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Elevation of a constructed auricle using the anteriorly based mastoid fascial flap

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SUMMARY. Two-stage methods for reconstruction of congenital microtia have been widely utilised. To obtain a desirable auriculocephalic angle and provide a nutrient support to the constructed auricle, elevation of reconstructed ears using a costal cartilage graft, the anteriorly based mastoid fascial flap transfer and a skin graft was performed as the second operation for nine microtia patients. In this procedure, the mastoid fascial flap was used instead of the temporoparietal fascial flap. Following the elevation of the reconstructed ear the anteriorly based mastoid fascial flap was harvested. A carved costal cartilage was grafted at the posterior wall of the concha and covered with the mastoid fascial flap, followed by a full-thickness skin graft from the inguinal region. The skin grafts took well and the appropriate auriculocephalic angle was preserved in all cases. This method was easy to perform and did not leave any scar in the temporal hair-bearing area. © 1999 The British Association of Plastic Surgeons

Keywords: anteriorly based mastoid fascial flap, congenital microtia.

Standard two-stage methods for reconstruction of microtia and modifications with acceptable results have been described[1–7] and widely utilised except in Korea where a one-stage method[8–10] is more popular. Nagata[7] emphasised the importance of constructing the appropriate auriculocephalic angle, and used a costal cartilage graft combined with a temporoparietal fascial flap transfer and full-thickness skin graft. The graft of the costal cartilage to the posterior wall of the concha is also beneficial in deepening the constructed concha, and the fascial flap transfer provides good vascularity to the transplanted framework. The authors have developed a new alternative using the anteriorly based mastoid fascial flap to avoid a scar on the temporal hair-bearing area.

Patients and operative techniques

Patients

This technique has been performed on nine cases as the second operation several months after the first operation of cartilage framework transplantation (Table 1). Seven cases were classic lobule-type microtia and the other two cases were concha-type microtia. An accessory ear was observed in one lobule-type case (patient 9), and a skeletal deformity was combined in one case (patient 7) with the first and second branchial arch syndrome.

Table 1 Case summary

Patient	*Sex*	*Age*	*Side*	*Type of microtia*	*Complications*
1	Male	21	Right	Concha-type	None
2	Male	24	Bilateral	Lobule-type	None
3	Male	11	Left	Lobule-type	None
4	Male	12	Right	Lobule-type	None
5	Male	11	Right	Lobule-type	Small necrosis of grafted skin
6	Male	10	Left	Lobule-type	None
7	Male	12	Right	Concha-type	None
8	Female	11	Left	Lobule-type	Dislocation of grafted cartilage
9	Female	11	Left	Lobule-type	None

Operative technique

The skin is incised along the rim of the transplanted framework as in the standard methods (Fig. 1A). The framework is then elevated; dissection is performed just beneath the framework. Thereafter, the mastoid fascial flap is elevated anteriorly, at 2–3 cm lateral to the skin incision (Fig. 1B). The descending feeding branch from the superficial temporal artery and the ascending feeding branch from the occipital artery should be transected. Care must be taken in dissecting the caudal edge of the pedicle so as not to damage the posterior auricular artery. The costal cartilage banked under the chest skin at the first operation is harvested, shaved and transplanted at the posterior wall of the concha with a few 4–0 absorbable sutures (Fig. 1C). The mastoid fascial flap is sutured to the rim of the auricle to cover the entire posterior surface of the auricle (Fig. 1D). The mastoid skin can be anteriorly advanced to the auricular sulcus. Finally, a full-thickness skin graft harvested from the inguinal region is grafted on to the transposed mastoid fascia with a tie-over compression dressing.

Results

The grafted skin took well in all nine cases. In patient 5, a small area of necrosis of the grafted skin was seen. In patient 8, dislocation of the transplanted cartilage was observed, but an appropriate auriculocephalic angle was preserved in the other eight cases.

