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Prefabricated flaps for the head and neck: a preliminary report

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SUMMARY. **The authors present some clinical applications of the concept of flap prefabrication. Three cases are described where reconstructions around the head and neck were accomplished. The radial vascular territory of the forearm was selected for prefabrication of structures which were then transferred by microsurgical techniques. In two cases, a sensate flap was used, with nerve repair in the neck.**

In 1981, Guofan *et al.* developed the free radial forearm flap which has become a popular flap for head and neck reconstruction, burn contractures (Song *et al.*, 1982) intraoral reconstruction (Soutar *et al.*, 1983), hand surgery (Biemer and Stock, 1983; Reid and Moss, 1983; Foucher *et al.*, 1984) and as a flow-through flap for one-stage coverage and revascularisation of traumatised ischaemic extremities (Costa *et al.*, 1991).

Several experimental reports have appeared concerning the prefabrication and neovascularisation of pedicle and free flaps (Erol, 1976; Martinot-Duquennoy *et al.*, 1986; Hirasé *et al.*, 1987, 1988a, b, c, 1989a, b; Valauri *et al.*, 1988; Obry *et al.*, 1990; Morrison *et al.*, 1990).

We report the use of prefabricated radial forearm flaps in the clinical field. Three cases are presented where complex reconstructions were achieved by this method in the head and neck (Fig. 1).

Case reports

Case 1

A 74-year-old male patient presented with a recurrent multifocal squamous cell carcinoma of the nose. Total amputation of the nose was indicated for eradication of the neoplastic process. An osteocutaneous radial forearm flap was partially raised to prefabricate the future missing complex anatomical structure (Fig. 2A). Silastic tubes were cut and inserted to maintain proper shape of the nasal apertures and nasal floor (Fig. 2B).

Three weeks later, the nose was amputated, including the frontal process of the right maxilla (Fig. 2C). Histological examination of all the edges revealed

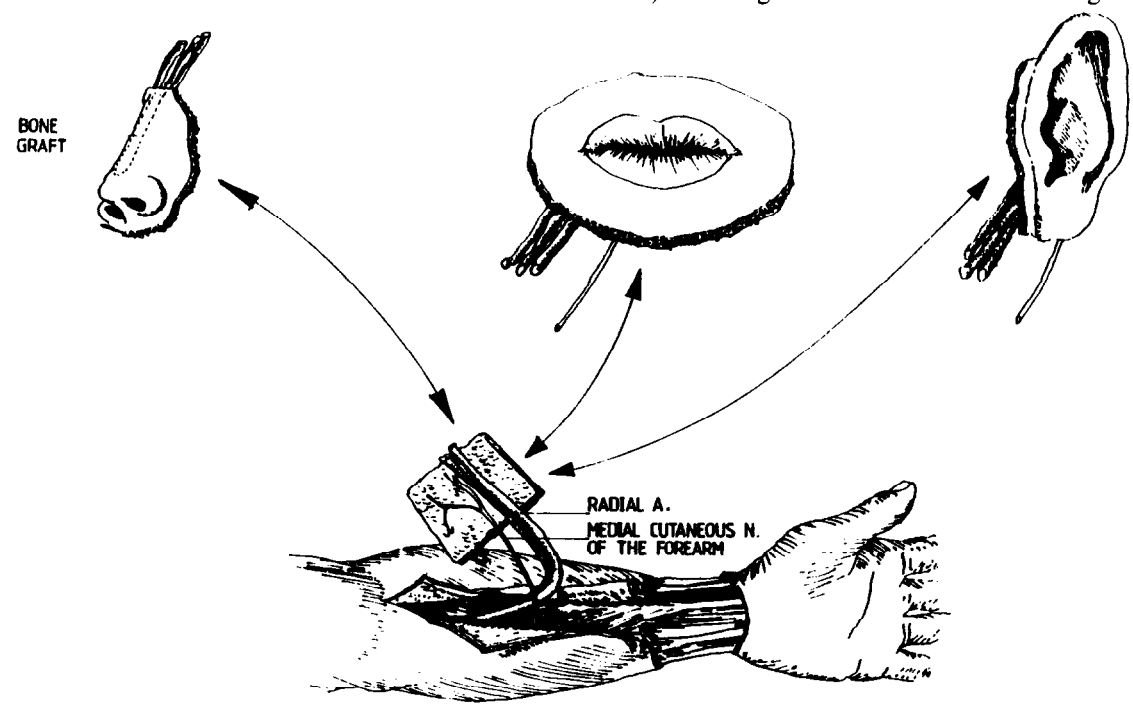

Fig. 1

Figure 1—Diagram showing the anatomical basis of the concept of prefabricated flaps, on the forearm, based on the radial artery.

