Clinical Otolaryngology

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The button graft technique for perforations affecting less than 25% of the tympanic membrane: a non-randomised comparison of a new modification to cartilage tympanoplasty with underlay and overlay grafts

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Objectives: To evaluate a new composite cartilage–perichondrium graft (button graft) for repair of small-sized tympanic membrane perforations and to compare its success rate with that of the underlay and overlay techniques with temporal fascia or tragal perichondrium.

Design: Prospective, sequential allocation of surgical technique study.

Setting: Tertiary care university hospital.

Patients: One hundred ninety-five patients aged 14–42 years with central, uncomplicated tympanic membrane perforations with completely visualised margins affecting less than 25% of the tympanic membrane, distributed in three groups: 1 (underlay), 2 (overlay) and 3 (button graft).

Interventions: Patients were allocated in sequence to: 1 underlay graft, 2 overlay graft and 3 cartilage tympanoplasty with button graft technique. Patients were operated on under local anaesthesia.

Main outcome measures: Postoperative status of the tympanic membrane, hearing improvement, duration of surgery and incidence of complications at 12 months postoperative.

Results: Group 1 (underlay) had 66 patients; group 2 (overlay), 65; and group 3 (cartilage), 66. Success was defined as the complete closure of the tympanic membrane one year after the operation. The success rates were 98.5% (65 of 66), 97% (63 of 65) and 98.5% (65 of 66) cases, and the mean air–bone gap gains were 10.18 (±5.4) dB, 8.5 (±6.5) dB and 9.1 (±5.1) dB for groups 1, 2 and 3, respectively. No bone conduction threshold or speech discrimination score worsening was noted. The mean durations of the operative procedure were 35 ± 8.4 (range 22–63), 42 ± 6.8 (range 33–75) and 23 ± 6.3 (range 15–41) min for groups 1, 2 and 3, respectively (P = 0.02). Tympanic membrane retraction occurred in three cases in underlay group 1, and tympanic membrane cholesteatoma pearls occurred in two cases in overlay group 2.

Conclusions: The button graft technique is an effective and fast alternative for the repair of small tympanic membrane perforations if complete visualisation of the margin is possible. The shorter time taken with the button grafts is mainly due to the non-requirement for a skin incision. The results are comparable to those of the underlay and overlay techniques.

Healing of tympanic membrane perforations is the rule after suppurative attacks of otitis media or after trauma. However, these perforations may fail to heal completely, and small perforations may remain forever. Residual small-sized perforations are also a relatively common complication after the use of ventilation tubes, especially in neglected cases. These perforations may also occur as a complication after other ear operations, including failed myringoplasty. Additionally, the perforations may resist conservative measures and require surgical intervention by different means of invasive myringoplasties. In managing small perforations, many surgeons have tried to avoid the usual methods of myringoplasty, namely the under and overlay techniques, using less invasive techniques, including repeated acid cauterisation, autologous fat grafts, hyaluronic acid, AlloDerm, inlay butterfly grafts and the use of bivalve cartilage, which was modified by other authors. Most of these techniques avoid skin incision and elevation of the annulus by performing the repair using transcanal approach.

This study describes the methods and results of a new modification of cartilage tympanoplasty. In this new mod-
ification, a new composite cartilage–perichondrium graft or ‘button graft‘ is fashioned to provide an easily harvested and fixed graft for small perforations using a simple method with transcanal approach under local anaesthesia.

Objectives

To evaluate the efficacy of the button graft technique in closing small perforations by assessing mainly the take rate, air–bone gap gain, recording any complications and comparing the success rates with those of the underlay and overlay techniques.

Methods

Ethical considerations

The study was approved by the ethics committee of Benha University. Written fully informed consent was obtained from patients or parents of patients less than 21 years old. They were informed about the details of each technique and the possible drawbacks.

Patients

The following inclusion criteria were used in this prospective study conducted between January 2009 and May 2011. All patients who met the following criteria were included: (i) central perforations present for at least 6 months, (ii) perforation size smaller than 25% of tympanic membrane size, (iii) no evidence of active chronic otitis media, cholesteatoma or retraction pocket formation, (iv) no suspected ossicular abnormalities on microscopic examination or after pure-tone audiometry, (v) anterior rim of the perforation not hidden by the anterior canal wall bulge, and (vi) functional hearing in the contralateral ear.

