Replantation of the Amputated Nose
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Objective: To assess the effectiveness of replantation in the treatment of nasal amputations.

Design: Retrospective chart review.

Setting: A university medical center.

Results: In no case did the replant survive completely, and in all cases revision surgery was required. However, in all cases, the resulting deformity was less than the original defect. In our pediatric patients, reconstruction with cartilage grafting and a midline forehead flap was successful and demonstrated proportionate and appropriate growth.

Conclusions: It is our belief that replantation serves many therapeutic functions. At the very least, there is the psychological/emotional factor that is involved in attempting to replace a native body part that has been severed. Also, it is difficult to persuade parents and patients that the amputated tissue that has been handled with kid gloves by paramedics, maintaining its pink “alive” color, is ultimately doomed to failure. Forehead flaps and conchal cartilage grafts are more willingly accepted after a “failed” replantation than as primary reconstructions. In every instance, we believe, the ultimate defect will be smaller than the original deformity. Certainly, the need for vestibular lining reconstruction is far less. Thus, the ultimate healed defect from the replantation greatly facilitates final nasal reconstruction.


REPORT OF CASES

WE REPORT 3 cases involving tissue loss of varying magnitudes. Although not all of the replants survived completely, in no case was the resultant defect worse than the original deformity, and in most cases at least vital structural support was preserved. Special attention is paid to replantation of the pediatric nasal amputation, subsequent normal nasal growth, and final rhinoplasty. We conclude that replantation is a safe and effective method of initially reconstructing the amputated nose.

CASE 1

A 2-year-old boy suffered a dog-bite amputation of his nasal tip, dorsum, columella, caudal septum, and philtrum of the upper lip. The avulsed segment was composed of skin, cartilage, and vestibular mucosa. The amputated piece was cleansed and replanted in the operating room. The immediate postoperative result was very good. Postoperative venous congestion was treated with leeches. Intravenous antibiotic therapy continued for 10 days. The patient ultimately received a midline forehead flap with conchal cartilage grafts 1 month later. At the time of reconstruction, the deeper layer of the replant had survived and ultimately facilitated reconstruction of the vital internal lining and structural support. Significant postoperative scarring required a second reconstruction with another midline forehead flap, conchal cartilage grafting, and turndown flaps. It has been 4 years since the injury, and the patient is breathing well, with an acceptable nasal configuration that is growing proportionately.

CASE 2

On October 29, 1988, a 10-year-old girl suffered a dog bite on her nose that resulted in the complete amputation of the nasal tip (Figure 1). Superiorly, the upper lateral cartilages had been avulsed just below their attachments to the caudal end of the nasal bones. Laterally, a small alar remnant remained on each side. The en-
tire columella was absent. The patient’s mother had transported the avulsed nasal tip to the emergency department, but it had not been cooled. The patient was taken to the operating room and the nasal tip was replanted. The patient was treated postoperatively with intravenous cefazolin sodium. Iced saline was applied. The nasal tip was initially pale, with some ecchymosis. At 48 hours, the nasal tip began to take on a pink-blue appearance and was mildly edematous. The patient underwent complete heparinization, and the following day medicinal leeches were applied. Five days after surgery, the skin sutures were removed and intranasal and external crusts were cleansed. Leech therapy was applied in the operating room. The following morning (posttrauma day 6), a small area along the right ala was black. The nasal tip rapidly took on a dark-purple appearance. Multiple stab wounds were made through the skin, with minimal bleeding of very dark blood resulting. The next day, a thick eschar formed over the nasal tip. Treatment with heparin and antibiotics was continued for another 48 hours, and the patient was then discharged to home after 8 days of hospitalization. The eschar fell off on December 1, 1988 (Figure 2), revealing a partial take of the composite graft, with preservation of part of the columella, a portion of the superior skin, and a portion of the left ala. The entire right ala was virtually lost.

The patient underwent a midline forehead flap resurfacing of the outer nose with dorsal turndown flaps for alar vestibular lining. One year later, she required scar revision and dermabrasion. Her nose continued to grow proportionately for the next 6 years. She underwent a definitive open septrhinoplasty at the age of 16 years. She is currently breathing well and pleased with her nasal appearance (Figure 3).

**CASE 3**

A 67-year-old man sustained an injury on his farm that resulted in a sharp amputation of his nasal tip, dorsum, left ala, and columella. The 4.0 × 5.5-cm piece was cooled and replanted within 5 hours after amputation. The postoperative course of treatment consisted of heparin and antibiotic therapy and multiple stab incisions. Immedi-

