Microsurgical Replantation of the Amputated Nose

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After studying this article, the participant should be able to: 1. Determine which patients are suitable candidates for nasal replantation. 2. Appreciate the difficulty and challenge that is required to replant specialized facial structures. 3. Realize that the replantation of specialized facial structures may result in extensive blood loss. 4. Formulate an educated decision regarding the decision to replant an amputated nose versus the possible risk of blood transfusion and transmission of blood-borne diseases.

A case of successful replantation of the nose is presented. Two arteries and one vein were anastomosed, providing a stable framework for direct revascularization of the amputated nasal segment. This resulted in complete survival of the nose, with an excellent aesthetic result. However, despite successful microsurgical arterial and venous repair, significant postoperative blood loss still occurred as a result of anticoagulation. In cases of the amputation of specialized structures, the improved functional and cosmetic result obtained with replantation must be weighed against the risk of blood-borne disease transmission when postoperative transfusion is required. Recognizing the potential need for postoperative transfusion in these cases is important in allowing the surgeon to exercise appropriate judgment in deciding whether replantation should be performed. (Plast. Reconstr. Surg. 105: 2133, 2000.)

The importance of the nose as a critical aesthetic subunit of the face cannot be overemphasized. In cases of partial or complete loss of the nose, the results of standard techniques of nasal reconstruction vary, and suboptimal results may lead to lifelong psychosocial difficulties. For this reason, the replantation of the traumatically amputated nose should always be considered when possible, particularly in younger patients in whom nasal reconstruction donor site disfigurement on the forehead can be quite noticeable. We report a case of successful microsurgical replantation of a completely amputated nose in a 15-year-old male patient.

CASE REPORT

On July 26, 1992, a 15-year-old unrestrained male passenger was thrown through the windshield of a car during a motor vehicle accident. Upon arrival at the hospital, the patient was evaluated under the advanced trauma life support protocol. Injuries identified in the secondary survey included a complete amputation of the nose from the nasion to the columella, sparing only the septum and a small portion of the right ala (Fig. 1). The patient also suffered a forehead laceration and minor extremity lacerations. The amputated nasal segment was delivered to the emergency department with the patient.

While the patient evaluation was completed, the amputated nose was taken to the operating room and examined. The wound was relatively sharp and clean, with minimal evidence of crush injury (Fig. 2). The left nasal branch of the facial artery and the right nasal branch of the supratrochlear artery were identified. The nasal branch of the left supratrochlear vein was also identified. The arteries were estimated as approximately 0.3 mm in diameter. Inspection confirmed the possibility of replantation, and the patient was taken to the operating room. Examination of the nasal defect revealed matching vessels.

The right supratrochlear arterial branch was anastomosed with four 10-0 black nylon sutures, and the nasal branch of the left supratrochlear vein was repaired with six sutures. With the release of the microvascular clamps, the nose initially turned pink; however, after 10 minutes it became white. Inspection of the vessels revealed arterial thrombosis. The patient was fully heparinized, and the anastomosis of the right supratrochlear arterial branch was revised. In addition, the left nasal branch of the facial artery was anastomosed. Once the clamps were released, the nose again turned pink, and it remained so for 20 minutes. The nose was then inset, and the forehead laceration was repaired. Total operating time was 9 hours.
To assist in venous drainage, the tip of the nose was abraded and wiped with a heparinized sponge every 15 minutes for the next 4 days. Oozing from the skin edges was constant, and multiple units of blood were transfused. At 4 days postoperatively, the heparinization was stopped, and the bleeding ceased. The nose remained pink and viable, and the entire amputated segment survived completely. The patient was discharged on the eighth postoperative day. Scar revision on the forehead was performed after 1 year. No airway obstruction developed, and normal sensation to the amputated segment returned, as was demonstrated by Semmes-Weinstein monofilament testing performed 6.5 years postoperatively (level C). Overall, the aesthetic result was excellent (Fig. 3).

**DISCUSSION**

Replacement of an amputated nasal segment as a composite graft has been reported numerous times; however, graft survival is variable and depends in part on the size and condition of the amputated segment. Hoffacker performed the largest series and successfully replaced (as composite grafts) 12 of 16 noses amputated in dueling matches. The uncertainty of composite graft survival naturally led to attempts at revascularization once microsurgical techniques were developed. Thus far, there has been one report of the successful microsurgical replantation of an amputated nose where both an artery and vein were successfully repaired. Replantation of a nasal segment attached to a complete amputation of the upper lip has also been reported, using the labial vessels as a source of vascular support. Two case reports have documented the use of an arteriovenous fistula as a source of venous return, with reasonable success despite early venous congestion. Two other case reports have documented arterial repair alone, with venous drainage provided by medicinal leeches or simple wound-edge oozing.