Patients in whom the anterior rim of the perforation was not clearly identified and was hidden by the anterior wall bulge of the external auditory canal were excluded from the three groups. The size of the perforation was estimated as a percentage of the tympanic membrane size and was graded using Saliba’s tympanic membrane perforations classification reported in 2008: grade I, small (for perforations<25% of the tympanic membrane surface); grade II, medium (for perforations 25–50% of the tympanic membrane surface); grade III, large (for perforations >50–75% of the tympanic membrane surface); and grade IV, total (for perforations >75% of the tympanic membrane surface). Only grade I perforations were included in this study.

The variables examined included patient age, sex, otologic symptoms, previous surgery on the affected side, perforation side, size and location and the duration of perforation. In addition, the collected data included postoperative complications, follow-up period and pre- and postoperative hearing test results, including pure-tone audiometry and speech discrimination scores.

Allocation to surgical technique

Eligible patients were sequentially allocated to: underlay graft (group 1), overlay graft (group 2) and button perichondrium cartilage graft (group 3). The temporalis fascia or the tragal perichondrium was used as the grafts for the underlay and overlay techniques (groups 1 and 2). All the patients were operated on under local anaesthesia with the aid of an operating microscope.

Surgical technique

The button cartilage graft technique (group 3). Under local infiltration anaesthesia (xylocaine 2% with 1 : 100 000 adrenaline), a piece of the tragal cartilage was taken with its covering perichondrium through an incision at the medial tragal surface. The size of the whole graft was approximately 7 × 7 mm.

The graft was prepared by the circumferential separation of one side of the perichondrium from the cartilage, while the central part was left intact (central perichondrium left adherent to the cartilage) (Fig. 1). This adhered area was equal to or less than the size of the perforation after trimming of its edges. This step was performed using a No 15 scalpel while supporting the graft on a metal surface with a dissector.

The perforation’s margins were then trimmed and de-epithelialised. The graft cartilage (with its fully attached perichondrium) was then sized approximately 1 mm larger than the perforation size, while the partially free perichondrium on the other side was sized at least 1.5–2 mm larger in all directions (Fig. 2).

The size of the perforation before and after trimming was assessed by the size of the suction tip. The graft was then inserted through the perforation such that the cartilage was completely under the perforation edge, the partially separated perichondrium over the perforation and the perforation edge lying between the cartilage and perichondrium such as for a grommet tube (Figs 3 and 4a).

When the malleus handle was on the rim of the perforation, the cartilage was split so it encompassed the malleus handle. The graft edges were then covered by gelfoam pieces, the external canal was packed with antibiotic ointment (fusidic acid) gauze, and the tragal incision was closed with two 4–0 sutures (Fig. 4).
Patients were discharged 2 h after the procedure. All patients were instructed not to blow their nose for one month after surgery. Ear packing was removed at the first-week visit, and antibiotic ear drops were applied twice daily for the next week.

The underlay technique (group 1). Using the post-auricular approach, the tympanomeatal flap was elevated until elevation of the fibrous annulus was achieved. The perforation edge was freshened, and the middle ear was packed with gelfoam pledgets. Then, the graft was placed medial to the perforation.
and the flap was returned to its position with gelfoam packing. The incision was closed, and the ear canal was packed with silastic sheets and fusidic acid ointment packs.

The overlay technique (group 2). Through a post-auricular incision, the vascular strip was created and elevated, the perforation edge was freshened and the remainders of the bony canal skin and periosteum were elevated medially towards the annulus. Once the annulus was reached, dissection was continued onto the tympanic membrane between the squamous and fibrous layers. The graft was then placed over the tympanic membrane remnant. The canal skin was then replaced, and the vascular strip was laid back down. The closure was the same as for the medial grafting technique.

Follow-up
Follow-up was conducted weekly for one month after the procedure and then at 2, 4, 6 and 12 months and every 6 months thereafter. The collected data included graft take, postoperative complications, postoperative hearing test results, including pure-tone audiometry and speech discrimination scores and follow-up period. The clinicians (residents) were blinded to the type of operation.