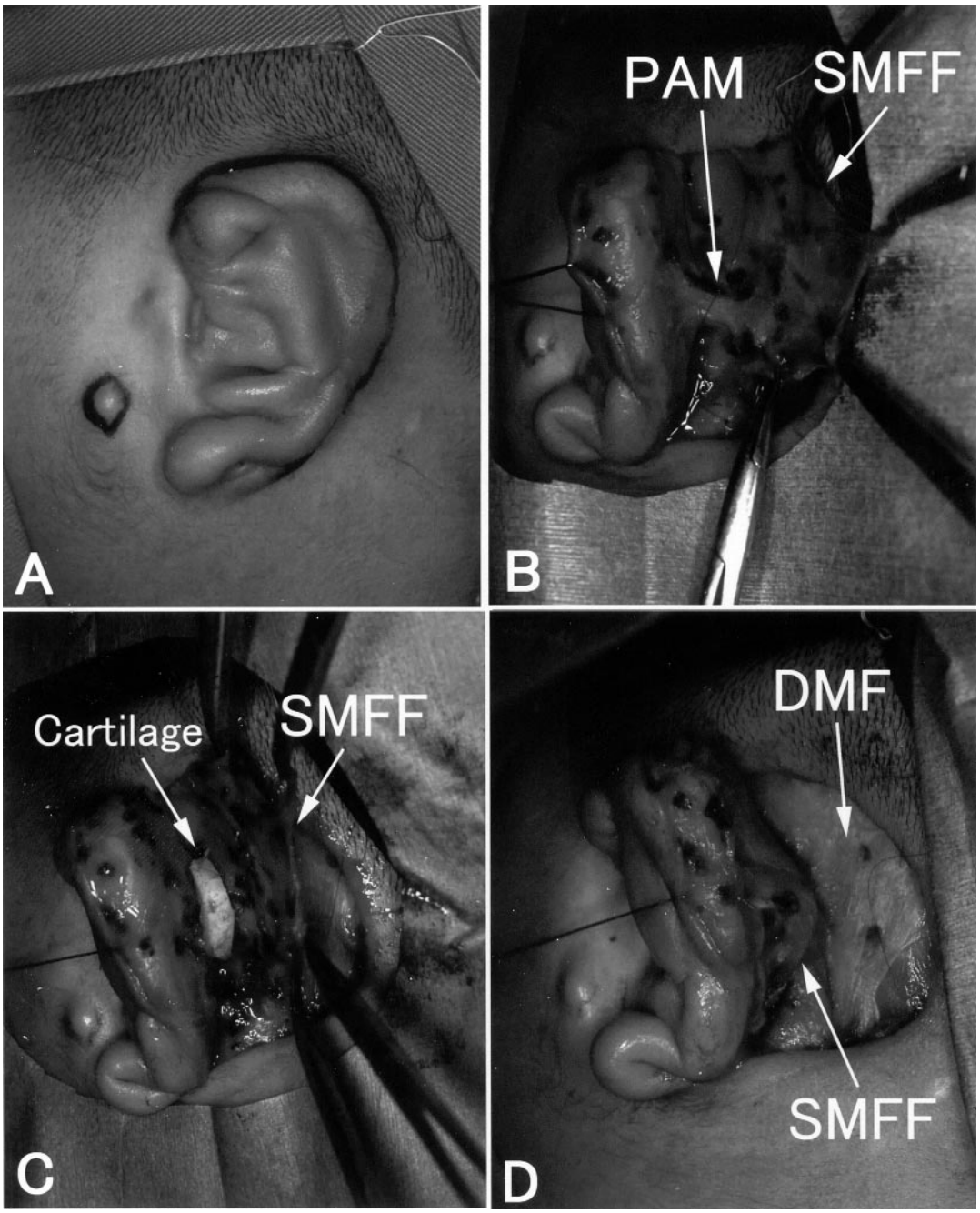

Figure 1—(A) Preoperative design (patient 9). An incision was made along the rim of the reconstructed auricle. An accessory ear was also corrected in this case. (B) The anteriorly based superficial mastoid fascial flap (SMFF) was elevated. The superficial mastoid fascia was used in this case. In some of the other cases, both the superficial and deep mastoid fasciae were harvested. The posterior auricular muscle (PAM) was left unsevered. (C) The carved costal cartilage, which was banked under the chest skin in the first operation, was grafted to the posterior wall of the concha. (D) The grafted cartilage and the entire posterior surface of the reconstructed auricle were covered with the fascial flap. DMF: the deep mastoid fascia.

Case report

Case 1 (Lobule-type microtia; Patient 3)

An 11-year-old male with lobule-type microtia underwent the costal cartilage graft in the first operation. Four months later, the reconstructed auricle was elevated (Fig. 2A). The banked costal cartilage was grafted at the posterior wall of the concha (Fig. 2B) and covered with the anteriorly based mastoid fascial flap followed by a skin graft (Fig. 2C). The grafted skin took very well, and the appropriate auriculo-cephalic angle was preserved at 12 postoperative months (Fig. 2D).

Discussion

The mastoid fascia is composed of two layers: the superficial mastoid fascia and the deep mastoid fascia. An anatomical cadaver study in the mastoid region was performed by Park et al.[9] They have used both of the fascial layers in a single-stage two-flap method of total ear reconstruction. The superficial mastoid fascia corresponds to the superficial temporal fascia cephalically.[9] The superficial mastoid fascia is primarily supplied by the posterior auricular artery and can be elevated as the antero-inferiorly based flap.[9] This