The most significant technical difficulty in achieving success with nasal replantation has been the establishment of adequate venous drainage. The most direct method is successful venous anastomosis; however, locating veins suitable for repair is difficult and often impossible. The creation of an arteriovenous fistula, often with the use of vein grafts, can create an avenue of venous outflow that results in graft survival but also to transient venous congestion. The use of medicinal leeches or wound abrasion to maintain venous outflow until vessels develop is less predictable. In each circumstance, systemic anticoagulation may be required to maintain the patency of the microsurgical repair or to ensure continued oozing from the amputated part until new venous channels are formed. This can lead to significant loss of blood, requiring multiple transfusions.

In this case, oozing from the abraded tip of the nose was minimal, and the repaired vein provided adequate venous outflow. However, oozing from the skin edges of both the nose and the forehead accounted for a significant loss of blood. By postoperative day 4, reendothelialization of the arterial repairs and/or revascularization of the amputated segment from the nasal bed had occurred, resulting in stable arterial inflow and venous outflow to the nose once the anticoagulation was stopped.

Significant transfusion requirements have also been noted in cases of replantation of the ear, lip, and scalp. Although technically feasible, it is this facet of replantation of special-
ized structures that makes the decision to replant difficult. The results of standard methods of reconstruction that do not require blood transfusion must by weighed against the risk of infectious disease transmission should transfusion become necessary after replantation. Certainly after the amputation of specialized structures, such as the nose, ear, scalp, lip, and finger, replantation offers the best functional and cosmetic result if the amputated part has not been severely damaged. In these cases, every effort should be made to provide primary venous drainage to avoid the excessive blood loss associated with alternative methods of temporary venous drainage.

Therefore, in cases of the amputation of specialized structures, replantation should be considered when the amputated segment has not been severely injured, when appropriate vessels can be isolated and repaired, and when, in the judgment of the treating surgeon, the result of a successful replantation will be a significantly improvement, both functionally and cosmetically, over the result obtained with standard methods of reconstruction.

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REFERENCES
8. Hoffacker, W. Case history of a severed portion of the nose which was completely detached from the body for twenty-five minutes. Med. Annu. 2: 149, 1836.

Fig. 3. Postoperative appearance 7 years after replantation. The airway is open, sensation is normal, and the aesthetic result is excellent.

Self-Assessment Examination follows on page 2137.
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1. The most significant difficulty in achieving a successful nasal replantation is:
   A) Adequate arterial anastomosis
   B) Adequate venous anastomosis
   C) Adequate nerve anastomosis
   D) Provision of satisfactory skin coverage
   E) Obtaining acceptable nasal support

2. The creation of an arterial-venous malformation may promote:
   A) Venous outflow
   B) Venous congestion
   C) Both
   D) Neither

3. The most successful early method of obtaining adequate venous drainage after a nasal replantation is:
   A) Allowing the wound to bleed by abrading its surface
   B) Application of topical heparin rubs
   C) Use of postoperative anticoagulation medication
   D) Neovascularization of venous channels at the periphery of the replanted flap
   E) Direct venous anastomosis

4. Which of the following is/are documented techniques for improving venous outflow in the replanted tissue?
   A) Direct venous repair
   B) Abrasion with heparin rub
   C) Creation of an arteriovenous fistula
   D) Use of leeches
   E) All of the above

5. All of the statements regarding replantation of a specialized facial structure are true except:
   A) Successful replantation requires the restoration of arterial inflow and venous outflow.
   B) Replantation may result in significant blood loss, requiring multiple transfusions.
   C) Absolute indicators for the replantation of amputated specialized structures are crushed or avulsed tissues.
   D) An experienced microsurgeon is the most important factor for successful replantation.

6. The blood supply to the nose is derived from both the internal and external carotid artery.
   A) True
   B) False

7. When is the earliest time interval that venous channels develop at the periphery of a replanted structure to support its venous outflow?
   A) Days 1–2
   B) Days 3–5
   C) Days 6–8
   D) Days 9–11
   E) Days 12 or greater

8. What are the likely postoperative consequences of replanting specialized facial structures such as the nose, lip, scalp, and ear?
   A) Successful replantation in greater than 95 percent of cases
   B) Possible risk of blood-borne disease transmission
   C) Aesthetic results generated are inferior to any other reconstructive options
   D) Requirement of multiple transfusions
   E) Both B and D

To complete the examination for CME credit, turn to page 2285 for instructions and the response form.