

Microvascular replantation of avulsed tissue after a dog bite of the face

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Abstract Various authors have described successful microsurgical replantation of totally avulsed facial tissue. In a significant number of cases difficulties were experienced with the venous anastomoses and/or venous drainage of the tissue. Many different methods were used to overcome the problem. Despite these difficulties, good cosmetic and functional results were reported.

These injuries are often caused by animal bites. Adequate wound care and the excellent local blood supply make immediate reconstruction after animal bites of the face a safe procedure. Other authors describing similar lesions and immediate repair have not reported the complication of wound infection.

We report on a patient who suffered a dog bite with total avulsion of most of the left upper lip, cheek and left alar rim. Venous congestion was overcome by multiple needle punctures to drain blood from the outer surface of the flap and local application of heparin. A good cosmetic result and the return of sensation and function of the orbicularis oris muscle were obtained.

S Afr Med J 1994; 84: 37-39.

Case report

A 46-year-old woman presented to the trauma unit at Groote Schuur Hospital with a large avulsion injury of the left side of the face (Fig. 1). She had hugged the family dog, which responded with an attack that caused this severe facial injury.



FIG. 1.
Avulsion injury resulting from a dog bite.

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Accepted 9 Dec 1992.

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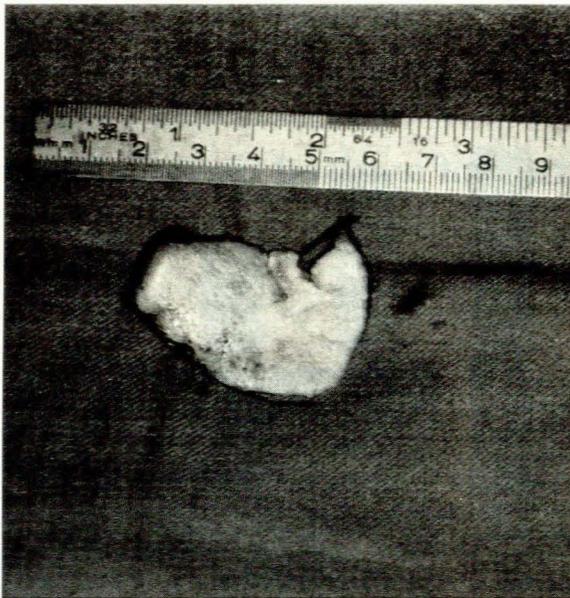
The patient, a non-smoker, was generally well. She was not shocked and systemic examination revealed no abnormalities. She was on treatment for hypertension, which was well controlled.

Examination of the wound revealed a full-thickness defect of the left upper lip, a partial-thickness defect of the left cheek, including facial muscle, tissue loss from the left alar rim of the nose, and a severely torn nasal floor and full-thickness laceration of the lower lip. There was no active bleeding.

The patient's husband, who brought her to hospital, was asked to go back to the scene of the accident to look for the avulsed tissue. The segment was retrieved and brought to the hospital in a plastic bag in ice water.

The block of avulsed tissue measured 5,5 × 3 cm. No obvious signs of crushing were present and the edges were reasonably clean-cut (Fig. 2). Because of the size of the defect and the uniqueness of facial tissue it was decided to replant the avulsed segment.

FIG. 2.



Segment of tissue avulsed.

The patient was taken to theatre 6 hours after the injury (1 hour of warm and 5 hours of cold ischaemia time). The replantation was performed under general anaesthesia. The avulsed tissue was rinsed in Ringer's lactate and the vessels identified (Fig. 3): (i) the facial artery, which was hanging free from the tissue and obviously stretched (1 in Fig. 3); (ii) the superior labial artery on the lateral side of the flap (2); and (iii) the superior labial artery and vein on the philtrum side of the flap. This artery was badly torn and partially avulsed (4).

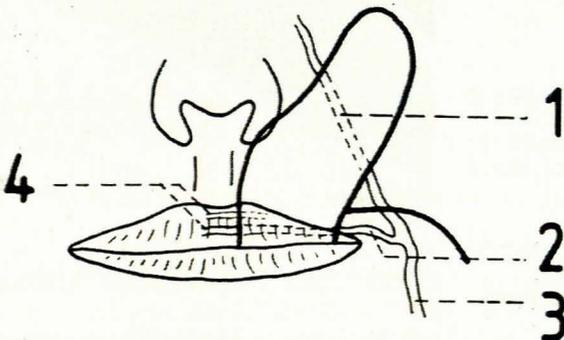


FIG. 3.
Identification of the vessels.

The wound was cleaned and a limited sharp debridement carried out. In the search for possible recipient vessels the superior labial artery on the lateral side of the wound was found to be damaged with a torn intima and thus not suitable for anastomosis. An incision was therefore made laterally into the nasolabial fold; the facial artery (3 in Fig. 3) was identified and dissected free.

An end-to-end anastomosis according to the method of Harris *et al.*¹ was performed microsurgically between the superior labial artery (1,2 mm diameter) of the avulsed tissue and the facial artery (1,5 mm diameter).