Fig. 2

Figure 2—(A) Drawing of the osteocutaneous radial forearm flap. (B) The prefabricated nose with silastic tubes. (C) The defect after total nose amputation. A transfixing wire was inserted in the nasal process of the frontal bone for fixation. (D, E) Appearance at 2 months after surgery.

Fig. 3

Figure 3—(A) Heavily scarred face, particularly around the mouth, with oral incompetence. (B) Prefabrication of mouth aperture and lips. (C) Appearance of the prefabricated mouth at 10 days after skin grafting. (D) Appearance at 3 months after surgery.

them to be tumour free. Immediate free transfer of the prefabricated nose was performed with microvascular end-to-end anastomoses between radial and facial vessels in the right submandibular area. Postoperatively, there were no complications, apart from oedema of the flap in the first days which gradually subsided in the following weeks and primary healing of soft tissues and bone was obtained. A good anatomical and functional result was obtained after a Y costal cartilage graft for the columellae and tip, performed two months later (Fig. 2D, E). The patient has now been followed up for 18 months with no change.

Case 2

This 18-year-old male patient suffered extensive burn contractures of the face and despite several surgical procedures suffered from oral incompetence, because of scar contractures (Fig. 3A).

We decided to prefabricate an oral aperture, including upper and lower lips and chin. A fasciocutaneous forearm flap was proximally islanded on the right forearm with preservation of its sensory nerve supply by the medial cutaneous nerve of the forearm. The donor area was split skin grafted and the flap was resutured over the skin graft. Ten days later, a transverse incision was made until the fascia was reached; after 4 more days, a full thickness opening was created in the flap, the edges of the aperture were deepithelialised and a circular skin graft was applied to mimic the vermilion (Fig. 3B, C).

Three weeks later, the perioral defect was recreated, interior flaps were raised for lining and immediate free transfer of the prefabricated flap was performed. Microsurgical anastomoses were performed in the right submandibular region and the medial cutaneous nerve of the forearm was anastomosed to a sensory branch of the cervical plexus. The postoperative period was uneventful and the flap healed well. He is now, at 17 months of follow-up, able to close his mouth and is orally competent for both solid foods and liquids (Fig. 3D).

Case 3

This 48-year-old male patient presented for right external ear reconstruction (Fig. 4A). A prefabricated

