ORIGINAL ARTICLE

The Versatility of the Temporoparietal Fascial Graft (TPFG) in Orbital Implant Exposure

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ABSTRACT

Background: The use of TPFGs for hydroxyapatite, porous polyethylene and silicone implant exposure has been described previously. To the authors’ knowledge, this is the first description of this technique for acrylic implant exposure and paediatric patients.

Purpose: To demonstrate the versatility of the TPFG in orbital implant exposures of varying duration, implant types and patient age as well as for recurrent exposure.

Methods: Retrospective, interventional, non-comparative case series.

Results: Twelve patients (13 grafts) are presented with a mean follow-up of 9.5 months. The duration of exposure prior to grafting ranged from 1–11 months occurring in bioceramic, hydroxyapatite, porous polyethylene and acrylic implant types. There were 2 graft failures (success rate 84.6%), one of which was treated with a 2nd TPFG. Two of the cases were from the paediatric age group.

Conclusion: This study provides further supporting evidence for the safety and efficacy of the TPFG and demonstrates the use of this graft in a variety of different clinical situations.

Keywords: Orbital implant exposure, temporoparietal grafts, versatility

INTRODUCTION

Orbital implant exposure is the most common complication arising from socket surgery with rates varying based on the type of implant used. Exposure rates range from 3.2% to 34%.¹–⁷ Exposure has been reported to occur earlier in hydroxyapatite implants and later in porous polyethylene implants.⁶

Implant exposure may arise following: infection, inflammation, trauma, poor prosthetic fit, excessive wound tension and failure to close the wound in layers (or forced-ball implantation with consequent tissue restitution and extrusion – “cactus” syndrome)⁸ or placement of an oversized implant.⁹ Wrapping of implants has been associated with lower exposure rates.¹

Management of an exposed implant may be either conservative or surgical. Conservative management consists of antibiotics (topical and/or oral), with or without topical steroids, in addition to vaulting of the prosthesis. Small exposures may spontaneously resolve with such measures. Some authors suggest surgical intervention if not resolved within 8 weeks.¹,¹⁰ Techniques described for closure of the defect, include the use of temporoparietal fascial flaps, fascia lata, dermis fat, sclera, hard palate, buccal mucosa, frontal or parietal periosteum, amniotic membrane, retroauricular myoperiosteal grafts and porcine dermal collagen xenografts.⁹–¹⁵

The use of temporoparietal facial grafts (TPFGs) has also been described for orbital implant exposure.¹⁰,¹⁶,¹⁷ We studied the use and versatility of this
graft in a series of patients with exposure of varying implant types.

**MATERIALS AND METHODS**

A retrospective, non-comparative, interventional case series was undertaken of a single surgeon’s experience (T.J.S) with TPFGs within Brisbane, Australia from 2005–2012. The study was conducted according to the Declarations of Helsinki. Cases were identified from both private and public practice. A chart review was conducted, identifying: age, gender, date and type of original procedure, type of implant, date of initial exposure, size of defect, initial management of exposure, time to TPFG, success/failure of graft and duration of follow-up.

Initial management of orbital implant exposure was conservative and consisted of removal of the prosthesis, and in the majority of cases, topical and/or oral antibiotics. Where conservative management failed to resolve the exposure, a TPFG was performed. Various surgical procedures for harvesting the graft have been described. Various surgical procedures for harvesting the graft have been described.10,16,17 Our surgical technique is described and illustrated in Figure 1.

**RESULTS**

Twelve patients (13 grafts) were identified (Table 1). There were 7 males and 5 females with a mean age of 36 years (SD =14.1, Range =10–52 years). Implant types included 5 hydroxyapatite, 4 porous polyethylene, 2 bioceramic and 1 acrylic implant. Primary implant surgery had been carried out by a number of surgeons at different institutions. Eight patients had undergone enucleation and three eviscerations. One patient originally had an evisceration subsequently complicated by two implant extrusions and in another case the original surgery/implant was unknown.