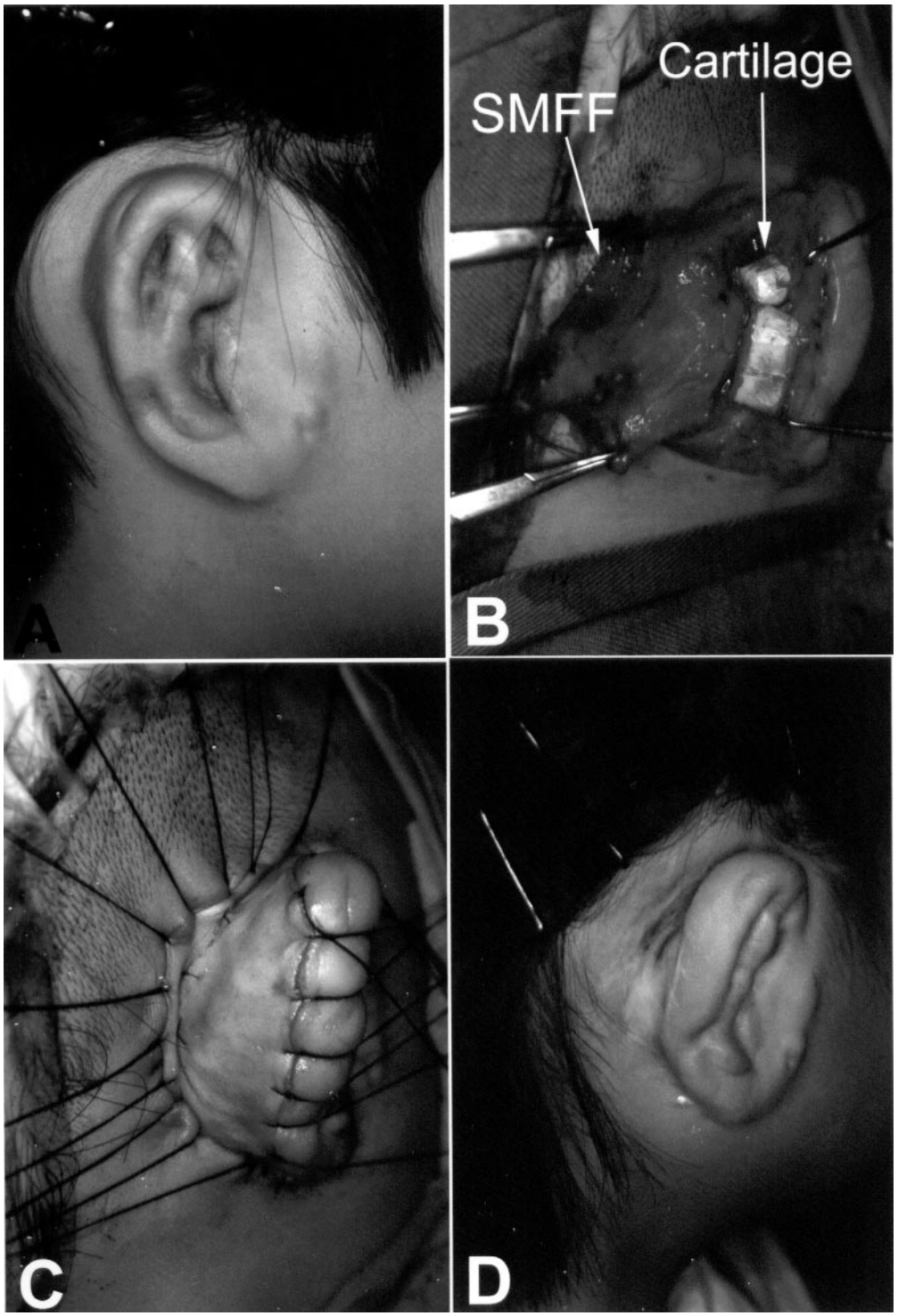

Figure 2—*Case 1*. (Lobule-type microtia: patient 3.) (A) Preoperative view. (B) The anteriorly based superficial mastoid fascial flap (SMFF) was harvested. The carved costal cartilage was grafted at the posterior wall of the concha. (C) After covering the grafted cartilage with the SMFF, a full-thickness graft from the inguinal region was applied. Note the multiple tie-over sutures. (D) Posterior view at 12 months postoperatively.

fascia is additionally supplied by: (i) the posterior branch of the superficial temporal artery or the superficial auricular artery;[11,12] and (ii) the occipital artery,[13] and can also be elevated as the superiorly based flap or postero-inferiorly based flap. The superficial mastoid fascia or both the superficial and deep mastoid fascia were used in our method for elevation of constructed auricles.

Nagata[7] introduced a method for elevation of constructed auricles. In his method, the carved costal cartilage was grafted to the auricular sulcus in order to obtain a desirable outward projection of reconstructed ears. To cover the grafted costal cartilage with viable tissue, the temporoparietal fascial flap was transferred to the posterior surface of the auricle, and thereafter a full-thickness skin graft was performed.

Although an appropriate auriculocephalic angle was attained by his method, the visible scar on the temporal hair-bearing region remained as a drawback. We have used the mastoid fascia, which can be harvested without making any additional incision.

The mastoid fascia can be safely elevated and its reliable vascularity through the posterior auricular artery may be expected to provide a nutrient support to both the elevated framework and the grafted skin. The superficial mastoid fascia can be applied to various kinds of ear reconstruction such as one-stage reconstruction of the partial auricular defect.[14] In cases in which both the superficial and deep mastoid fascia were harvested, the periosteum of the mastoid bone was exposed and a relatively deep pocket was left. It was, however, readily repaired by advancing the mastoid skin anteriorly to the new auricular sulcus. Although the fascial layers we used were thicker than the temporoparietal fascia and the constructed sulcus has a tendency to be less deep, it should be emphasised that this scarless procedure has a large advantage from a cosmetic point of view.

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