative Study of Different Graft Materials and Various Surgical Techniques

Background: Myringoplasty is a surgical procedure to repair a perforation in the tympanic membrane. Various surgical techniques and graft materials are in practice. Current study aims at determining the efficacy of different surgical techniques and surgical approaches and the effect of size of perforation and graft materials on take rate at our institution.

Objective: To determine the comparative outcome of myringoplasty by overlay and underlay techniques, and to determine the take rate of graft for perforations of different size, graft materials and surgical techniques.

Design: Comparative study.

Place And Duration of Study: Department of ENT, Pakistan Institute of Medical Sciences Islamabad from January 2006 to June 2008.

Materials And Methods: 215 ears with tympanic membrane perforation were surgically managed in 195 patients and were followed for minimum of two months. 20 patients underwent myringoplasty in both ears. An intact graft at the end of two months was considered a success. Patients with purulent discharge, marginal perforation, suspected ossicular disease and suspected cholesteatoma were excluded from the study. Tragal perichondrium was used as graft material in 158, temporalis fascia in 49 and fat from ear lobule in 08 cases. Transmeatal approach without flap elevation was employed in 158 cases, transmeatal approach with flap elevation in 12 cases and postaural approach in 45 cases. Overlay technique was used in 145 ears and underlay in 70 ears.

Results: There were 104 female patients and 91 males. Perforation was of small size in 16 ears, medium size in 165 and subtotal in 34 ears. Take rate was 100% in small sized perforations while it was 85% and 71% in medium and large sized perforations respectively. Take rate for tragal perichondrium was 85%, temporalis fascia 75% and fat from ear lobule was 100%. No significant difference was found for take rate between overlay and underlay techniques and for surgical approaches. Overall success rate was 84%. Graft failed in 35 (16%) ears.

Conclusion: Small and medium size perforation carry a better take rate. Tragal perichondrium is superior to temporalis fascia. Surgical approach and position of the graft do not significantly influence the outcome. Overall success rate in our study was 84%.

Key Words: Tympanic membrane. Myringoplasty. Tragal perichondrium. Temporalis fascia.

Introduction

Myringoplasty is an operation used to repair and reconstruct the perforation in tympanic membrane. Different surgical approaches, surgical techniques and graft materials are in practice. Most commonly employed graft materials are tragal perichondrium with or without cartilage and temporalis fascia.\(^1\) Other materials like fat, periosteum, vein graft, cadaveric dura as allograft and bovine tissue as xenograft are also used depending upon size of defect and availability of tissues.\(^2\)\(^3\)\(^4\)\(^5\) Success rate is highly variable from centre to centre. Tragal perichondrium is mainly preferred due to its easy harvesting technique, decreased time consumption, minimal scarring and no significant postoperative morbidity. Tragal cartilage with perichondrium is preferred in case of large or anteriorly placed perforations or associated eustachian tube dysfunction but at the cost of delayed hearing
restoration for six months. Temporalis fascia is generally considered to be superior with respect to the take rate probably due to its low basal metabolic rate. Fat from ear lobule is used to plug small perforations with highly encouraging results. It is also minimally invasive and particularly useful for residual perforations because of angiogenic properties of fat. As regards the surgical techniques modifications are still in progress without a common consensus from underlay and overlay to a combination of both or a sandwich technique where the graft is placed between squamous and mucosal layers of tympanic membrane. However outcome is not significantly altered. Same is the case with surgical approaches. Transcanal approach was mainly used at our institution because of its simplicity on part of both surgeon and patients.

The current study aims at determining the efficacy of different surgical techniques and surgical approaches and the effect of size of perforation and graft materials on take rate at our institution.

Materials and Methods

215 ears with tympanic membrane perforation were surgically managed in 195 patients and were followed for minimum of two months. 20 patients underwent myringoplasty in both ears. An intact graft at the end of two months was considered a success. Patients with purulent discharge, marginal perforation, suspected ossicular disease and suspected cholesteatoma were excluded from the study. Tragal perichondrium was used as graft material in 158, temporalis fascia in 49 and fat from ear lobule in 8 cases. Transmeatal approach without flap elevation was employed in 158 cases, transmeatal approach with flap elevation in 12 cases and postaural approach in 45 cases. Overlay technique was used in 145 ears and underlay in 70 ears.