Outcome measures

**Graft take.** Successful closure and graft failure rates were based on the status of the tympanic membrane at 12 months postoperatively.

**Hearing test results.** Hearing improvement was assessed using the audiogram results obtained 6 and 12 months postoperatively. Any bone conduction decrement of 10 dB or greater was considered a significant sensorineural hearing loss and reported in the results. The mean values of the preoperative and postoperative air conduction and bone conduction thresholds at the frequencies of 500, 1000, 2000 and 4000 Hz served to calculate the pure-tone average and the air–bone gap closure. The postoperative speech discrimination scores at 12 months postoperatively were compared to the preoperative scores.

**Statistical analysis**
A variance analysis with repeated measures and chi-squared tests was performed for statistical analysis. A \( P < 0.05 \) was considered statistically significant.

No power calculation was performed to indicate the size of the study required.

**Results**
This prospective study included 205 patients; only 197 patients with 197 perforations completed the follow-up (Fig. 5). Group 1 included 66 tympanic membrane perforations, group 2 included 65, and group 3 included 66. Age (range, 14–41 years, mean 20.56 years), sex and side of tympanic membrane perforations were not significantly different among the three groups (Table 1). Under microscopic vision, the tympanic membrane was virtually divided into four quadrants (posterosuperior, postero-inferior, anterosuperior and antero-inferior) to facilitate the localisation of the tympanic membrane perforation site. The site distribution was not significant among the three groups (Table 1).

One hundred 48 cases had histories of chronic suppurative otitis media with intermittent discharge for years, and others had previous surgical procedures in the affected ear: transtympanic tube, myringoplasty and stapedectomy or previous trauma. (Table 1).

Otolologic symptoms in the preoperative period showed no statistically significant difference among the three groups. Patients reported hearing loss, otorrhoea, otalgia, ear fullness and tinnitus.

The surgeries were performed by senior MD staff surgeons.

Surgical procedures were followed up for more than 12 months in the three groups. The mean postoperative follow-up was 17.7 months.

**Graft take results**
We assessed age as a categorical variable; patients were categorised as younger than 18 years old and 18–41 years old. No significant difference was found between the 2 age categories in each group or among the three groups (Table 2).

The global success rate of tympanic membrane perforation closure was not significantly different comparing the three groups: underlay 98.5% (65 of 66 cases), overlay 96.9% (63 of 65) and button graft 98.5% (65 of 66) techniques. Furthermore, no significant differences in success rates were observed when posterior perforations were compared with anterior perforations in each group and between groups (\( P > 0.05 \)).
Hearing results

Hearing results 12 months postoperatively are given in Table 3. The air–bone gap was significantly improved after surgery in the three groups. No significant difference was found postoperatively among groups 1 (96.6%), 2 (96.0%) and 3 (98.3%) for the speech discrimination scores or for the bone conduction threshold.

Failed cases

Failed cases occurred mainly in the first two postoperative months in the three groups. In total, we observed one failed case in group 1, two cases in group 2 and one case in group 3. The causes of failure were not identified.

Duration of surgery

The mean duration of the operative procedure was 35 ± 8.4 (range 22, 63) min for underlay group 1, 42 ± 6.8 (range 33, 75) min for overlay group 2, and 23 ± 6.3 (range) min for cartilage group 3 (P = .02 between group 1/2 and group 3).

Complications

Few complications were encountered (Table 4). Three cases of tympanic membrane retraction developed after using the underlay technique (group 1).

Tympanic membrane cholesteatoma pearls occurred in two cases after using the overlay technique (group 2). Surgery was performed through a transcanacl approach using local anaesthesia, and the cholesteatoma pearl was peeled from the tympanic membrane. After removal, the medial layer of the tympanic membrane was intact, and no further action was taken. Histopathologic analysis confirmed a cholesteatoma. Follow-up examination showed no signs of recurrence.

