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Case Report

Otologic Considerations in a Full Face Transplant Recipient

Michael J. Cammarata BS; Daniel Jethanamest MD; Eduardo D. Rodriguez, MD, DDS

Facial transplantation provides a functional and aesthetic solution to severe facial disfigurement previously unresolved by conventional reconstruction. Few facial allografts have been ear containing; hence, there is limited knowledge of the postoperative otologic considerations. We describe the case of a 44-year-old man who underwent transplantation of the total face, eyelids, ears, scalp, and skeletal subunits in 2015 after an extensive thermal injury. We detail the patient’s transition from osseointegrated prosthetic ears to an ear-containing facial allograft, and describe the unique surgical approach and challenges encountered. Subsequent bilateral revision meatoplasties were performed, which provided relief from stenosis of the external auditory meatus.

Key Words: Facial plastics/reconstructive surgery, microvascular reconstruction and transplant surgery, external ear, otology.


INTRODUCTION

Loss of the external ears may occur secondary to burn or traumatic amputation and results in a profound psychosocial burden. The ears are particularly vulnerable to thermal injury, and auricular reconstruction remains a significant challenge in burn-related care. Tissue engineering alternatives, although promising, remain elusive at this time. Although osseointegrated implants provide a viable alternative to the use of autologous tissues, they are an imperfect solution due to discrepancies in likeness to donor skin and require replacement with time. Therefore, surgeons have begun to explore alternative avenues in select patients with extensive composite tissue defects.

Facial transplantation is a form of vascularized composite allotransplantation (VCA) that offers a functional and aesthetic solution to individuals with severe disfigurement previously unresolved by conventional reconstruction. With over 40 procedures performed to date, facial transplantation continues to challenge surgical norms and has led to the inclusion of larger amounts of soft tissue and skeletal elements than previously thought possible. Given this complexity, a multidisciplinary approach to every facet of patient care is paramount.

Previous reports have addressed prosthodontic and ocuroplastic considerations in facial transplantation, and although several ear-containing face transplants have been performed, few reports detail the postoperative considerations in otologic care. In this case report, we describe a patient with a history of severe facial burn who received a full face transplant including the bilateral ears. We describe the postoperative course and emphasize the surgical challenges associated with ear-containing allografts, highlighting the role of the otolaryngologist.

CASE REPORT

The patient is a 44-year-old man who sustained third-degree burns to the entire face and scalp while in the line of duty as a firefighter in 2001. The injury resulted in neck, perioral, and periorbital contractures and loss of the bilateral external ears (Fig. 1A,B). The patient underwent over 70 reconstructive procedures, largely skin grafting to the face, and wore bilateral ear prostheses secured with osseointegrated implants, which were placed in 2002 (Fig. 1C,D). He was dissatisfied with the color-match of the prostheses and described incidents of their falling off in public. The patient did not report a history of ear infection, vertigo, or tinnitus.

Preoperative physical examination revealed residual meatus and pinna cartilage on the right. A remnant of the concha and portions of the root of the helix were also visible, and the external auditory canal was patent with normal skin (Fig. 1E). Otomicroscopy revealed an intact tympanic membrane (TM) without lesions or inflammation bilaterally. The auricular defect was nearly identical on the left, and the external auditory canal (EAC) was patent with normal skin (Fig. 1F).

After extensive cadaveric rehearsals, the patient underwent full face transplant including the eyelids, ears,
scalp, and skeletal subunits on August 13 to 14, 2015. This was the first face transplant to include the complete scalp and ears, and thus, it was assessed with indocyanine green during research procurement prior to transplantation. The occipital arteries perfused the posterior scalp and ears via anastomotic networks with the posterior auricular arteries, although the posterior auricular arteries were ligated at their origin.¹²

Postoperatively, the patient was given ofloxacin ear drops twice daily for Pseudomonas prophylaxis. On postoperative day 10, bloody drainage was observed from the ear canals and the patient was returned to the operating room for exploration of the ear and the left posterior scalp, where a significant hematoma was visualized in proximity to the ear canal. The left auditory meatus was compromised, requiring reapproximation, and bleeding was noted from the left posterior occipital artery. The artery was repaired via microvascular anastomosis using 9-0 nylon. The scalp was advanced and reapproximated. The ear canals were reexamined at this time, and confirmed to be patent with visible TMs bilaterally.

After surgery, there was mild serosanguinous drainage from the ears, but the incisions otherwise healed uneventfully. Five months postoperatively, however, the patient endorsed a sensation of misalignment and stenosis of the left ear canal, but denied drainage or pain. Upon examination, both EACs were narrow with cartilage alignment causing curvature of the canals. The inferior and posterior portions of the canal appeared most obstructive. TMs were visible and intact. Two weeks later, the patient underwent bilateral meatoplasty (Fig. 2A,B) prior to lip and eyelid revision surgery. The left ear was examined, cleaned, and infiltrated with lidocaine with epinephrine. Two longitudinal incisions were created superiorly toward the incisura and inferiorly. These were connected with a round 7200 blade to create a laterally and externally based skin flap, which was dissected from the underlying soft tissue and cartilage. A wedge of cartilage was removed along with subcutaneous soft tissue. This was further trimmed until a patent opening was seen, and the laterally based skin flap could be laid down to meet the skin edges without curling. The remainder of the bony canal was patent. This procedure was then repeated on the right. A nonabsorbable sponge packing was fashioned and used to pack and stent both sides and removed at the first postoperative visit. The patient experienced relief from stenosis over the next several months. However, he presented 7 months later with intermittent edema of the EAC, and a sensation of clogged canals, but denied otorrhea or pain. A left meatus revision was performed in the office setting, during which 1 mm of cartilage was excised at the rim. Sponge wicks were placed with ciprofloxacin–dexamethasone topical drops therapy. The incision eventually healed without complications and all packing and stenting materials were removed. The patient decided to proceed with a similar revision to the right EAC.