Exposure occurred on average at 51 months (SD =63.7, Range =2–216 months) following primary socket surgery. All exposures were treated with temporary removal of the artificial eye. In addition, 7 exposures were treated with topical antibiotics, two with topical and oral antibiotics and 3 received no pharmacological intervention. Grafts were performed for the exposure on average at 4 months post-identification (SD =3.31, Range 1–11 months). The mean follow-up for cases within the series was 9.5 months (Median =4.5, SD =11.94). Of the 13 grafts performed, two failed during the follow-up period, equating to a failure rate of 15.4%.

Both graft failures were associated with infection. The first occurred in a patient who had undergone enucleation with bioceramic orbital implant elsewhere, complicated by infection and wound dehiscence at 2 weeks. Although the wound was surgically repaired and antimicrobial treatment was initiated, conjunctival breakdown occurred at 2 months. Following referral to our department, the implant infection was treated empirically with topical chloramphenicol and oral clindamycin prior to a TPFG 3 months later. The graft failed at three weeks due to ongoing implant infection and subsequent cultures grew *S. aureus*, *Streptococcus anginosus* and *Bacteroides fragillis*.

**FIGURE 1.** (A) Exposed porous polyethylene implant. (B) TPFG exposed and harvested via a vertical scalp incision aligned with the anterior aspect of the ear, behind the superficial temporal artery. (C) Intra-operative dissection to expose the full extent of the defect. (D) TPFG placed to overlap viable sclera or tenon’s at posterior limit of exposed area, and sutured in place with 8 × 6-0 vicryl sutures. (E) Tenon’s and conjunctiva are overlapped to cover the TPFG and sutures with interrupted 6-0 vicryl sutures. (F) 3-month post-operative result.
The second failed graft occurred in a patient who had undergone enucleation in 1998. She presented with exposure in 2006 which was treated promptly with a right TPFG. The post-operative course was complicated, over the next 6 years, by recurrent granulomata, conjunctival breakdown, and persistent polymicrobial infection of the implant. She was treated with oral clindamycin and once the socket infection had settled she underwent a second left TPFG. This graft was still viable 7 months and the patient was symptom-free.

**DISCUSSION**

This study demonstrates the versatility of the TPFG for the correction of orbital implant exposure. We have shown the use of the graft to correct defects in four different types of implants, including acrylic and bioceramic, with previous studies demonstrating its use in hydroxyapatite, porous polyethylene and silicone implants. We also demonstrated that the TPFG may be used successively, in a patient who developed recurrent granulomata and conjunctival breakdown overlying a porous polyethylene implant, with a period of greater than 5 years between the two grafts. To our knowledge no reports within the literature exist demonstrating this.

The timing of closure of implant exposures varies amongst surgeons with inadequate published data providing advice on how long an exposure should be observed before committing to surgical intervention. It is generally accepted that the smaller the defect (in the absence of infection) the more likely it will resolve with conservative management. Some advocate early closure, within 2 months, in order to reduce rates of contiguous spread of infection into the implant. More urgent closure is recommended if exposure occurs within the first couple of months of implant insertion due to the absence of fibrovascular ingrowth into the implant. It was therefore surprising to note that in our series, the patients with longer duration exposures before grafting did not show a trend towards graft failure or need for implant removal.