Discussion

The first series of cartilage tympanoplasties was published in 1963 by Salen. Since this time, many evolutions and modifications have occurred, including palisade techniques, cartilage mosaics, strips, plates and various cartilage–peri-chondrium composite grafts.9
Comparisons with other studies

The reported success rate for myringoplasty (all sizes of perforations) varies from 60% to 99% in adults and from 35% to 94% in children. This button graft technique showed a success rate of 98.5%, defined as the complete closure of the perforation within 12 months of the procedure. Such a success rate is comparable to the underlay (98.5%) and overlay (96.9%) techniques used in the same study. It is also comparable to the results of some studies that showed 99.35%11 and 92%12 take rates, and it is higher than the results of other studies that showed 88.2%, 13 75%5 and 73.3%14 rates.

Hearing tests at 6 months and 1 year after the operation were similar. The air–bone gap closure significantly improved from 17.6 to 8.5 dB, with a mean gain of 9.1 dB; this result is comparable to the results of group 1 (10.18 dB air–bone gain), group 2 (8.5 dB), endoscopic inlay cartilage myringoplasty (7.09 dB)14 and other studies.12,15

Synopsis of findings

The site of the tympanic membrane perforation did not affect the success rate of the button graft technique. This study excluded cases where the perforation edge is hidden by an anterior canal wall bulge. This can make graft placement difficult and affect success rates. Some authors14,16 cite the advantage of endoscopic ear surgery in this situation.

A tragal cartilage graft is harvested because it is flat, thin (≃1 mm) and abundant (http://www.waent.org/archives/

### Table 1. General criteria of the studied groups

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group 1 (underlay)</th>
<th>Group 2 (overlay)</th>
<th>Group 3 (button graft)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases</td>
<td>66</td>
<td>65</td>
<td>66</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td>21.12 (3.56)</td>
<td>20.60 (3.15)</td>
<td>19.98 (3.72)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Gender (no.,%)</td>
<td>Male 43 (65.2%)</td>
<td>32 (49.2%)</td>
<td>39 (59.0%)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>Female 23 (34.7%)</td>
<td>33 (50.8%)</td>
<td>27 (41.0%)</td>
<td></td>
</tr>
<tr>
<td>Side of perforation (no.,%)</td>
<td>Right 45 (68.2%)</td>
<td>27 (41.5%)</td>
<td>42 (63.6%)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>Left 21 (32.8%)</td>
<td>38 (58.5%)</td>
<td>24 (36.4%)</td>
<td></td>
</tr>
<tr>
<td>Location of perforation in relation to the tympanic membrane</td>
<td>Posterosuperior 10</td>
<td>7</td>
<td>16</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>Posteroinferior 19</td>
<td>23</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anterosuperior 18</td>
<td>15</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anteroinferior 19</td>
<td>20</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Duration of perforation (mean, SD) in years</td>
<td>7.09 (4.3)</td>
<td>6.35 (5.2)</td>
<td>8.1 (3.9)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Duration of dry ear (mean, SD) in months</td>
<td>12.2 (5.9)</td>
<td>13.95 (6.05)</td>
<td>12.85 (6.06)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Aetiology of perforations (no.,%)</td>
<td>Chronic otitis media 49 (74.2%)</td>
<td>51 (78.5%)</td>
<td>48 (72.7%)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>Transtympanic tube 8 (12.1%)</td>
<td>6 (9.2%)</td>
<td>12 (18.18%)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>Myringoplasty 5 (7.5%)</td>
<td>7 (10.6%)</td>
<td>4 (6.06%)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>Stapedectomy 1 (1.5%)</td>
<td>0</td>
<td>2 (3%)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td></td>
<td>Trauma 3 (4.5%)</td>
<td>1 (1.5%)</td>
<td>0</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

### Table 2. Myringoplasty results regarding age as a categorical variable

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Result</th>
<th>Group 1 (n = 66)</th>
<th>Group 2 (n = 65)</th>
<th>Group 3 (button graft) (n = 66)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18</td>
<td>Success 28</td>
<td>38</td>
<td>29</td>
<td>NA</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>Failure 0</td>
<td>0</td>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>&gt;18</td>
<td>Success 37</td>
<td>25</td>
<td>36</td>
<td>0.83</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Failure 1</td>
<td>2</td>
<td>0</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>P value</td>
<td>NA 0.12</td>
<td>0.15</td>
<td>0.83</td>
<td>NA</td>
<td>0.79</td>
</tr>
<tr>
<td>Total success</td>
<td>65</td>
<td>63</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total failure</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As a grafting material, it has been reported that cartilage with perichondrium on one or both sides had better viability than totally naked cartilage. A study in human beings showed that middle ear infection had strong lethal effects on chondrocytes and that cartilage grafts survive better in dry ears. One theoretical ‘disadvantage’ of cartilage is that it creates an opaque tympanic membrane repair site, which could potentially hide disease recidivism. However, fascia grafts are less opaque yet certainly not so translucent that disease can be appreciated otoscopically.

