

Case study: facial and ear reconstruction



The case report involved a 36-year-old man. He was injured in a road traffic accident and had extensive 3rd degree and 4th degree facial burns over the right side of his face, with complete loss of his right auricle. We performed a free flap coverage of the right face with the anterolateral thigh (ALT) flap. The reconstruction of his auricle was performed by culturing a cartilage framework on the forearm and transferring it straight to the original location to rebuild the new ear as free flap. Results were assessed 12 months after surgery. The follow-up is still short but the patient is satisfied with the results achieved.

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Simultaneous reconstruction of the face and the auricle is a difficult challenge, especially with the type of extensive injuries that devastates total auricular and soft tissue over one side of the face. The facial reconstruction requires a skin flap of sufficient size and features that are suitable for the face. After coverage of the facial damage with a skin flap, the restoration of a fully satisfactory, complete auricle depends on local tissue and skin conditions (Park and Mun; 2006; Cordova et al, 2008; Cabral et al, 2013; Hwang et al, 2014). In cases of severe damage of the skin and soft tissue and of severe burn damage with destruction of the arteria temporalis superficialis, a prosthetic reconstruction might be the only reasonable solution (Sharma et al, 2006; Giot et al 2011; Sharma et al, 2012). The reconstruction of the auricle by culturing a cartilage framework on the forearm and going straight to the original location to rebuild the new ear is an especially difficult technique and, therefore, extremely rare. However, for patients who do not accept a prosthetic reconstruction, this technique could be a great solution.

We obtained the patient's written informed consent for the reconstruction of his auricle by culturing a cartilage framework on the forearm. We had performed and obtained good results. He expressed complete satisfaction with the outcome of treatment given the severity of his initial injury.

Case report

The 36-year-old male presented with no

prior medical history. He was injured in a road traffic accident. As a result, he had extensive 3rd degree and 4th degree facial burns over the right side of his face. He also had a L1 burst fracture.

On 25.7.2018, we took him to the operating room for required debridement to remove the extensive necrotic tissue from the burn and performed free flap coverage of the right face with an ALT flap. He had lost his complete right auricle, so required two subsequent surgeries (on 9.8.2018 and 15.11.2018) to reconstruct his auricle and optimize the contour of his right facial flap.

Technique for reconstruction

We performed free flap coverage of the right face. An ALT flap (25 cm x 20 cm) was harvested from the right thigh. The facial artery and facial vein were used as recipient vessels with end to end microsurgical anastomosis using 8.0 nylon. 7 cm x 15 cm and a split-thickness skin graft was used for donor site coverage [Figure 1].

After 2 weeks of coverage of the right face, the total complete reconstruction of the auricle required an operation in two stages. The first stage involved creating a skin pocket at the site of the forearm by reshaping the available tissue and thinning the skin to mimic the ear skin. Rib cartilage was then harvested in three pieces, which was carved and wired together with fine, stainless steel wire to produce a very detailed auricular structure. The structure was then inserted in the pocket, and gentle suction was applied to enable

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Figure 1. Extensive necrotic tissue from the burn was removed and a free flap coverage of the right face was performed



Figure 2. A cartilage framework on the forearm was cultured and harvested together with the right forearm flap



Figure 3. Postoperative images from about 4 weeks (A) and 7 months (B, C) after surgery

the skin and the auricle structure to come together [Figure 2].

After 12 weeks, the second stage was performed. The new auricle and the right forearm flap were then harvested together and placed into position at the head as a free flap. The facial artery and facial vein were used as recipient vessels with end-to-side microsurgical anastomosis using 8.0 nylon. The new ear was lifted into place with a piece of cartilage behind it to support its position [Figure 3].

Discussion

The reconstruction of the auricle using rib cartilage was described as early as 1968 by Converse and Nagata (1993) using a two-stage technique. These procedures were optimized, among others, by Firmin (1998), Weerda and Siegert (2012). The basic principle of current techniques is the harvesting of the costal cartilage as the first step. After the creation of the framework of the auricle during the same procedure, it is positioned underneath the skin on the planum mastoideum. At

an interval of 3 to 6 months, the three-dimensional (3D) projection from the mastoid is accomplished by elevating the neoauricle from the mastoid and creating a posterior auricular sulcus. Often, a third stage is necessary for the fine tailoring of the contours of the auricle, which is the basis of most current techniques (Nahi et al, 1978; Park and Mun, 2006; Cardova et al, 2008; Cabral et al, 2013; Selcuk et al, 2014).

