

Nasal Reconstruction of a Gunshot Injury

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Abstract

The nose which is positioned in the center of the face is an aesthetically and functionally important structure. Destruction of this three-dimensional structure which is maintained by nasal bones and cartilages may result in poor life quality both socially and functionally as a respiratory and sensory organ. Most common causes of destruction are surgical excision of neoplasms, trauma, infections and congenital abnormalities. Multiple options must be considered through the reconstructive ladder and most appropriate technique for the defect and patient must be chosen. In this study, we present a patient who had a nasal bone, cartilage and soft tissue defect due to a gunshot injury. We performed a two-stage reconstruction. In the first stage we reconstructed the soft tissue with a paramedian forehead flap and in the second stage, we reconstructed the framework with a rib cartilage graft. The patient was both aesthetically and functionally satisfied by the result.

Keywords: Nasal reconstruction, forehead flap, cartilage graft, aesthetic subunit, gunshot injury, paramedian forehead flap

Introduction

In plastic and reconstructive surgery practice, nasal defects are often encountered as a result of excision of neoplasms, trauma, infections and congenital abnormalities. The defect may include only skin or both the skin and the osseocartilaginous framework. The surgeon must consider multiple options through the reconstructive ladder and choose most appropriate technique for both the defect and the

patient. Applying the aesthetic subunit principle described by Menick and Burget gives us the advantage of more favorable outcomes (1). The nasal subunits are the dorsum, nasal sidewalls, nasal tip, alar subunits, soft-tissue triangles, and columella. The goal of reconstruction is to avoid crossing subunits, and to place incisions along subunit boundaries also regardless of the size of the defect excision of entire subunit is recommended.

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Allowing the cutaneous defects less than 5 mm healing by secondary intention is an effective method. Cutaneous defects less than 1cm can be managed by primary closure especially in elderly patients and on the nasal dorsum and sidewalls because of additional skin laxity. But in the distal third primary closure may result in an unfavorable distortion of the alar contour. Skin grafts are another option for cutaneous defects. Full thickness skin grafts are usually preferred due to less secondary contraction and better color match (2). Skin grafts need a vascularised wound bed and may provide a cosmetically worse outcome rather than flaps due to discrepancies in thickness and color, hypo-hyper pigmentation.

Commonly used local flaps include the bilobed, glabellar, dorsal nasal, and V-Y advancement flaps. The bilobed flap is ideal for defects less than 1,5cm on the nasal sidewall or tip. It is a transposition flap which has a good color match but it has complex incision lines that can exceed the subunit border. The glabellar flap is a transposition flap used for the defects located on the upper third of the nose. It has good color and texture match but it may narrow the interbrow distance. The dorsal nasal flap is based on angular artery. It is used to cover defects on dorsum, tip and sidewalls.

The workhorse for large nasal defects greater than 2 cm is the paramedian forehead flap. It is an axial pattern flap based on the supratrochlear artery. Studies show a very low incidence of flap necrosis or dehiscence (3). It provides very good texture and color match, but it is a bulky flap since the forehead skin is thicker than the nasal skin. The flap can be thinned before the inset preserving the dermal plexus. Also another disadvantage is carrying the hairy skin of the forehead to the nose in some cases. The

nasolabial flap is another option in nasal reconstruction, often used for alar defects. It can be based superiorly or inferiorly. It requires a second stage for pedicle division or debulking.

Structural reconstruction must be considered when the nasal defect involves bony and cartilaginous structures as well as when there is concern for significant contracture or stenosis in an area of soft-tissue defect. The ideal structural graft should be biocompatible, resistant to infection, nonresorbable, easily manipulated, easy to obtain, cost-effective, and have similar integrity as the native nasal framework (4).

Nasal septal cartilage has the advantage of being accessed through the same surgical site. It is strong and straight but limited in quantity. The auricular conchal cartilage grafts are weaker. They can be harvested from the same surgical field with minimal donor-site morbidity. The natural curvature of the cartilage has the advantage of mimicking the natural contours of the nasal framework. Costal cartilage can supply numerous grafts with respect to shape, length and width. Its rigidity offers excellent support. It can form an L strut for tip support. As a disadvantage, costal cartilage requires a second incision but scar is relatively short and can be concealed in the inframammary crease. Harvesting costal cartilage has some additional risks such as pneumothorax, costal fracture, increase of postoperative pain. The cartilage may warp over time leading to distortion (2, 4).