### Table 3. Audit of hearing outcomes

#### Group 1 (underlay graft) \( n = 66 \)

<table>
<thead>
<tr>
<th>Air–bone gap (dB) 0.5, 1, 2 and 4 kHz</th>
<th>No., percentage</th>
<th>( \leq 0 )</th>
<th>1–10</th>
<th>11–20</th>
<th>21–30</th>
<th>31–40</th>
<th>41–50</th>
<th>50+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>21.2</td>
<td>6.43</td>
<td>0</td>
<td>9 (13.6%)</td>
<td>23 (34.8%)</td>
<td>29 (43.9%)</td>
<td>5 (7.6%)</td>
<td>0</td>
</tr>
<tr>
<td>Postoperative</td>
<td>7.9</td>
<td>6.4</td>
<td>8 (12.1%)</td>
<td>32 (48.5%)</td>
<td>17 (25.7%)</td>
<td>9 (13.6%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Change (negative values indicate better hearing)</td>
<td></td>
<td></td>
<td>0</td>
<td>3 (4.5%)</td>
<td>45 (68.2%)</td>
<td>18 (27.8%)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Group 2 (overlay graft) \( n = 65 \)

<table>
<thead>
<tr>
<th>Air–bone gap (dB) 0.5, 1, 2 and 4 kHz</th>
<th>No., percentage</th>
<th>( \leq 0 )</th>
<th>1–10</th>
<th>11–20</th>
<th>21–30</th>
<th>31–40</th>
<th>41–50</th>
<th>50+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>19</td>
<td>9.9</td>
<td>0</td>
<td>5 (7.7%)</td>
<td>24 (36.9%)</td>
<td>32 (49.2%)</td>
<td>4 (6.1%)</td>
<td>0</td>
</tr>
<tr>
<td>Postoperative</td>
<td>10.5</td>
<td>7.44</td>
<td>4 (6.1%)</td>
<td>33 (50.8%)</td>
<td>18 (27.7%)</td>
<td>10 (15.4%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Change (negative values indicate better hearing)</td>
<td></td>
<td></td>
<td>0</td>
<td>2 (3.1%)</td>
<td>41 (63.1%)</td>
<td>22 (33.8%)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Group 3 (button graft) \( n = 66 \)

<table>
<thead>
<tr>
<th>Air–bone gap (dB) 0.5, 1, 2 and 4 kHz</th>
<th>No., percentage</th>
<th>( \leq 0 )</th>
<th>1–10</th>
<th>11–20</th>
<th>21–30</th>
<th>31–40</th>
<th>41–50</th>
<th>50+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>17.6</td>
<td>7.6</td>
<td>0</td>
<td>7 (10.6%)</td>
<td>24 (36.4%)</td>
<td>30 (45.5%)</td>
<td>5 (7.6%)</td>
<td>0</td>
</tr>
<tr>
<td>Postoperative</td>
<td>8.5</td>
<td>5.8</td>
<td>8 (12.1%)</td>
<td>33 (50%)</td>
<td>19 (28.8%)</td>
<td>6 (9.1%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Change (negative values indicate better hearing)</td>
<td></td>
<td></td>
<td>0</td>
<td>3 (4.5%)</td>
<td>38 (57.6%)</td>
<td>25 (37.9%)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

BC, bone conduction.
Strengths of the study

If we look at the shape of a grommet tube, we can imagine how the button graft fits in place. The graft meets the de-epithelialised edges of the perforation with two raw surfaces, cartilage from the inside and perichondrium from the outside, and this coverage most likely hastens the growth of tympanic membrane cells and lessens the repair time.