<table>
<thead>
<tr>
<th>Case (Age; Gender)</th>
<th>Indication &amp; Type of Primary Socket Surgery</th>
<th>Implant Type</th>
<th>Time from Primary Surgery to Implant Exposure (months)</th>
<th>Size of Epithelial Defect (mm)</th>
<th>Duration of exposure prior to Temporoparietal Fascial Graft (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (22 years; F)</td>
<td>Microphthalmos; Enucleation</td>
<td>Acrylic scleral wrapped</td>
<td>4</td>
<td>4 × 7</td>
<td>1</td>
</tr>
<tr>
<td>2 (47 years; M)</td>
<td>Uveitic Glaucoma; Evisceration originally, followed by 2 implant extrusions</td>
<td>Bioceramic mesh wrapped</td>
<td>2</td>
<td>3 × 4</td>
<td>1.5</td>
</tr>
<tr>
<td>3 (49 years; F)</td>
<td>Traumatic Globe Rupture; Evisceration</td>
<td>Porous Polyethylene</td>
<td>44</td>
<td>No size recorded</td>
<td>1</td>
</tr>
<tr>
<td>4 (40 years; M)</td>
<td>Penetrating Eye Injury; Enucleation</td>
<td>Hydroxyapatite</td>
<td>7</td>
<td>10 × 8</td>
<td>7</td>
</tr>
<tr>
<td>5 (35 years; F)</td>
<td>Orbital Hemangioma; Enucleation</td>
<td>Porous Polyethylene scleral wrapped</td>
<td>95</td>
<td>Multiple small</td>
<td>Duration not noted</td>
</tr>
<tr>
<td>6 (44 years; M)</td>
<td>Microophthalmus; Evisceration</td>
<td>Hydroxyapatite</td>
<td>161</td>
<td>5 × 5</td>
<td>11</td>
</tr>
<tr>
<td>7 (39 years; F)</td>
<td>Retinopathy of Prematurity; Enucleation</td>
<td>Hydroxyapatite</td>
<td>216</td>
<td>5 × 2</td>
<td>5</td>
</tr>
<tr>
<td>8 (48 years; M)</td>
<td>Traumatic Globe Rupture; Unknown</td>
<td>Hydroxyapatite</td>
<td>36</td>
<td>Removal of conjunctival cyst left defect of 7</td>
<td>Duration not noted</td>
</tr>
<tr>
<td>9 (13 years; M)</td>
<td>Traumatic Globe Rupture; Enucleation</td>
<td>Porous Polyethylene</td>
<td>26</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>10 (10 years; M)</td>
<td>Retinoblastoma; Enucleation</td>
<td>Porous Polyethylene</td>
<td>65</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>11 (52 years; M)</td>
<td>Retinopathy of Prematurity; Enucleation</td>
<td>Bioceramic mesh wrapped</td>
<td>5</td>
<td>Multiple small</td>
<td>3</td>
</tr>
<tr>
<td>12 (34 years; F)</td>
<td>Penetrating Eye Injury; Enucleation</td>
<td>Hydroxyapatite</td>
<td>126</td>
<td>2 × 2</td>
<td>7</td>
</tr>
</tbody>
</table>

The second failed graft occurred in a patient who had undergone enucleation in 1998. She presented with exposure in 2006 which was treated promptly with a right TPFG. The post-operative course was complicated, over the next 6 years, by recurrent granulomata, conjunctival breakdownt, and persistent polymicrobial infection of the implant. She was treated with oral clindamycin and once the socket infection had settled she underwent a second left TPFG. This graft was still viable 7 months and the patient was symptom-free.

TABLE 1. Orbital implant exposure table.
Finally, we report the use of this graft successfully in two paediatric patients aged 10 and 13 years. Exposure rates amongst paediatric implants is reported to be greater than that of adults; this has been attributed to the fact that the main indication for socket surgery in the paediatric population is retinoblastoma.\textsuperscript{18,19} Previous studies of paediatric implant exposure have demonstrated the use of dermis fat grafts, re-suturing and donor sclera.\textsuperscript{20,21} In our experience the TPFG is also a suitable option for the paediatric population.

In summary, the temporoparietal fascial graft is a versatile graft with respect to: (1) the effectiveness for both short- and long-duration orbital implant exposures; (2) the use with different implant types; (3) its use within paediatric cases; and, (4) the ability to use it successively in the same patient. The graft also has other advantages as highlighted from previous reports: (1) it is within the same surgical field as the orbit and most orbital and ophthalmic surgeons will have an understanding of the anatomy in this region; (2) the tissue is autogenous, minimizing chances of immune rejection or infection; and, (3) the graft is thin and pliable.\textsuperscript{10,16,17} We would recommend meticulous socket follow-up after orbital implant surgery to look for signs of early infection and a low threshold for antibiotic treatment. Should exposure develop despite these measures, a TPFG should be considered and may avoid the need for orbital implant removal.

acknowledgments

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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