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CASE REPORT
Pediatric/Craniofacial

Total Nose and Upper Lip Replantation: A Case Report and Literature Review

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Summary : The nose plays a critical role in olfaction, air filtration and humidification, and facial aesthetics. Most nasal amputations result from animal bites, human bites, and lacerations from glass. Successful replantation yields the best aesthetic and functional outcomes and is preferred compared with multistage nasal reconstruction. However, nasal replantation is technically challenging; establishing venous outflow can be particularly difficult. A 17-year-old male sustained a complete nose and upper lip amputation in a motor vehicle accident. The midface segment was emergently replanted. Two arteries (left dorsal nasal artery, left superior labial artery) and 1 vein (branch of the left supratrochlear artery) were anastomosed using microsurgical technique. A vein graft, systemic anticoagulation, and postoperative leeching were important adjuncts. Total operative time was 10 hours. Cold ischemia time was 2 hours and warm ischemia time was 1 hour. Two arteries were anastomosed to minimize the risk of ischemia of the nose and/or upper lip. Complete survival of the replanted segment was achieved. Eighteen months postoperatively, the patient has bilateral nasal patency, intact septal support, and an excellent aesthetic result. All efforts should be made to establish a venous anastomosis during nasal replantation to maximize functional and aesthetic outcomes. Partial necrosis is common following artery-only replantation, leading to tissue loss and contracture. *(Plast Reconstr Surg Glob Open 2018;6:e1839; doi: 10.1097/GOX.0000000000001839; Published online 3 October 2018.)*

James published the first successful microvascular nasal replantation in 1976.[1] Multiple reports of partial nasal replantation[1–15] and near total nasal replantation[16–19] have been published since. Common postoperative complications include tissue necrosis and secondary scar contractures.[1,14,15,19,20] Total nasal replantation is uncommon. We present a case of a total nose and upper lip replantation following traumatic amputation.

PREOPERATIVE ASSESSMENT

A 17-year-old male presented to the emergency room 2 hours after sustaining an amputation of his nose and upper lip as he was ejected through the windshield in a motor vehicle accident. The patient was a smoker but was otherwise healthy. The amputated nose and upper lip had been wrapped in gauze and placed on ice at the scene of the accident. The nose had been amputated from the cephalad aspect of the upper lateral cartilages to the columella including the septum, and upper and lower lateral cartilages. The upper lip was amputated in continuity with the nose, resulting in a 90% defect of the upper lip (Fig. 1).

OPERATIVE COURSE

The amputated nose and upper lip segment was immediately brought to the operating room for exploration. Microsurgical clamps were used to mark the superior labial arteries (1.0 mm in diameter) bilaterally and the left dorsal nasal artery (0.5 mm) (Fig. 2; **see figure, Supplemental Digital Content 1**, which displays the posterior surface of the amputated nose and upper lip midface segment, ***http://links.lww.com/PRSGO/A841***). A branch of the supratrochlear vein (0.5 mm) was identified on the left cranial aspect of the nose. No further veins were found despite extensive dissection.

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Fig. 1. The appearance of the patient on presentation to the emergency room. He had sustained a complete amputation of his nose and upper lip. Additional lacerations extended into his left glabella and upper eyelid. The tissue defect of the left upper eyelid required closure with a full-thickness skin graft from the postauricular area.

The patient was placed under general anesthesia. Following debridement of the facial lacerations, the mucosa of the left naris was sutured to the remaining intact mucosa on the face. This rapidly stabilized the nose for microsurgical anastomosis of the left dorsal nasal artery and then the left superior labial artery. The amputated part recovered appropriate capillary refill and abundant bleeding was present from its tissues.

The venous anastomosis was completed, repairing a branch of the left supratrochlear vein. Despite initial adequate venous outflow, the replanted segment became congested after 20 minutes. The anastomosis was excised, a thrombus was evacuated, and a second attempt was performed using an alternative 0.5 mm recipient vein located in the left glabella. This venous anastomosis also failed after 30 minutes of adequate flow.

Further dissection was performed from the glabellar wound cranially to move further away from the zone of injury. A suitable 0.8 mm vein was found 3.5 cm cranially. A 4 cm interposition vein graft was harvested from the medial aspect of the right foot. As the venous anastomoses were completed, a 5,000 unit heparin bolus was given intravenously. Good venous outflow was achieved and maintained (Fig. 3; **see figure, Supplemental Digital Content 2**, which displays a 4 cm vein graft was harvested from the medial aspect of the right foot for use as an interposition vein graft from the nose to a glabellar vein, ***http://links.lww.com/PRSGO/A842***).

Fig. 2. Anterior view of the amputated nose and upper lip midface segment. The superior labial arteries were found bilaterally within the upper lip. The left dorsal nasal artery, a branch of the angular artery, was identified on the cranial aspect of the nose. Micro-clamps were placed to mark the arteries on the back table in the operating room to prepare the nose for replantation while the patient was placed under general anesthesia.

Given the intraoperative difficulties with venous outflow, leeching was started immediately after the replantation. An incision was made on the right distal septum intranasally to allow leech attachment while avoiding external scarring (**see figure, Supplemental Digital Content 3**, which displays an intranasal incision was made on the right distal septum to allow for venous leeching at the end of the operation, ***http://links.lww.com/PRSGO/A843***). Ciprofloxacin was used for antibiotic prophylaxis until the leeches were discontinued. A Doyle Airway Splint (Doyle Medical, Ohio) was placed in each naris for 7 days to maintain patency.

