Successful Non-Microvascular Nasal Tip Replantation After Traumatic Avulsion

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Abstract
Objectives: To present a case of a traumatic avulsion of the nasal tip treated successfully with non-microvascular replantation

Methods: Illustrative case report

Results: A 37-year-old male presented to Thomas Jefferson University Hospital with a traumatic avulsion of his nasal tip from a human bite. The avulsed tissue was 2cm in size, included the lower lateral cartilage and involved multiple subunits of the nose. Replantation was performed 8 hours after the traumatic incident. Leeches were applied to the re-implanted tissue immediately following surgical repair. Two weeks after surgery 80% graft survival was noted. The residual defect was reconstructed with a pedicled columellar graft.

Conclusions: This case presents evidence that non-microvascular replantation of full thickness composite tissue can result in survival with acceptable clinical outcomes. In this particular case, tissue survival obviated forehead flap reconstruction and its associated morbidity. Future studies to determine the effects of time, size and leech therapy on replanted tissues are needed.

INTRODUCTION
Nasal defects created by traumatic amputation are much less common than those created by the surgical excision of malignancies. Flanery and others have shown that replantation of amputated nasal tissue is superior to other reconstructive efforts including local flaps and skin grafts when the defects are small in size. However, when the defects are massive, replantation almost always results in necrosis. Even with smaller defects replantation is often associated with partial graft failure and a high incidence of revision surgery. A recent review of the literature of replantation of traumatic nasal tip injuries has revealed methods and complications associated with mostly microvascular repairs. We present a case of a traumatic avulsion of the nasal tip that was repaired by a non-microvascular technique with substantial survival. A review of the literature and discussion of indications and management of microvascular and non-microvascular replantation follows.

CASE REPORT
A 37-year-old male presented to the Thomas Jefferson University emergency department following the traumatic avulsion of his nasal tip by a human bite during an altercation. The amputated nasal tissue was located several hours later at the scene of the altercation and brought to the emergency department, where it remained on iced saline until the time of surgery approximately 8 hours after the altercation. Physical examination at the time of presentation revealed a nasal defect encompassing the nasal tip with a portion of the right lower lateral cartilage, the soft triangle and a portion of the anterior columella (figure 1). No venous or arterial vessels were identified in the defect or amputated tissue for microvascular anastomosis. The amputated tissue contained skin, cartilage, and nasal mucosa and measured approximately 2.5cm x 2.5cm (figure 2).
The patient was treated with intravenous fluids and antibiotics including cefavolin in the emergency department. In addition, the wound was copiously irrigated with an antibiotic solution. The patient was then taken to the operating room for further debridement of the wound and surgical replantation of the amputated nasal tissue as a composite graft under general anesthesia. Total tissue ischemic time was approximately 8 hours. The graft was re-implanted by approximating the cartilage on the amputated nasal tip to the intact lower lateral cartilage using interrupted 6-0 Monocryl (Ethicon®) suture. The skin was then approximated with an interrupted closure (figure 3). The graft immediately developed vascular congestion and bruising (figure 4), so medicinal leeches were placed on the graft. They quickly became engorged and resolved the majority of the bruising in the area (figure 5). A dressing of Xeroform (Kendall®) gauze was applied and covered with an Aquaplast (WFR Aquaplast Co. ®) shield conformed to the nasal tip.
Post-operative care included continued antibiotic coverage with IV ampicillin/sulbactam and prophylactic HIV treatment with Combivir® and Hepatitis B vaccination. He was discharged home on post-operative day 2. At discharge the graft looked pink with minimal residual bruising.

One month following his initial repair, the patient exhibited substantial flap survival as depicted by the purple outlined area in figure 6. Failure occurred along the soft triangle. This was ultimately repaired with a turn-in flap from the grafted skin edges to permit lining of the internal nasal valve and a staged medial crura composite flap from the right collumela to reconstruct the soft triangle (figure 7).

DISCUSSION

Micro-surgical reattachment of amputated tissues has been described in facial structures including the ear, lip, nose and scalp. Nasal replantation was first reported by Fioraventi in 1570 who described the case of a gentleman that had his nose amputated by a Spanish soldier. The tissue was re-implanted and the tip survived well after being bound in place for 10 days. In 1828, Hottacker, a German physician who attended dueling matches in the 19th century, similarly demonstrated the ability of cleansed, amputated nasal tissue to survive replantation. He reported the successful replantation of nasal tissue in 12 of 16 cases by simply securing the amputated tissue to the defect with tape. Our case involved a nasal tip that was cleansed and placed in iced saline after being bitten off by a human during an altercation and dropped to the floor in a similar manner to those cases seen by Hottacker. It has been clearly shown that nasal amputations should be managed by storing the tissue in cold saline to decrease metabolic demand prior to surgery.