Results

Take rate was 100% in small sized perforations while it was 85% and 71% in medium and large sized perforations respectively.

Table-I: Age and Gender Distribution (n = 195)

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Number</th>
<th>%</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>17–20 Years</td>
<td>60</td>
<td>31</td>
<td>31</td>
<td>29</td>
</tr>
<tr>
<td>21–30 Years</td>
<td>90</td>
<td>46</td>
<td>42</td>
<td>48</td>
</tr>
<tr>
<td>30–40 Years</td>
<td>45</td>
<td>23</td>
<td>18</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>195</td>
<td>100</td>
<td>91</td>
<td>104</td>
</tr>
</tbody>
</table>

Take rate for tragal perichondrium was 85%, for temporalis fascia 75% and for fat from ear lobule was 100%. Table I sows age and gender distribution of the patients. No significant difference was found for take rate between overlay and underlay techniques and for surgical approaches as shown in table II and table III respectively.

Table-II: Results of Surgical Technique for Myringoplasty (n=215)

<table>
<thead>
<tr>
<th>Surgical technique</th>
<th>Number operated</th>
<th>Successful</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overlay</td>
<td>145</td>
<td>123</td>
<td>85%</td>
</tr>
<tr>
<td>Underlay</td>
<td>70</td>
<td>57</td>
<td>82%</td>
</tr>
</tbody>
</table>

Overall success rate for complete healing of perforation was 76%. Residual perforation was noticed in 18 ears (8%). All of these residual perforations healed spontaneously. Graft failed in 35 (16%) ears.

Table-III: Results of Surgical Approaches for Myringoplasty (n=215)

<table>
<thead>
<tr>
<th>Surgical Approach</th>
<th>Number operated</th>
<th>Successful</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmeatal: without flap elevation</td>
<td>158</td>
<td>140</td>
<td>89</td>
</tr>
<tr>
<td>Transmeatal: with flap elevation</td>
<td>12</td>
<td>9</td>
<td>75</td>
</tr>
<tr>
<td>Postaural</td>
<td>45</td>
<td>41</td>
<td>91</td>
</tr>
</tbody>
</table>

Discussion

Myringoplasty is one of the most frequently preformed procedures in otolaryngology. Great variability exists not only in the surgical technique but also in its outcome throughout the world. Temporalis fascia and tragal perichondrium with or without cartilage are most often used.

Fiorino and Barbieri used fat graft taken from ear lobule or abdominal wall to repair residual perforation with a closure rate of 87%. In our study we used fat from ear lobule in 8 patients with small perforations with 100% success rate. Success rate is below optimal in paediatric age group due to recurrent upper respiratory tract infections and eustachian tube dysfunction in these patients. Yung et al have documented graft take rate of 80% in 51 myringoplasties in young and older children; true success was found only in two thirds of these cases. Singh and Sharma used transcanal approach in 25 patients with an overall
success rate of 84% in terms of perforation closure. We used this approach in 158 patients with a success rate of 89% with respect to the graft take. Makaya proposed success rate of 84% in terms of take rate in 85 patients undergoing myringoplasty. While Harvinder et al described success rate of 57% using temporalis fascia. Borkowski et al repaired total perforations in 21 patients using cartilage from choncha with 100% closure rate. El-Hennawi reported a take rate of 86.6% using tragal cartilage with perichondrium. Modified cartilage-perichondrium composite ring graft was tried by M H Mansour and co in 13 patients having total or subtotal perforations with 100% success rate.

We had an overall success rate of 84% using tragal perichondrium without cartilage and in few cases with cartilage, temporalis fascia and fat from ear lobe. Individual success rate with each type of graft material was 85%, 75% and 100% respectively. These figures are comparable to those reported by earlier studies.

**Conclusion**

Small and medium size perforations carry a better take rate. Tragal perichondrium is superior to temporalis fascia in our study. Surgical approach and position of the graft do not significantly influence the outcome.

**References**

11. Coskun BU; Cinar U; Seven H; Ugrur S; Dadas B. The effects of the incision types in myringoplasty operations on cosmesis. Eur Arch Otorhinolaryngol. 2006; 263:820-2