



A Rare Case of Hyena Bite - Reconstruction of Complex Central Face Defect with Folding Free Radial Forearm Flap: A Case Report

Pradeep Goil¹ and Saket Srivastava^{1*}

¹Department of Burns and Plastic Surgery, SMS Medical College, Jaipur, India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Background: A hyena bite to the face of a live adult human is one of the rarest cases and is hardly reported in India. The central face is an intricate 3-Dimensional structure and is a dominant feature of a human being. A complex central facial defect can severely affect a person's appearance and function; and poses a substantial challenge for reconstructive surgeons. The aim and principles of central facial reconstruction are to achieve adequate function and aesthetics.

Case Report: This report describes a very rare case of a 43-year-old man, resident of a rural part of Rajasthan state of India, who sustained a massive injury in the central face after getting bitten by a hyena. A free radial forearm flap was designed as a multiple folding, double paddle flap that was divided into several portions. The folded portions of the flap were used to reconstruct the nose, oral mucosa and the upper lip defects and while a downturned forehead flap provided the lining for nasal mucosa reconstruction. The patient achieved a good functional recovery and had a good aesthetic outcome.

Conclusion: One of the rarest cases reported in the literature, where timely intervention was done is nothing short of a miracle. Meticulous preoperative planning and harvesting of flaps enabled the achievement of good aesthetic and functional results in the present patient.

*Corresponding author: E-mail: saket.kgmu@gmail.com;

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1. INTRODUCTION

The central face is a 3-dimensional multilayered structure which includes pneumatized bones and specialized soft tissues of the nose, upper lips and cheek. The nose as a central feature of the face carries a heavy weight in facial symmetry, aesthetics and harmony. In cases of extensive tissue loss due to thermal injury, trauma or surgical resection; the reconstruction of the central face poses a significant challenge for the reconstructive surgeon. The aim of central facial reconstruction is to restore both the function and aesthetics i.e. the bony and soft tissue; contours of the face, rigid support for the velum, allow oronasal separation, and to support the orbit with obliteration of the maxillary sinus to restore the main functions, namely respiration, speech, deglutition, mastication, olfaction, and vision [1]. In cases of large complex defects, local flaps fail to provide the needed lining, support, and coverage. Conventional free flaps, too, are insufficient replacements for the original multilayered facial structures. The authors designed a radial forearm free flap, forming a multiple-folding flap, for the reconstruction of the upper lip, oral mucosa and nose. Nasal mucosa lining was formed by downturned forehead flap and a cantilever bone graft and was covered with radial forearm flap for nasal reconstruction. Overall good results were obtained.

2. CASE REPORT

While working in a village farm in the rural part of Rajasthan, India a 43-year-old man was bitten in the central face by an unsuspecting adult hyena, resulting in a full-thickness loss of the nose, left cheek, left commissure and upper lip. The teeth, gums, meatus nasi, and medial canthus were exposed, but the left eye was spared (Fig. 1). Initially, the patient was taken to a local clinic, where primary management, tetanus and rabies vaccination were done and the patient was referred to a tertiary centre for further management. A computed tomographic scan was done which showed a fracture of the nasal bone and left zygoma (Fig. 2). The patient was posted for reconstructive surgery and with consent, the authors did an elective tracheostomy to ensure the patient's airway patency and performed thorough wound debridement. The defect size was 9*8 cm² with extensive loss of soft tissue. Planning was done to cover the defect.



Fig. 1. A 43-year-old man was bitten in the central face by a hyena, resulting in full-thickness loss of the nose, left cheek, left commissure and upper lip. The teeth, gums, meatus nasi, and medial canthus were exposed



Fig. 2. CT scan showed nasal and left zygoma bone fracture

2.1 For Nasal Lining

Since the defect was extensive, a paramedian forehead flap could not be used to cover the defect, hence it was planned to be used for nasal lining.

2.2 For Bony Reconstruction

A non-vascularized free bone graft was taken from the olecranon process of the ulna of approximate size 4*1 cm², which used as cantilever graft for reconstructing dorsum of the nose, was fixed at the frontal bone with a titanium screw.

2.3 For Framework Reconstruction

A free radial forearm flap on the left forearm (non-dominant side, Allen's test was negative) was designed in the form of trapezoid according to the size and shape of the central face defect. The size of the flap was 12*9 cm² (Fig. 3). The flap was designed into double paddle fashion and was de-epithelized in between: distal flap was used for nasal reconstruction and the proximal flap was marked for upper lip and oral mucosa (Fig. 4).



Fig. 3. A free radial forearm flap (12*8 cm²) from the left forearm was designed according to the size and shape of the central face defect

The proximal flap was subdivided into part A, which was 5*3 cm² and used to construct the upper lip; and part B was 3*4 cm², used to reconstruct the right cheek. In the distal flap: folding portion C and D, which were 8*2 cm² each, replaced the lateral nasal wall, and folding portion E and F were used to form the nostril.

(Fig. 5). The multiple-folding flap had a 5-cm vessel pedicle. The end of the radial artery was anastomosed end to end with the facial artery ipsilaterally. The end of the cephalic vein was anastomosed end to end with the facial vein ipsilaterally. The donor site of the forearm was covered with a split-thickness skin graft, which was harvested from the right anterolateral thigh. The flap survived successfully without complications (Fig. 6). For maintaining nostril patency merocel ventilatory tube was used for 5 days post-op. The patient had bilaterally patent nasal airways 12 months postoperatively (Fig. 7).

