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Case Report

Successful microsurgical lip replantation: Monitoring venous congestion by blood glucose measurements in the replanted lip

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ABSTRACT

Replantation of an amputated lip using microvascular anastomosis is the best option for restoration of the defect. However, the amputated region often lacks veins with appropriate diameters for microvascular anastomoses and typically necessitates both postoperative exsanguination using medicinal leeches and a blood transfusion. We present a case of the successful replantation of an avulsed lip in which postoperative congestion was evaluated objectively by measuring blood glucose levels in the replanted region. The patient presented to our hospital with an upper lip avulsion that was caused by a dog bite. The lip was replanted by the microvascular anastomoses of one artery and two veins using interposed vein grafts. The replanted lip showed signs of congestion on postoperative day one; exsanguination using medicinal leeches was attempted, while blood glucose levels were measured every three hours. Critical congestion, which did not occur in this patient, was defined as a blood glucose level lower than 40 mg/dL. Lip replantation was successful without any complications in this patient.

This work has never been presented in any meeting or conference nor any publication.

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Introduction

Replantation using microvascular anastomosis is often the best option for reconstruction of defects associated with a facial avulsion injury. However, the amputated region often lacks veins with appropriate diameters for anastomoses.[1] Even if the veins are large enough to be anastomosed, the amputated region easily develops congestion and requires additional venous drainage using leeches or topical heparin injections, which often necessitate a blood transfusion. Exsanguination should be performed based on objective data to minimise total blood loss. We present the successful replantation of an avulsed upper lip that required postoperative exsanguination using medicinal leeches; the replanted region was objectively monitored for congestion by measuring blood glucose levels in the replanted lip.

Case report

A 68-year-old female presented to the emergency unit with amputation of the upper lip caused by a dog bite. The size of the amputated region was 2.5 × 3.5 cm and had been placed inside a plastic bag containing water and ice: It consisted of the upper third of the vermillion/white lip with partial left alar skin containing a small amount of orbicularis oris muscle without the mucosa (Figure 1). The patient was taken to the operating room, and replantation was attempted. First, the amputated region was inspected under a microscope: Two labial arteries (0.7 mm), one angular branch of the facial artery (0.8 mm) and two veins (0.5 mm) were found and isolated. The branch of the facial artery and two veins were selected for anastomoses. Because each vessel stump was too short for direct anastomosis, the amputated region was inverted, and the artery was anastomosed with an interposed vein graft that was harvested from the dorsum of the left hand. The amputated region was promptly revascularised, and the venous return was detected from the two vein stumps within the amputated region immediately after the artery was unclamped. The two veins were anastomosed with interposed vein grafts that were harvested from the dorsum of the left foot (Figure 2). The amputated region was again inverted and roughly secured with 4-0 nylon sutures (Figure 3). The procedure lasted 9 hours, 42 minutes, with a total ischemia time of approximately 9.5 hours. On postoperative day one, part of the flap became livid, and we administered leech therapy and intravenous heparin (5,000 U/day). The replanted lip's blood glucose levels were monitored every three hours by a pin prick; critical congestion was defined as a blood glucose level below 40 mg/dL. Throughout the entire procedure, these levels were stable (mean 90.1 mg/dL, standard deviation (SD) 23.4) and never dropped below 40 mg/dL. Leeches were

Figure 1. The avulsed upper lip/ala, and the amputated region.

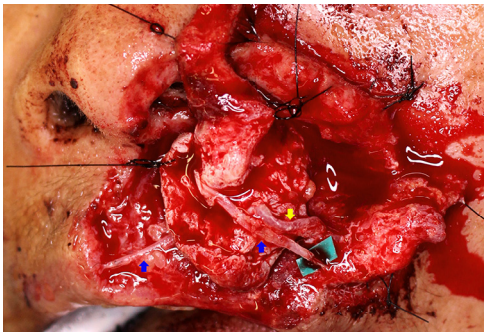

Figure 2. The revascularized lip. The yellow arrow indicates an anastomosed artery with an interposed vein graft. The blue arrows indicate two anastomosed veins with interposed vein grafts.

Figure 3. Photograph at the end of surgery.

applied when the replanted lip was pink/livid, even when blood glucose levels were greater than 40 mg/dL. One to three leeches were applied per day for 10 days (19 total) to resolve the congestion. Heparin was discontinued on postoperative day seven. On postoperative day 13, the patient was discharged. The patient's haemoglobin level was 13.5 mg/dL before replantation and 10.1 mg/dL at discharge. Because of partial necrosis of the nasal ala, three flap revisions were performed under local anaesthesia. The patient was satisfied with the surgical results two years after replantation (Figure 4).

Discussion

Lip replantation is now feasible because of the development of microsurgical techniques. However, unlike replantation of amputated fingers, amputated lips often lack veins suitable for anastomoses. Even if the veins are anastomosed, the lip often develops congestion and requires venous drainage, resulting in the need for a blood transfusion. Until 2016, 34 cases of lip replantation were reported, of which 28 required postoperative venous drainage. Among these cases, 26 needed a blood transfusion.[2] Considering the risks of blood loss, blood transfusion, and infection by *Aeromonas hydrophila*, exsanguination using leeches should be minimised. Thus, the extent of congestion must be evaluated objectively to determine whether exsanguination is needed. Hara et al[3] reported that blood glucose levels could be used as an indicator of the flap's venous congestion: When a flap develops congestion, blood glucose levels decrease (62 mg/dL was set as the cut-off value in this article). We used 40 mg/dL as the cut-off value for the determination of venous congestion to decrease false-positive findings. One to three leeches per day were sufficient to

Figure 4. Photograph at two years postoperatively.

maintain blood glucose levels in the replanted lip above 40 mg/dL. The estimated total blood loss was 881.5 mL, and no blood transfusions were required.

In this case, two veins were anastomosed; the replanted lip developed congestion and required additional venous drainage using leeches. Most studies of lip replantation have reported that replanted lips are susceptible to congestion, even in anastomosed veins. Until 2016, 34 cases of lip replantation which consists of 21 arterial-only anastomoses and 13 arterial & venous anastomoses have been reported; 7 of the 13 arterial & venous anastomoses required additional venous drainage, most of which are medicinal leech therapy.[1,4–10] Considering that one anastomosed vein is sufficient to drain one replanted finger, amputated lip veins have a lesser capacity for drainage than amputated fingers. The reason for this finding is not clear but is probably because most amputated lips are avulsed and do not match their angiosomes, unlike amputated fingers. As we and others have shown, anastomosing veins of an amputated lip does not guarantee freedom from postoperative venous congestion.

We diagnosed the replanted lip with congestion because of its colour on postoperative day one and began leech therapy. The blood glucose levels of the replanted lip were consistently greater than 90 mg/dL and never fell below 40 mg/dL. From our experience, when transplanted/replanted tissues have occluded veins, their blood glucose levels always sharply decrease to less than 40 mg/dL. Taking these factors into consideration, the replanted lip developed congestion, but the anastomosed veins were probably still patent. Postoperative blood glucose levels should be compared between replanted lips with and without venous anastomoses in the future.

Conclusions

Postoperative leech therapy and replantation were performed on an avulsed lip caused by a dog bite. The level of venous congestion was objectively monitored by measuring blood glucose levels in the replanted lip. The lip was replanted successfully, and no blood transfusions were needed.

Informed consent/ethics

Informed consent was obtained for the use of photographs from the patient in this study. The consent has been formally documented in the medical record. This study has been approved by the Ethics Committee of Asahi General Hospital

Conflict of interest

None.

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