POSTOPERATIVE CARE

An intravenous heparin infusion was used for 36 hours after surgery to maintain a partial thromboplastin time 1.5 times the normal value. The patient was then transitioned to a daily prophylactic dose of low molecular weight heparin (enoxaparin 40 mg SC) for the duration of his hospitalization.

Hourly clinical assessment was performed, and a leech was applied when venous congestion was noted. This resulted in hourly application for the first 12 hours, then every 2 hours for 24 hours, every 3 hours on postoperative day (POD) 2, every 4 hours on POD 3, and every 6–10 hours on POD 4–6. No further leeches were required af-

Fig. 3. The appearance of the patient 2 hours after surgery. Initial arterial inflow was greater than venous outflow resulting in a pink color of the replanted nose and upper lip. Leech therapy was started immediately postoperatively to augment the venous outflow. "No pressure" was marked over the glabella to minimize the risk of external compression of the venous anastomoses. A bolster dressing was kept in place over the left upper eyelid full thickness skin graft for 5 days.

ter POD 7. The patient required 6 units of blood, all during the first 48 hours, due to significant bleeding during surgery and continuous blood loss from the wound edges postoperatively.

The patient was kept on bed rest for the first 3 days with his head elevated in a warm room (26–28°C). His diet and activity level were gradually increased. He was discharged home on POD 10. He was able to quit smoking following surgery.

No complications occurred postoperatively. At his 18 month follow-up, the patient demonstrated excellent nasal airway patency and was very satisfied with his aesthetic result (Fig. 4; see figure, **Supplemental Digital Content 4**, which displays clinical appearance 4 months postoperatively, ***http://links.lww.com/PRSGO/A844***; see figure, **Supplemental Digital Content 5**, which displays clinical appearance 4 months postoperatively, ***http://links.lww.com/PRSGO/A845***; see figure, Supplemental Digital Content 6, which displays MRI axial imaging 18 months postoperatively, ***http://links.lww.com/PRSGO/A846***). He had regained motor function of the upper lip orbicularis oris bilaterally. Circumoral muscle movement and symmetry were present, on visual inspection and by palpation, when the patient

Fig. 4. Clinical appearance 4 months postoperatively. There was complete survival of the replanted nose and upper lip with no areas of necrosis. There has been no evidence of scar contracture, septal collapse, or loss of airway patency.

pursed his lips and spoke. At rest, there was a mild deficiency of the left upper lip vermilion, compared with the right. With light touch sensory testing, the patient stated that his replanted nose and upper lip sensation were near-normal compared with the surrounding tissues (cheeks and lower lip). No contact, thermal, and cold injuries had occurred, and the patient denied any difficulty with oral continence.

DISCUSSION

Nasal Replantation Literature Review

For successful replantation of the nose, arterial anastomosis is an absolute requisite. Recipient arteries include the lateral nasal artery, dorsal nasal artery, supratrochlear artery, angular artery, superior labial arteries, or a branch of the anterior ethmoidal artery.[7] Establishing adequate venous outflow minimizes the risk of partial or complete necrosis of the replanted part and subsequent scar contracture.

The veins that accompany the facial artery in the midface region are small, fragile, and difficult to locate.[21] Although most technically challenging, venous drainage is most reliably established via venous anastomosis, particularly in replantation of large composite parts, as in our case. Alternate outflow techniques include leech therapy, arteriovenous fistula, pinpricks, heparinized abrasions, heparin injections in the replanted part, an open venous vacuum drain system, and systemic anticoagulation.[21–23]

Successful artery-only replantation of partial nasal defects has been reported. Stillaert et al.[4] described 2 cases of

successful replantation of the distal half of the nose using leeching when a suitable vein could not be found in the wound bed. Sun et al.[5] described a partial nasal replantation using an arterial venous bypass and multi-point blood drainage for venous outflow.

If nasal replantation fails, secondary nasal reconstruction can be performed with various grafts and flaps. Partial success can facilitate further reconstruction if the skin of the replanted nose necroses but the underlying cartilage and mucosa survive.[24]

Upper Lip Replantation Literature Review

In a multi-institutional study, successful lip replantation was achieved with artery-only anastomoses in 54% of cases.[25] The identification of recipient veins was challenging as the lip drains through small venous plexuses in the subdermis and submucosa. Of 13 patients, 11 required leech therapy for an average of 5.5 days. Systemic heparin was used for 10 patients. An average of 6.2 units of blood was transfused in 12 patients. Four patients had a vessel diameter less that 0.5 mm.

Cooney et al.[20] described the replantation of a composite nasal, upper lip, and lower lip midface segment based on the labial arteries and glabellar veins. Secondary deformities were addressed with an open rhinoplasty and local flaps. Larsson et al.[19] performed an artery-only replant of a composite nose and upper lip defect. Three hundred fifty-eight leeches, 39 units of blood, and 24 days of hospitalization were required. Partial necrosis and scarring of the upper lip required revision with a dermal graft and an Abbe flap.

SUMMARY

There are reports of viable replantation of both the nose and upper lip with establishment of venous outflow with either venous anastomosis or leeching. In our case, we used both techniques, given the large segment replanted and the high stakes of this procedure. If a return to the operating room had been required for inadequate venous outflow, it is unlikely the entire replanted part would have survived. For our patient, the clinical resolution of venous congestion and the decreasing need for leech therapy corresponded to the theoretical neoangiogenesis that takes 5–7 days to establish new venous outflow.

Successful nasal replantation restores form and function. To achieve a similar result with secondary reconstruction, multiple staged surgeries would be required with numerous donor sites. Despite its technical challenges, nasal replantation should be attempted as it provides superior aesthetic and functional outcomes compared with other reconstructive techniques.

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