Technological advances allowing for microsurgery have developed techniques of vascular anastamosis of one artery and two veins with good outcomes. Microvascular repair of a defect may be considered when the tissue mass is large enough that it requires adequate arterial supply, in the case of crush injury to the tissue, or if a long period of time has elapsed since the initial injury. However, when vessels are not available for anastamosis or when the defects are small, replantation remains an essential reconstructive principle. Several other authors have shown the benefits of replantation when compared to other reconstructive efforts, namely pedicled flaps and other grafts. Replantation restores the normal nasal function and appearance including defects spanning several nasal subunits, which are difficult to
accurately reconstruct by other means. The skin of the replanted tissue matches the surrounding skin in terms of color and texture.

The greatest barrier to success of tissue replantation is the establishment of adequate venous drainage. Lack of venous outflow from the replanted tissue produces vascular congestion that can result in graft failure. Two methods used to improve venous outflow are medicinal leeches and the induction of external bleeding. Medicinal leeches function by using anticoagulants in their saliva, hirudin and bdellin, while three serrated jaws create a wound to initiate bleeding. Each leech feeds for approximately twenty minutes, extracting 5-8ml of blood and is subsequently removed. Hirudin, the most powerful anti-coagulant known, can cause additional bleeding of up to 50cc at the wound site even after the leech is removed due to the local anticoagulant effect. In addition to relieving vascular congestion of the replanted tissue, leeches contain numerous infectious organisms. The normal gut flora of the leech includes Staphylococcus species, A. hydrophila, Pseudomonas species, and other gram negative rods. Therefore, prophylactic antibiotic therapy as well as daily monitoring for signs of systemic infections should be performed when medicinal leeches are used. After approximately 5-10 days following replantation, neovascularization of the tissue graft should begin and the need for external bleeding or leeches is no longer required.

Additional aspects of clinical management that improve graft survival include cooling, anti-coagulation, and multiple stab incisions of the amputated tissue. These concepts are based upon the fact that plasmatic circulation, spontaneous anastomosis of severed blood vessels and penetration of the graft by vessels from the recipient site are the three key mechanisms of graft nourishment that provide for survival. Spontaneous anastomosis of blood vessels, which is extremely important for non-microvascular reattachment, provides for nutrition during the first 24 hours following reimplantation, but composite grafts are penetrated by capillaries from the recipient site for finite revascularization by post-operative day three or four. In addition, it has been postulated that maintaining the patient in a position that maximizes gravity drainage of the replaced nasal tissue contributes significantly to post-operative graft survival.

The role of hyperbaric oxygen therapy with composite grafts for nasal defects has been debated. Nichte LS et al. reported a case of successful replantation of a near-total nasal defect treated post-operatively with hyperbaric therapy.

CONCLUSION

Nasal amputations present difficult management problems. These problems have prompted the development of several different methods for restoring function and appearance. Although many cases have reported the use of microsurgical techniques to create a vascular anastamosis for graft replantation, few recent reports of non-microvascular nasal replantation exist. We have described a successful case of replantation of a moderate size nasal tip defect crossing several subunits. In addition, we have demonstrated how leech therapy may provide a successful means of relieving the venous congestion commonly encountered with this reconstructive therapy. Several advantages to replantation of native tissue following nasal trauma exist. There is an emotional and psychological component to replacing a missing body part that is difficult to quantify, but often significant. Also, replacing the native tissue will often result in at least partial reduction in defect size, making further reconstruction with grafts or pedicled flaps easier to accomplish. Also, the amputated tissue contains the appropriate skin, mucosa, and cartilage that the wound is missing. Based on these principles and our experience in this case we recommend replantation of amputated nasal tissue after extensive debridement and cleansing with the understanding that further reconstructive efforts will most likely be required.

References

9. Yao, Jina-Min; Yan, Sheng; Xu, Jing-Hong; Li, Jian-Bing; Ye, Po. Replantation of Amputated Nose by Microvascular Anastomosis. Plastic and Reconstructive Surgery.
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