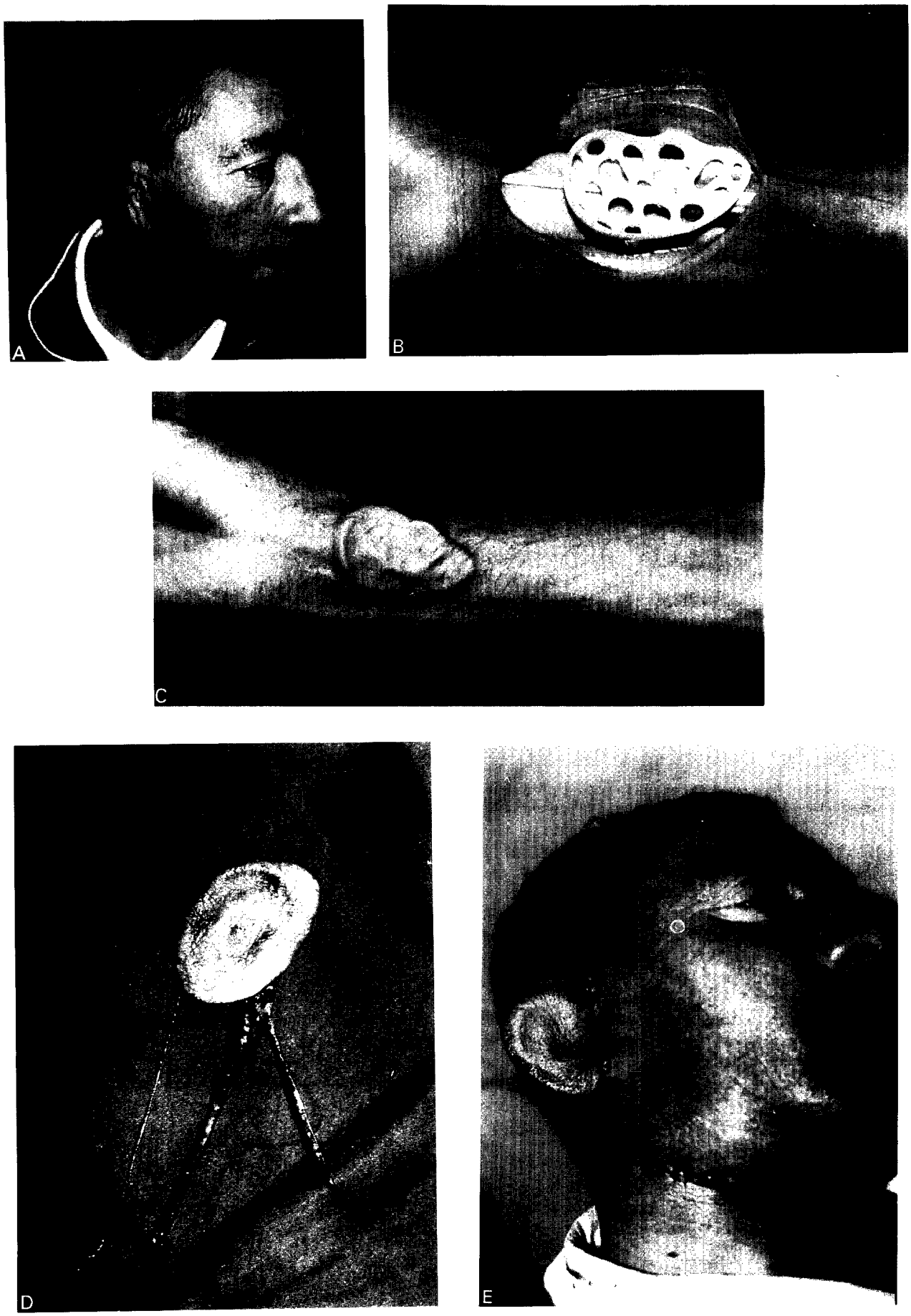

Fig. 4

Figure 4—(A) Right microtia with chondrocutaneous remnants. (B) Raising of the dermal pedicle flap and insertion of the alloplastic silastic mould. (C) Appearance of the prefabricated ear at 2 months. (D) The neurosensate prefabricated flap is ready for transfer. (E) Appearance at 10 days after surgery.

flap was planned on the right forearm using an alloplastic silastic mould. A C-shaped pedicle flap was raised on the anterior surface of the distal third of the right forearm, using sharp subdermal dissection to preserve the subdermal plexus. After the tourniquet had been released, careful haemostasis was performed; the silastic ear mould was placed in the pocket, a suction drain inserted and the wound closed in two layers (Fig. 4B).

Four months later the patient was readmitted for microvascular transfer of the prefabricated flap (Fig. 4C). The flap was raised, including the pocket which contained the silastic ear mould and was proximally islanded, preserving the medial antebrachial nerve (Fig. 4D). Microsurgical anastomoses were performed in the upper neck and the medial antebrachial nerve was sutured to the great auricular nerve. The deep surface of the flap, which became the retroauricular area, was left to granulate and one week later, a split skin graft was applied. Rim necrosis was present, corresponding to the area of skin between the previous c-scar and the medial incision of the flap on the forearm. After local excision and shaving of the extruded silastic mould, healing took place, although with a poor end result (Fig. 4E) at 16 month follow-up.

Prefabrication of flaps is another technique enhancing the reconstructive capacity of the plastic surgeon, particularly in the microsurgical field.

Baudet, in the Fourth European Course in Plastic Surgery, held in Glasgow—September 1990, presented a paper on reconstruction of the face where he mentioned a case of total nose reconstruction in a young patient, with a prefabricated osteocutaneous radial forearm flap, similar to our Case 1, with an interesting result. The three clinical cases presented in this paper clearly show the advantages that can be offered by this method, *i.e.* versatility and wide field of application.

Another important point is that the procedures were generally acceptable to the patients.

In conclusion, prefabricated and neovascularised free flaps are useful in selected patients. Further study is needed on the vascularity of these flaps, and on the long term resistance of cartilage and bone tissues to reabsorption in the neovascularised flaps.

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