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CASE REPORT

The replantation of an amputated tongue by supermicrosurgery

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Summary The tongue has important roles in deglutition, speech, airway protection, taste, and sexual function, and its amputation is very serious. Using supermicrosurgical techniques, we replanted successfully a patient's tongue, the distal part of which had been amputated by the bite of another person, through the anastomosis of a blood vessel that was only 0.7–0.8 mm. The result was that the state of the replanted tongue was relatively good both functionally and aesthetically, and the patient was very satisfied.

Case report

A male patient aged 32 years arrived at the hospital with a completely amputated tongue owing to a bite while fighting with another person. The patient's tongue was amputated on the bias from the dorsum to the ventral side, and the size of the amputated tongue at the ventral side was 2.5 × 1.7 cm, and at the dorsum side was 2.5 × 0.8 cm (Fig. 1).

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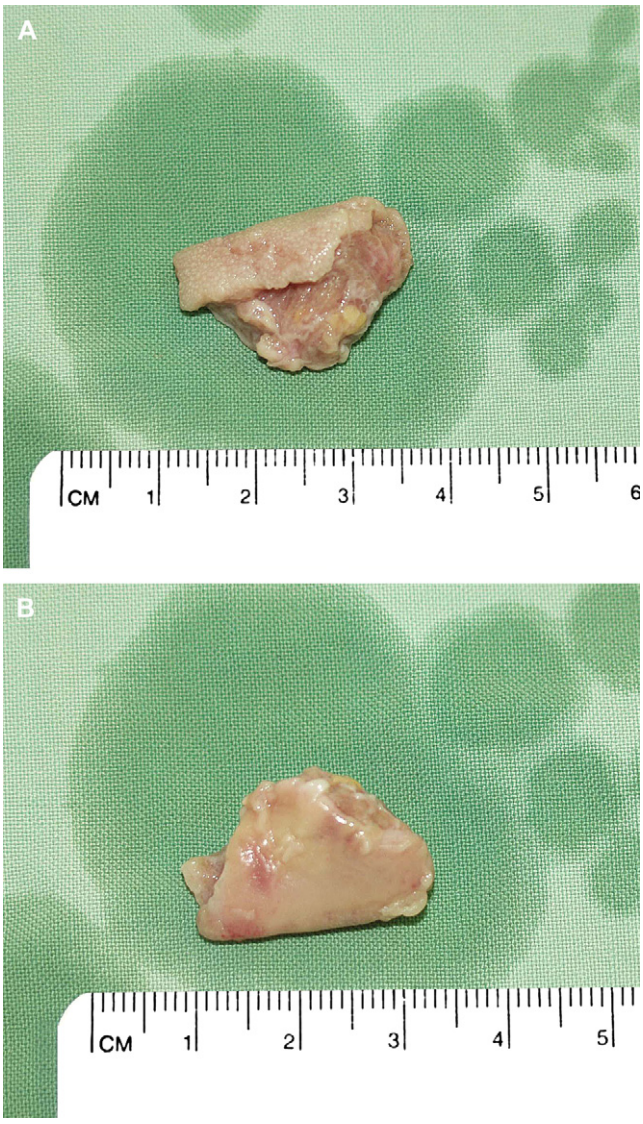

Figure 1 Preoperative views of the amputated tongue segment. Its dimension is 2.5 × 1.7 cm. (A) Dorsal surface. (B) Ventral surface.

During the pre-surgical discussion, it was advised that anastomosis would be performed if possible and, if not feasible because the size of the amputated tongue was too small, primary closure would be performed after a wedge-shape excision. However, the patient strongly desired the replantation. Under a general anaesthetic, first the amputated tongue segment was assessed with an operating microscope. This revealed a deep lingual artery approximately 0.7—0.8 mm in diameter in the left side of the amputated segment. However, veins could not be found. In the left tongue stump, a deep lingual artery was found, and so the anastomosis of two deep lingual arteries was performed with 11/0 nylon. As the diameter of blood vessel was so small, it was very difficult to make six stitches. Immediately after removal of the microvascular clamps, blood perfusion in the amputated segment could be observed. In the ventral portion of the right side of the tongue segment, venous bleeding occurred, and the vein below the mucosa

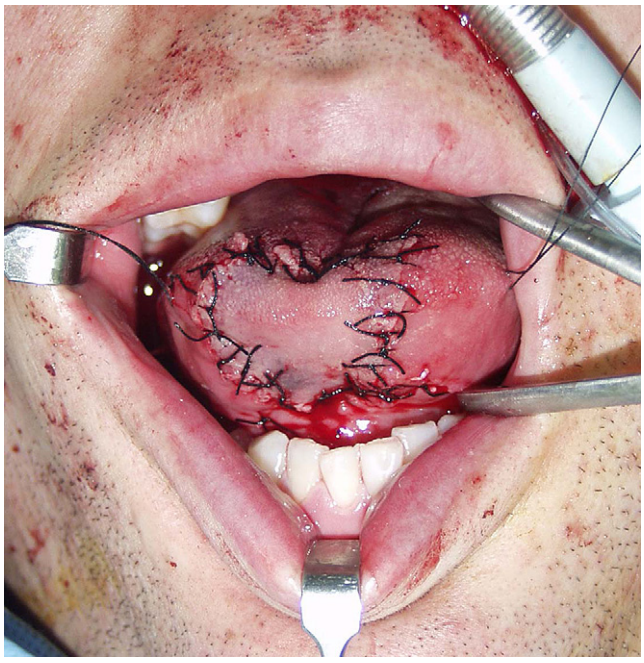

Figure 2 Revascularised amputated tongue segment after replantation. It was found that the amputated tongue segment became pinkish.

could be found. Nevertheless, the diameter was 0.6—0.7 mm and the wall was particularly friable, so anastomosis could not be performed. It was decided to perform the salvage procedure if congestion of the replanted tongue segment occurred and the vein was ligated. The lingual nerve, approximately 1.0—1.1 mm in diameter was found in the amputated tongue segment; however, contusion and avulsion were too severe to suture. Anticipating the spontaneous neuritisation, the avulsed lingual nerve was resected. After complete haemostasis, the wound margin was sutured with 4/0 silk (Fig. 2). The total surgery time was 2 h 15 min, and the total time from injury to revascularisation was 9 h.