All the veins on the flap were damaged, but the superior labial vein (0,5 mm diameter) on the philtrum side of the flap had suffered the least damage. An end-to-end anastomosis of the two ends of this vein was performed.

With release of the clamps the avulsed tissue immediately turned pink with brisk bleeding from the edges. The flap was sutured into position and the lower lip repaired.

Six hours postoperatively the flap was found to be pale and bluish with no bleeding of the surface after pricking with a needle. Arterial obstruction was diagnosed and the patient was immediately returned to the operating theatre. The feeding artery was found to be kinked and thrombosed at the anastomotic site. The excess length was excised and the anastomosis redone.

The colour of the flap improved, but the circulation was still impeded. There was obviously inadequate venous outflow. It was our impression that the initial venous anastomosis was compromised as a result of the damage and the small size of the vessel. These conditions could not be improved by re-exploration. The venous anastomosis was therefore not redone.



FIG. 4.
Appearance at 9 months.

There was good bleeding from the surface of the flap when pricked with a needle. To improve venous drainage multiple needle punctures were made on the outer surface of the flap. Clotting was prevented by wiping the surface with a heparin-soaked cotton swab every 10 minutes for the first 48 hours. Thereafter the intervals were progressively lengthened to 30 minutes according to the appearance of the flap.

The patient was treated with antibiotics (cloxacillin 500 mg 6-hourly for 5 days), heparin 5 000 IU 6-hourly subcutaneously for 10 days, and aspirin 1/2 tablet daily for 14 days; the hypertension was controlled with amiloride/hydrochlorothiazide (Moduretic) 1 tablet daily and enalapril maleate (Renitec) 30 mg daily.

Despite continual bleeding from the flap surface for 10 days the haemoglobin concentration did not fall below 9,5 g/dl. The anaemia was treated with an iron supplement, folic acid and vitamin B₁₂.

The flap healed well except for a small area (0,5 × 1 cm) of skin loss on its upper medial aspect. This was treated with dressings and healed spontaneously.

The patient was discharged on the 12th postoperative day and followed up at the outpatient clinic. At 7 months she had good movement of the replanted orbicularis oris muscle with clear contraction when pursing her lips. Sensation had partially returned at this stage. Her appearance 9 months after the bite is shown in Fig. 4.

Discussion

James² reported thromboses of the venous anastomoses 6 hours after replanting a 5 × 3 cm full-thickness upper lip and part of nose in a 3-year-old girl. The vessels were debrided and the anastomoses redone, and most of the flap survived.

Pennington and Pelly³ described successful replantation of the ear by microvascular techniques using vein grafts to restore arterial blood supply and venous drainage. Two tiny veins (0,4 mm diameter) were identified and anastomosed to a vein graft.

Holtje,⁴ who successfully replanted an amputated upper lip, performed anastomoses of veins 0,5 mm in diameter, but a few minutes after completion of the repair complete obstruction developed. He considered that it was not possible to form a proper venous anastomosis. The venous return of the flap was seriously disturbed and medicinal leeches were applied to improve the drainage. The wound healed without further complications.

Mutimer *et al.*⁵ used medicinal leeches from the 5th postoperative day after a difficult initial venous anastomosis in a 3-year-old boy whose ear was replanted after a dog bite. Tajima *et al.*⁶ also experienced problems in finding adequate veins for microvascular anastomosis. They described an artery-to-vein anastomosis for venous drainage in a successful replantation of a bitten-off nose.

In a report on replantation of an amputated ear, Tanaka and Tajima⁷ mentioned difficulties in venous drainage and in establishing adequate venous flow when replanting avulsed facial tissue. They successfully replanted a totally avulsed ear by dissecting the superficial temporal vessels up towards the distal ends to obtain sufficient length of the pedicles for anastomoses to the vessels of the ear.

In our case, the only veins found that were possibly suitable for anastomoses measured 0,5 mm in diameter, but inadequate length after debridement and damage to the vessels were complicating factors. Adequate venous drainage was established by pricking the flap surface with a needle and wiping it with heparin-soaked cotton swabs. The flap healed without further problems.

Difficult venous repairs and resultant inadequate venous drainage after microsurgical repair of avulsed facial tissue are therefore very common, but the problem has been overcome by surgeons in a variety of ways. Despite these difficulties there is little doubt that replantation of totally avulsed facial tissue is the method of choice in these injuries.

Animals are often the cause of these injuries.^{2,5,6,8,9} In all these cases successful replantations were performed and no problems with infection were reported. The excellent blood supply of the face, the use of antibiotics and early definitive surgical repair after adequate debridement without sacrificing tissue unnecessarily, as described by Venter,⁹ give the best possible cosmetic result when dealing with human bite wounds of the face. In our opinion these principles are also applicable in injuries of the face where tissue is totally avulsed as a result of an animal bite.

The uniqueness of facial tissue and the difficulties in satisfactory facial reconstruction make microsurgical replantation of totally avulsed facial tissue the method of choice in the management of these injuries. Good cosmetic results can be expected and return of sensation and motor function, as described in this case and by Schubert¹⁰ and Holtje,⁴ is possible.

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