In conventional myringoplasty, many surgeons consider the placement of pieces of absorbable gelfoam medial to the graft is important for supporting the graft, preventing its medialisation and preventing the development of adhesions between the medial side of the tympanic membrane and the promontory. This support was not performed in group 3 (button graft), as the graft was locked well in place and showed no postoperative medialisation or displacement. The inner perichondrial layer may prevent the formation of adhesions with the promontory.

Our technique can be considered a new modification of cartilage tympanoplasty. It has some similarity with the inlay cartilage myringoplasty technique first described in 1998 by Eavey20 that had become an accepted method for repairing tympanic membrane perforations.6,12,13,21 Inlay cartilage tympanoplasty was originally performed using tragal cartilage grafts to seal only small- to medium-sized perforations.6,12,13,21 The cartilage was scored circumferentially for 1–2 mm by a scalpel for placement through the perforation like a tympanostomy tube. The graft was covered with a split-thickness skin graft, but this skin graft increased the risk of infection.21 The bivalve edge provided an instant ‘locking’ of the graft, which diminished concerns about graft lateralisation and displacement caused by patient activities, especially in children.6,20

The button graft technique shares advantages of this technique, namely graft stability with the lack of a need for gelfoam support and absence of graft lateralisation or displacement. In our view, circumferential partial separation of the perichondrium from the cartilage is easier and faster than scoring the thin cartilage. The created slit between the cartilage and perichondrium is attached better to the perforation edges, and the larger outer perichondrial layer performs the duty of the skin graft (without increasing the risk of infection); saves time harvesting the skin graft; abolishes the donor area problems; and provides a good seal of the perforation.

The mean surgical time for the button graft technique was 23 ± 6.3 min, compared with 35 ± 8.4 min for group 1, 42 ± 6.8 min for group 2 and 33.6 ± 7.8 min for the original inlay cartilage tympanoplasty,13 and it ranged from 29 to 45 min in the cartilage inlay method.14 This observation highlights the speed advantage of the button graft technique, which is mainly due to the non-requirement of a skin incision.

Weakness of the study

Age did not influence the take rates; however, the study did not include patients younger than 14 years old, so we cannot draw conclusions regarding results in children less than 14 years old. Other researchers have achieved excellent success rates with myringoplasty regardless of patient age and advocate surgery as early as possible.22,23 Other points of weakness are non-randomisation of cases and absence of power calculation to indicate the size required for the study.

Clinical applicability of the study

The button graft technique was performed under local anaesthesia with no need for sedation. It also required less operative time, and the patients were discharged within 2 h after the procedure, providing patient comfort and low hospital costs. The button graft technique does not involve significant manipulations involving middle ear structures, and compared with traditional myringoplasty, this technique carries a low risk of iatrogenic middle ear trauma.

Conclusion and recommendations

The button graft technique is an effective, feasible, safe and fast modification of cartilage tympanoplasty in small tympanic membrane perforations if complete visualisation of the margin is possible. It fulfils the basic requirements for tympanic membrane grafting. The technique is performed under local anaesthesia without sedation and yields a high success rate. The results are comparable to those of the underlay and overlay myringoplasty techniques. In addition, favourable characteristics include its being faster with lower rates of complications. The button graft technique can be recommended as a first choice for the reconstruction of small, dry tympanic membrane perforations.

With further experience, this method could be performed as an office-based, locally anaesthetised procedure. It could also be tested for larger perforations and in children.

Table 4. Complications

<table>
<thead>
<tr>
<th>Complications</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tympanic membrane retraction</td>
<td>3 (4.5%)</td>
<td>–</td>
<td>–</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Tympanic membrane cholesteatoma</td>
<td>–</td>
<td>2 (3.01%)</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>
Conflict of interest

None to declare.

References

The button graft technique for perforations affecting less than 25% of the tympanic membrane: a non-randomised comparison of a new modification to cartilage tympanoplasty with underlay and overlay grafts.