In cases where the patient is unable to have a reconstructed auricle due to a severe damage of the skin and soft tissue in the face of the neck, tumour resection and especially severe burn damage with destruction of the arteria temporalis superficialis, a prosthetic reconstruction might be the only reasonable solution (Sharma et al, 2006; Giot et al, 2011; Sharma and Rahul, 2012). However, infections and fungal infections when exposed to implants (Miles et al, 2006; Mirchandani et al, 2016), inflamed and loose screw pins, color change of materials, drop of fake ears when colliding or participation in sports activities are common and complex problems arising from the prosthetic restoration (Hwang et al, 2014; Miles et al, 2006; Sharma and Rahul, 2012). The alloplastic ear will not be worn until complete skin infection is resolved and skin care where contact with a lifelong implant is forced (Giot et al, 2011; Mirchandani et al, 2016; Sharma et al, 2006). This makes it difficult for many patients to accept prosthetic restoration, especially in young people (Tam et al, 2014).

Conclusion

We think that this complex technique offers an excellent solution in cases where the sustained injuries have been extensive and devastated the total auricular and soft tissue over one side of the face. It is especially suited for patients who do not accept or are not suited for a prosthetic reconstruction.

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References

- Cabral AR, Alonso N, Brinca A et al (2013) Earlobe reconstruction by the Gavello technique and bilobed flap. *An Bras Dermatol* 88(2):272–5
- Cordova A, D'Arpa S, Pirrello R et al (2008) Retroauricular skin: a flaps bank for ear reconstruction. *J Plast Reconstr Aesthet Surg* 61 Suppl 1: S44–51
- Firmin F (1998) Ear reconstruction in cases of typical microtia. Personal experience based on 352 microtic ear corrections. *Scand J Plast Reconstr Surg Hand Surg* 32(1): 35–47
- Giot JP, Labbe D, Soubeyrand E et al (2011) Prosthetic reconstruction of the auricle: indications, techniques, and results. *Semin Plast Surg* 25(4): 265–72
- Hwang CM, Lee BK, Green D et al (2014) Auricular reconstruction using tissue-engineered alloplastic implants for improved clinical outcomes. *Plast Reconstr Surg* 133(3): 360e–9e
- Miles BA, Sinn DP, Gion GG (2006) Experience with cranial implant-based prosthetic reconstruction. *J Craniofac Surg* 17(5): 889–97
- Mirchandani B, Shrestha B, Theerathavaj M L, Srithavaj, Thaworanunta S (2016) Prosthetic rehabilitation of trauma induced partial auricular defect with magnet-retained prosthesis. *M Dent J* 36: 329–35
- Nahai F, Hayhurst JW, Salibian AH (1978) Microvascular surgery in avulsive trauma to the external ear. *Clin Plast Surg* 5(3): 423–6
- Park C, Mun HY (2006) Use of an expanded temporoparietal fascial flap technique for total auricular reconstruction. *Plast Reconstr Surg* 118(2): 374–82
- Nagata S (1993) A new method of total reconstruction of the auricle for microtia. *Plastic and Reconstructive Surgery* 92(2): 187–201
- Selcuk CT, Durgun M, Bozkurt M (2014) The reconstruction of full-thickness ear defects including the helix using the superior pedicle postauricular chondrocutaneous flap. *Ann Plast Surg* 72(2): 159–63
- Sharma A, Rahul GR, T Poduval S, Shetty K (2006) Implant-supported auricular prosthesis - an overview. *J Oral Implantol* doi: 10.1563/AAID-JOI-D-12-00058.1
- Sharma K, Goswami SC, Baruah DK (2006) Auricular trauma and its management. *Indian J Otolaryngol Head Neck Surg* 58(3): 232–4
- Tam CK, McGrath CP, Ho SM et al (2014) Psychosocial and quality of life outcomes of prosthetic auricular rehabilitation with CAD/CAM technology. *Int J Dent* doi: 10.1155/2014/393571
- Weerda H, Siegert R (2012) *Surgery of the Auricle Part I: Surgery of Auricular Malformations. An Introduction with Clinical Examples*. Endo Press, Tuttlingen, Germany