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**PATIENTS AND METHODS**

The operative database of the senior author (T.A.C.) was searched for cases involving patients who had been treated for animal and human bites and for sharp mechanical injuries to the nose. This search resulted in 25 cases. A chart review eliminated 19 cases that involved lacerations, gunshot wounds, and macerated amputations. The resulting 6 cases were limited to the management of various degrees of nasal amputations. Three patients underwent replantation; the other 3 did not (irretrievable amputations). Informed consent was obtained before treatment was initiated. A retrospective chart review searched for patient age, date and cause of injury, amputation anatomy (tip, dorsum, left ala, right ala, septum, or columella), amputation composition (skin, cartilage, vestibular skin/mucosa, or bone) and size, hours of ischemia, method of replantation, postoperative management (heparin therapy, treatment with leeches, antibiotic treatment, cooling, multiple stab incisions, and aspirin therapy), immediate outcome of replantation, and number and extent of revision surgeries. Growth estimations were made of replanted tissue in the pediatric cases. The ultimate effect of nasal replantation was assessed in all replant cases.
the piece with povidone-iodine solution and then placed it in a cooled solution consisting of 200 mL of Ringer lactate solution, 80 mg of gentamicin sulfate, and 1000 U of heparin. The nose was replanted after minimal debridement, with skin and mucosal sutures only. After surgery, the patient was kept on a regimen of heparin (5000 U every 6 hours for 5 days) and intravenous antibiotics and required multiple transfusions. The superficial layer sloughed off on postoperative day 6, and the resulting deficit was then grafted with full-thickness skin. The patient ultimately had a good cosmetic result. They conclude, and we agree, that simple reattachment followed by cooling, anticoagulation, multiple stab incisions, and antibiotic coverage is an effective method with which to treat the amputated nose. Furthermore, the presence of cyanosis and crusting in the postoperative period should not elicit aggressive debridement. The underlying tissue survives and provides coverage and structure.

Grabb and Dingman hypothesize that the success of replantation is dependent on “accurate realignment of the tissues, so that blood vessels are in apposition.” This allows rapid inosculation of the vessels of the graft and its bed.

Free grafts survive by plasmatic circulation, spontaneous anastomosis of several vessels, and penetration by vessels from the recipient site. A limiting factor for proper nourishment is distance from the recipient site to the composite replant. Composite grafts that are farther than 1 cm from the recipient site do poorly. The distant cells, deprived of oxygen and nourishment, are bathed in toxins and die. To circumvent the limitation of composite grafts, Fuleihan et al recommend cooling the grafts, which decreases metabolic demand. To prevent venous outflow obstruction, stab wounds are made and heparinization is performed. Care is taken to avoid numerous cutaneous sutures, which could ultimately cause pressure necrosis of the graft edges.

Microvascular replantation techniques have been described for reattaching the amputated nose. Problems with venous congestion require intensive postoperative treatment, similar to that used in composite graft reattachment (ie, multiple stab incisions, application of leeches, cooling, and anticoagulation). These similar postoperative techniques raise the question as to whether the healing process in microvascular replantation is the same as composite grafting. Newer techniques involve artery-to-vein anastomosis for improved venous return and consequent survivability.

Our philosophy for managing the amputated nose is a combination of aggressive intervention followed by conservative restraint. The amputated piece should be cleansed in povidone-iodine and chilled in an antibiotic solution. Intravenous antibiotic therapy should be started immediately and continued for at least 10 days. The replantation should be performed in the operating room under proper lighting and sterile conditions. The wound is debrided and irrigated. The amputated tissue is re-planted with mucosal and skin sutures only. The nasal cavity is packed with a nonadherent dressing (Telfa, Kendall Health Care Products Co, Mansfield, Mass) to control bleeding and to provide temporary support.

Postoperatively, the graft is cooled with iced saline gauze and allowed to drain, with multiple stab inci-
sions, heparinization, and leeching as needed. Other investigators have reported radically different results on flap survival with hyperbaric oxygen therapy. A prospective case-controlled study analyzing the outcome of replants vs primary reconstruction has yet to be published. Our study was limited in that it was a retrospective review of only replantation cases. A comparative study would be ideal, but our data were insufficient.

Postoperatively, the graft may take on a dark-blue, crushed appearance, raising the suspicion of full-thickness necrosis. Restraint is the preferred treatment. Many times, this darkened color indicates only partial thickness loss and the majority of the flap survives. In the worst case scenario, the graft serves as a biological dressing that facilitates healing and prevents the inevitable wound contracture that would result in its absence.

Other authors have criticized the replantation of amputated tissue when the injury is sustained from animal and human bite wounds. In such cases, they claim, the resulting defect is worse than the original deformity. Furthermore, in an age of nasal reconstitution, in which almost any Mohs-created nasal defect can be remarkably restored, is there a role for replantation? Should primary reconstruction be the treatment of choice?

It is our belief that replantation serves many therapeudic functions. At the very least, there is the psychological/emotional factor that is involved in attempting to replace a native body part that has been severed. Also, it is difficult to persuade parents and patients that the amputated tissue that has been handled with kid gloves by paramedics, maintaining its pink “alive” color, is ultimately doomed to failure. Forehead flaps and conchal cartilage grafts are more willingly accepted following a “failed” replantation than as primary reconstructions. In every instance, we believe, the ultimate defect will be smaller than the original deformity. Certainly, the need for vestibular lining reconstruction is far less. Therefore, the ultimate healed defect from the replantation greatly facilitates final nasal reconstruction.

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REFERENCES