Clinical Otolaryngology

تاريخ النشر: يونيو 2013

المؤلف:

الفحص وطريقة البحث - اختيار المرضى، إجراء بعض العمليات الجراحية، الإشراف على متابعة المرضى، كتابة البحث، نشر البحث

د/ أحمد محمد عبد الغني

مدير الأذن والأنف والحنجرة

- حكيلية طب بنها

رئيس قسم الأذن والأنف والحنجرة

أ/ أحمد محسن سلطان

التقديم للترقية

أ/ أحمد محمد عبد الفتاح

عميد مكليه طب بنها

Luqman

Lqman
الملخص العربي:

الأهداف: تقييم رقعة جديدة مكونة من غضروف وغشاء الغضروف لإصلاح ثقب طبقة الأذن الصغيرة ومقارنها بنجاحها بترقيع الطبقة بالطرق التقليدية.

التصميم: دراسة مستقبلية غير عشوائية تمت في مستشفى جامعي.

المريض: ماما وسعة وتسعون مريضا ففي سن من 14 إلى 42 عاما يعانون من ثقب مركزي غير مضاعف بطبقة الأذن بحيث أقل من 25 بالمائة من مساحة الطبقة. تم توزيع الحالات على ثلاثة مجموعات: المجموعة الأولى توضع الرقعة بطنية لطبقة الأذن، المجموعة الثانية توضع الرقعة غطائية لطبقة الأذن، المجموعة الثالثة الرقعة الزراعية.

التدخل الجراحي: بمخبر موضعي تم ترتيب طبقة الأذن المشقوقة بالرقعة من داخل الطبقة بالمجموعة الأولى وفي الرقعة من خارج الطبقة في المجموعة الثانية وبدلاً بالرقعة الزراعية التي تتكون من غضروف مع الغشاء الملتصق به (مجهز بطريقة خاصة) في المجموعة الثالثة.

مقاطع النتائج الرئيسية: حالات الطبقة بعد الجراحة، تحسن السمع، مقدار الوقت المستهلك في العملية ومعدل حدوث المضاعفات عند نهاية الشهر الثاني عشر من المتابعة.

النتائج: تم تحريف النجاح بانغلاق حكامل للثقب عند الشهر الثاني عشر. المجموعة الأولى شملت 66 مريضا بمعدل نجاح 98 ونصف بالمائة، المجموعة الثانية شملت 65 مريضا بمعدل نجاح 97 بالمائة، المجموعة الثالثة شملت 66 مريضا بمعدل نجاح 98 ونصف بالمائة. بلغ متوسط الفجوة الهوائية العظمية 10.1 ديسيلب في المجموعة الأولى و8.5 ديسيلب في المجموعة الثانية و9.1 ديسيلب في الثالثة. لم يحدث تدهور في معدل التمييز العملي ولا في مستوى استقبال الصوت العظمى. متوسط المدة المستحيلة في الجراحة بلغ 35 دقيقة + 8.4 في المجموعة الأولى، 42 دقيقة + 6.8 في المجموعة الثانية، و23 دقيقة + 6.3 في المجموعة الثالثة.

مدير الطب في جامعتنا

أحمد محمد عبد الغني

تدقيق للترقية

أحمد محمد سليمان
حدثت ثلاثة حالات من ارتداع الطلبة للداخل في المجموعة الأولى بينما حدثت حالتين من لألفة كوليستاتوما طبقة الأذن في المجموعة الثانية.

الاستنتاج: طريقة الرقعة الزراعة طريقة فعالة وسريعة لإصلاح ثقوب الطبقة الصغيرة الحجم في حالة رؤية حقل أحرف الثقب. سرعة هذه الطريقة تعود غالبا لعدم الحاجة لشق الجلد. نتائج هذه الطريقة تقارن بنجاح الطرق التقليدية.

<table>
<thead>
<tr>
<th>عميد حكيلية طب بنيها</th>
<th>رئيس قسم الأذن والأنف والحنجرة</th>
</tr>
</thead>
<tbody>
<tr>
<td>أ.د/ توفيق محمد مواصل</td>
<td>أ.د/ أحمد محسن سليمان</td>
</tr>
</tbody>
</table>

التقدم للترقية:
أ.د/ أحمد محمد عبد الغني

رئيس قسم الأذن والأنف والحنجرة:
أ.د/ أحمد محسن سليمان