Case Presentation

A 60 year-old man presented to our clinic with a story of gun shot injury one year before. He told that he was living in a country in which a civil war was present. While he was walking in the street, a bullet came from his right side transversely and injured his nose. He wasn't able

to see where it came from and who shot it. The wound healed with secondary intention. He was able to breathe well but he had developed a social phobia because of his physical appearance. He used to wear glasses but after the injury he was unable to wear glasses. His nasal bones were defective and there was only an unhealthy scar tissue on the upper nasal vault (Figure-1).

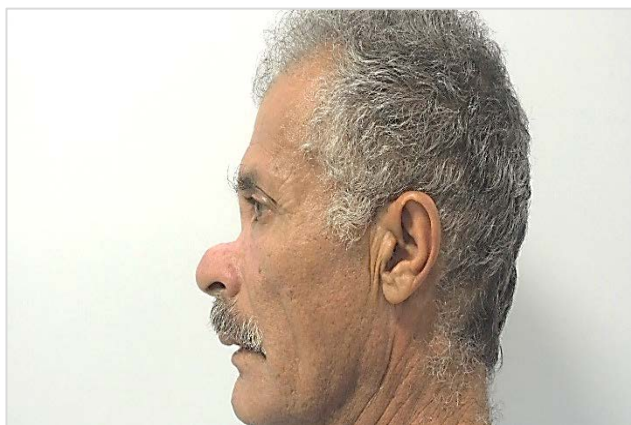


Figure-1. The patient's preoperative view



Figure-2. 30 days after the first stage, just before pedicle division and reconstruction with costal cartilage graft.

We planned a two stage reconstruction. In the first stage we debrided the unhealthy scar tissue with scalpel and for the soft tissue cover we performed a paramedian forehead flap. We considered the subunit principle during debridement and flap coverage procedure inclu-

ding all dorsum and sidewalls in the debridement and flap coverage. The flap healed well with no complications (Figure-2). After one month the second stage was performed. The flap was divided. The donor site was closed primarily. For structural support we harvested cartilage graft from the right 6th costal cartilage. We reshaped and put the cartilage graft under forehead flap for dorsal augmentation (Figure-3). There was no complication related to forehead flap, cartilage graft or donor area. One month after the second operation the patient was satisfied with the result and returned to his country.



Figure-3. 10 days after the second stage

Discussion

For the large defects main objective of nasal reconstruction is to achieve a functional nose with good aesthetic outcomes. The surgeon must consider the defect three dimensionally. Soft tissue reconstruction, structural support, reconstructive ladder, subunit principle must always be kept in mind. The expectations of the patient must be discussed before the operation.

Our patient had both soft tissue and structural defect. Paramedian forehead flap is one of the workhorses for large nasal defects. The first nasal reconstruction using forehead flaps was described in 600 B.C. by Sushruta Samita. It is a

reliable flap with low complication rates. It has good color and texture match. We chose paramedian forehead flap for soft tissue reconstruction. We were able to cover whole nasal dorsum and sidewalls with the flap while we could close the donor site primarily. We planned to reconstruct the structural support at the second stage in order not to disrupt flap viability. 30 days after the first operation we divided the pedicle. In the second stage our aim was to divide the pedicle and augment the dorsum. Since the patient had no serious problems with breathing we didn't open the septum. The flap itself had formed a quite structure on the dorsum because of its bulkiness. We preferred to place a costal cartilage graft under the flap for augmentation. We secured the cartilage graft with absorbable sutures.

Conclusion

Nasal reconstruction requires a patient oriented approach. Each case must be considered individually. Soft tissue and structural defects must be considered three dimensionally. By replacing the skin with similar characteristics and including the subunit principle optimal results can be obtained.

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