Nearly 3 years posttransplant (Fig. 3), the patient remains free of significant otologic complications. Although the EACs remain narrowed bilaterally with a tortuous anterior curve toward the TM, the patient denies the need for additional surgery at this time.

source of perfusion of the scalp and ears had previously been unclear; thus, it was assessed with indocyanine green during research procurement prior to transplantation. The occipital arteries perfused the posterior scalp and ears via anastomotic networks with the posterior auricular arteries, although the posterior auricular arteries were ligated at their origin.¹²

Fig. 1. Initial thermal injury. Right (A) and left (B) lateral views with ear prostheses (C) removed. Prostheses in place, with poor color match and lack of continuity at the inferior border (D). Right (E) and left (F) external ears, demonstrating the extent of the thermal injury prior to facial transplantation, with only residual cartilage, but a patent meatus bilaterally. (Printed with permission and copyrights retained by Eduardo D. Rodriguez, MD, DDS).
DISCUSSION

Of the at least 40 face transplants performed to date, four have included the ears; however, only the senior author’s (E.D.R.) 2015 report detailed the surgical approach (Table I).6,11 An additional ear-containing allograft was reported in 2003, when a team from China transplanted a scalp and bilateral ears to a 72-year-old woman following melanoma resection.13 However, the case was met with significant criticism due to numerous unanswered questions about its potential contraindications.14 Given the risk of severe adverse effects related to mandatory lifelong immunosuppression, VCA remains a therapeutic option for select patients with severe facial disfigurement meeting specific inclusion criteria. In our case, the patient presented with a full facial burn that warranted the inclusion of extensive soft tissue and skeletal components. Thus, the sole allotransplantation of the ears and/or scalp, or similarly small allografts, is not presently a viable alternative to prosthetics or reconstruction, unless in the context of more extensive facial disfigurement.

This case demonstrates the viability of an ear-containing allograft, but underscores the potential of an acquired postoperative stenosis of the EACs. Despite the risk of pretransplant stenosis due to the initial thermal injury, this patient’s canals were patent with clear visualization of the tympanic membranes during the first head and neck examination. Posttransplant, stenosis and curvature of the canal led to sensations of fullness and obstruction. Advanced stenosis can lead to chronic otitis externa, accumulation of cerumen, or hearing impairment.15 Relief

<table>
<thead>
<tr>
<th>Team Leader</th>
<th>Date</th>
<th>Extent of Defect</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lantieri</td>
<td>April 2009</td>
<td>Forehead, nose, eyelids, ears, cheek</td>
<td>Death (sepsis, 2 months)</td>
</tr>
<tr>
<td>Lantieri</td>
<td>June 2010</td>
<td>Eyelids, ears, nose, lips, oral mucosa</td>
<td>Alive</td>
</tr>
<tr>
<td>Pomahac</td>
<td>February 2013</td>
<td>Nose, lips, eyelids, forehead, cheek, ears, eyes, neck</td>
<td>Alive</td>
</tr>
<tr>
<td>Rodriguez</td>
<td>August 2015</td>
<td>Scalp, forehead, eyelids, nose, cheeks, lower face, ears, lips, neck</td>
<td>Alive</td>
</tr>
</tbody>
</table>
from these symptoms may be managed with meatoplasties, with the goal of restoring a wide meatus and preserving native canal skin to ensure cerumen migration.16 Restenosis is possible, although rates are typically low.15,17 More aggressive cartilaginous resection was considered during the initial meatoplasties; however, these may have compromised maintenance of the aesthetic appearance of the graft, which was a priority of the patient and transplant team. Hence, the initial meatoplasties were performed conservatively. Furthermore, the donor–recipient interface creates a site of potential misalignment, leading to the sensation of obstruction, and thus additional widening the EAM may not have led to more significant relief from symptoms. This allograft design allows for repositioning of the entire auricle, which may be warranted as a future revision.

Given the paucity of reports documenting the implications of an ear-containing allograft, it is unknown whether other teams have witnessed comparable otologic complications. Although prior reports have understandably focused on severe immune-related complications, we encourage teams to report on all components of the allograft, when feasible, which will improve surgical techniques and patient outcomes.

CONCLUSION

Ear-containing facial allografts provide an effective means of ear replacement for select patients in the context of additional facial disfigurement. We describe our unique approach to inclusion of the ears and the first documented case of acquired external auditory canal stenosis after full face transplant. Meatoplasty to remove excess cartilage can provide relief from stenosis.

BIBLIOGRAPHY