Figure 3 Salvage procedure. Medical leech attached to the congested replanted tongue segment.

For the first 7 days after surgery, alprostadil (Prostaglandin E1, WelFide Korea Co., Whaseong, Korea), dipyridamole and dextran (for first 5 days only) were intravenously administered. From day 8 post-surgery, aspirin was administered orally for 7 days. Postoperative perfusion was monitored clinically. From approximately 2 h after surgery, congestion developed in the replanted tongue segment. Medical leeches were immediately placed in the replanted tongue segment (Fig. 3). From 7 days post-surgery, the congestion ameliorated, so the salvage procedure was no longer required. During the 7-day period, a total of 10 medical leeches were used. Eight days after surgery, a wound dehiscence developed in the opposite side to the anastomosed artery. In the operation room, necrotic tissue was removed from the wound area and a closure was performed, again with 4/0 vicryl. Fifteen days after surgery, the wound had healed completely and the stitch was removed. The patient was discharged 18 days after surgery.

The patient is currently 105 days post-injury (Fig. 4), and is very satisfied with the surgery outcome. Nonetheless, although not a great inconvenience, the level of gustatory

Figure 4 The appearance of the tongue 105 days after surgery. The shape and function of the tongue are almost normal. (A) Dorsal surface. (B) Ventral surface.

Table 1 Comparison of three previous reports for replantation of tongue

Author (year)	Cause	Size	Vessel diameter	Anastomosis	No. of thread	Ischaemic time	Associated injuries	Comments
Buntic et al. (1998)	Motor vehicle	5 × 4 cm	1.5 mm (artery) 1–1.5 mm (vein)	Left artery Left vein	?	8 h	Mandibular alveolar fracture	Vein graft
Davis et al. (2001)	Bite	5 × 3.5 cm	0.5 mm (vein)	Left artery Right vein	10–0	10 h	None	Necrosis on 6th day after replantation
Egozi et al. (2006)	Motorcycle	Anterior 2/3 of mobile tongue, incomplete	Less than 1 mm (artery, vein)	Left artery Right vein	10–0	16 h	Bilateral Lefort II, mandibular fracture	Necrosis of the distal-most 1 cm segment

sense was low, and somatic sensation was still dull but better than the gustatory sense, and a touch could be felt at the tip of tongue. The patient's speech could be understood clearly by others, and he was able to swallow food or water without regurgitation or drooling.

Discussion

Recently, with the development of microsurgery, replantation is not only limited to the upper limbs or the hand area, it now includes the successful replantation of the scalp,[1] the upper lip,[2] the ear,[3] and the penis and scrotum.[4] Three cases of replantation of the amputated tongue have been reported previously. According to the first report by Buntic and Buncke, the lingual artery and vein were found in the amputated 5 × 4 cm tongue segment, anastomosis was performed, and the replantation was successful. In this case, the diameter of the lingual artery was 1.5 mm and the vein diameter was approximately 1—1.5 mm.[5] Although it failed, Davis and Armstrong attempted replantation by anastomosis of the lingual artery and vein of a 5 × 3.5 cm tongue segment.[6] According to Egozi et al., in the amputated anterior two-thirds of the mobile tongue, the lingual artery and a vein smaller than 1 mm were found. Anastomosis was performed, and the replantation was successful (Table 1).[7]

In our case, the amputated tongue (2.5 × 1.7 cm) was markedly smaller than previous reports and, as a result, the diameter of the deep lingual artery was very small, 0.7—0.8 mm, so a very precise anastomosis technique was required. According to Kosima, anastomosis of blood vessels 0.5—0.8 mm in diameter is defined as 'supermicrosurgery',[8] hence, our case is the first report of replantation of an amputated tongue using supermicrosurgical techniques.

The tongue is divided into left and right halves by the median fibrous septum, and the minimal interconnecting blood supply crosses bilaterally.[5,9] According to Bracka, within the muscle mass the two arterial trees are separated by a median fibrous septum, except for anastomoses across the tip and between the transverse dorsal branches in the root. And the principal feature of the superficial vasculature is of interconnecting longitudinal arcades alongside the midline.[10] According to Buntic, Davis, Egozi, and colleagues, when the anastomosis of one artery and vein in the same side, or the anastomosis of an artery in one side and a vein in the opposite side, is performed, the blood supply of the tongue is adequate. In our case, based on the midline of the tongue, a greater proportion of the right side (three-quarters) than the left side (one-quarter) was amputated. Similar to the previous reports, following anastomosis of the deep lingual artery of the left side, perfusion was good in the right side of the tongue; however, a wound dehiscence developed in the right side 8 days after surgery, so it seems that the perfusion was not as effective as in the left side.

In cases with a 'small' amputated tongue, as in our case, it may be argued that it is preferable to discard it, perform the wedge excision of the remained stump, and perform primary closure. However, we performed microsurgery instead of performing the primary closure for the following reasons: first, the patient strongly desired the replantation; and second, considering the psychological and physical loss caused by the shortening of the tongue length, replantation was thought to be more beneficial. However, the shortcomings of this procedure are that the hospitalisation time was longer than the primary closure, and the sensation is not yet completely recovered.

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