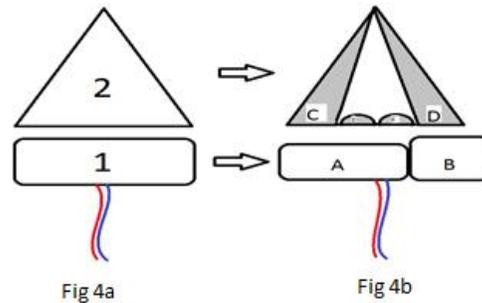


Fig. 4. Fig. 4a: (1) Proximal flap: lip and cheek; (2) Distal flap: nasal reconstruction. Fig. 4b: (A) Upper lip; (B) Lt cheek; (C & D) folded to form lateral wall; (E & F) external nostrils



Fig. 5. Cantilever bone graft and nasal lining by forehead flap



Fig. 6. Immediate post op



Fig. 7. The patient had bilaterally patent nasal airways 12 months postoperatively. The patient achieved good functional recovery and had a good aesthetic outcome

3. DISCUSSION

Although a major public health problem, animal-related injuries remain neglected and contribute significantly to high morbidity and mortality worldwide [2]. Hyena attacks and a bite to the face is one of the rarest cases in adult humans and is hardly reported in India. Although, considered as scavengers, hyenas are effective hunters and will consider humans as potential prey if the need and opportunity arise. According to Mitchell, hyenas generally attack the face,

neck, and cervical spine region of their victim, where their powerful bite can inflict damage to soft tissue and internal organs [3]. A case series of 4 cases of hyena attack in eastern Ethiopia, where late reconstruction was done, has been reported by Fell et al. [4]. An attack on the face creates a complex central facial defect that severely affects person's appearance and function. Reconstruction of such complex defect is extremely challenging because of the necessity to replace the original multilayered facial structures. The ultimate goal of a central face reconstruction is the restoration of the nasal functions of respiration, olfaction, humidification, filtration, and proper cosmesis. Classically, we need to address the reconstruction in three layers: soft tissue covering, bony and cartilaginous scaffolding, and mucosal inner lining [5]. Although a wide array of flaps for reconstruction of facial defect exists, it is difficult to replace complex central facial defect, especially after the total loss of the specialized subunits of the central face.

Reconstruction of the total nasal defect has a long and interesting history dating back to the first forehead flap described by Sushruta in India as early as 3000 BC. Compared with local and regional flaps, free flaps are more effective for complex or extensive defects. The overall success rate of free flap reconstructions of head and neck defects is 94% [6]. The free radial flap is used predominantly in head and neck reconstructions because of its large size, thin, pliable tissues and a long vascular pedicle. Li et al reported a case of a full-thickness cheek defect and its reconstruction with a single free folding radial forearm flap [7]. In the present case, the authors designed a trapezoid-shaped free radial forearm flap which was harvested as a double paddle flap and while in-setting it was used as a multiple-folding flap divided into several portions. Wei Zhou reported a similar case of wild boar injury where the central facial defect was reconstructed with a Multiple-Folding Radial Forearm Flap [8]. Grajek et al. also presented a case of the simultaneous whole nose and partial cheek reconstruction using 3 free flaps. One radial forearm free flap and 2 auricular free flaps were used to cover the defect, but this increased the surgical risk and the patient's trauma [9]. Henry et al also reported a case series of 8 patients in whom total nasal reconstruction was done using radial forearm free flap, titanium mesh, and a paramedian forehead flap [10]. Salibian et al presented a series of 47 patients in whom nasal

reconstruction was done with free radial forearm flap [11]. In our case, the folded portion of the flap was used for the simultaneous reconstruction of the oral mucosa, cheek defects and provided the envelope for the nasal reconstruction. Several options have been described to provide a nasal scaffold. Free bone harvested from the split calvarial bone graft or from iliac crest can be used, but they have the disadvantage of a second donor site. Cartilage grafts from conchal cartilage, nasal septum, or rib graft are all well described but may have a higher risk of resorption [12]. Titanium mesh can also be used as strong nasal support, but in many cases, extrusion can occur. In this case report, free bone graft from the olecranon process was used to provide the nasal scaffolding. Because of the extremely large and complex defect, the paramedian forehead flap was utilized in the primary procedure and was used for nasal lining [13]. Overall, the patient achieved a good functional recovery and had a good aesthetic outcome.

4. CONCLUSION

Because of ever-increasing human encroachment in the domains of wild territories, animal-related injuries are bound to increase and are major but neglected emerging public health problem; contributing significantly to high morbidity and mortality worldwide. For reconstructing large complex central facial defects, it is unrealistic to restore both aesthetic and functional features at one time. In the present scenario, with the introduction of new variants and improved design in shape and additional applications, microsurgical flaps have evolved to include an increasing range of available types. Meticulous preoperative planning and harvesting of flaps enabled the achievement of good aesthetic and functional results in the present patient. However, minor surgical revisions should be anticipated to achieve the best cosmetic outcome.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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