

Forehead flap in maxillofacial surgery: Our experiences

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ABSTRACT

The forehead flap is a commonly used technique to reconstruct the deep and large nasal defects. It can be conveniently performed under local or general anesthesia and provides a very good color and texture matching to the nasal skin, which makes it a suitable graft harvesting site for nasal reconstruction. It has only single disadvantage that it is a two-stage procedure and “finishing” surgeries are needed occasionally for best surgical and cosmetic outcome. In this paper, we describe three different applications of forehead flaps.

Key words: Interpolation flap, nasal reconstruction, paramedian forehead flap

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INTRODUCTION

The forehead flap is relatively simple in concept and technique. It is widely used for nasal reconstruction. The importance of this flap is due to its versatility since different types of nose defects and its reconstruction are very challenging for a reconstructive surgeon to achieve an optimal, esthetic, and functional result after reconstructive surgery. When large skin structures of nose are missing, a forehead flap provides sufficient skin including good color matching and texture including the thickness. The forehead flap (median and paramedian forehead flap) is the commonly used interpolation flap for nasal reconstruction,^[1-4] and is of extreme benefit due to its broad pedicle and rich vascular supply. This flap has been described as the most robust and dependable flap.^[5] In addition, it has the advantage of having large arc of rotation. Further, it provides good color matching at the host site, hair-free pedicle, and matching tissue texture. The severe arc of rotation usually does not compromise the blood supply, thus good vascularity is an additional benefit for wound healing. The flap is basically a paramedian flap and

utilizes single supratrochlear/supraorbital vessel. This flap is commonly used to reconstruct the acquired and congenital nasal deformities. In this paper, we describe our own experiences with median and paramedian forehead flap in the management of three different conditions.

SURGICAL TECHNIQUE

First, the surgical site was cleaned with 5% betadine solution (povidine-iodine), and area adjacent to ulcer was isolated, and the defect was marked. The defect was then mapped and a template made from the foil of suture packet. With the help of the template, the flap was marked on patient’s forehead. Supratrochlear artery was marked by palpation [Figure 1] and its patency confirmed by pocket Doppler machine. The base of the pedicle was kept approximately 1.5 cm wide to allow axial rotation of the flap without strangulation of vessel. Then, 2% xylocaine with adrenaline in a concentration of 1:80,000 was injected around the donor site. Distal extension of flap was kept just below the hairline to prevent incorporation of hair into the flap. The flap was harvested using a no. 15 blade in such a manner that the distal portion of the flap was elevated in a subgaleal plane and the proximal portion (pedicle) incorporated the frontalis muscle. In case no. 1, the flap was found to be short. In this case, the pedicle was extended across the rim, including a bit of eyebrow while preserving the vascular bed. Further deficiency of flap length was eliminated by local advancement flap in nasolabial region. Then the flap was rotated (clockwise

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in right-side flap and counterclockwise in left-side flap) preventing strangulation of the vessel and sutured to the defect in two layers using 4-0 vicryl and 6-0 prolene. Donor site defect was closed primarily in every case in two layers. The raw area of pedicle was dressed with Seri-Strip. Sutures around the flap were removed in 7 days and donor site sutures were removed in 10 days. After 3 weeks, the pedicle was excised. A “touch-up” surgery in the glabellar area was done in case 1 and 2 to make the area more esthetic.

In the cases under reference, cases 1 and 3 were planned for reconstruction by paramedian flap and case 2 for median forehead flap under general anesthesia.

Case 1

A 70-year-old male attended the OPD of Department of Oral and Maxillofacial Surgery with the chief complaint of nonhealing ulcer for the past 7 years which was progressively increasing in size. The patient was a gardener by profession. During this period, he consulted many doctors and received various medications, but without any response. He was quite worried due to disfigurement and discomfort in the affected area. The ulcer was approximately 8 cm × 1-1.5 cm with undermined, everted, and indurated edges. The ulcer was in close proximity to the lower eyelid. The nasal bone and lateral nasal cartilage were intact. There was no lymphadenopathy. On the basis of clinical features, a provisional diagnosis of squamous cell carcinoma was made and incision biopsy of the lesion was done. The histological features were consistent with basal cell carcinoma. The patient was planned for total excision of the ulcer under general anesthesia. Total excision of lesion was done from the base as well as the margin using BP knife no. 15 and tissues from different representative sites were sent for histopathologic examination to ensure that whole of the pathological tissue was removed. Final

report confirmed the diagnosis of basal cell carcinoma. Since the defect was large and deep for a paramedian forehead flap, a combination of forehead and local advancement flap was planned for reconstruction. The flap gave the adequate bulk of the soft tissue. The margins were thinned before suturing. The wound was closed using 6.0 nylon suture. The healing was uneventful. After 7 days, the sutures were removed and after 3 weeks, the division of pedicle and reshaping of the tissues and suturing were done. After 6 months of surgery, the patient is happy with his facial appearance and there is no recurrence [Figure 2].

Case 2

A 25-year-old lady with large congenital nevus of face [Figure 3a] attended hospital with the chief complaint of ugly look of face due to nevus. The patient was thoroughly examined and found to be fit otherwise. We planned a multi-stage excision of the nevus and reconstruction of the facial tissue with local tissue advancement flap by stretching of the tissues. The patient agreed to our plan and we started with excision of nasal tissues and reconstruction planned by median forehead flap [Figure 3b]. Major part of nose and tip was reconstructed by the standard technique. The healing was uneventful. The patient is happy with initial cosmetic result [Figure 3c].

Case 3

A lady of about 30 years of age attended our OPD with the chief complaint of loss of nasal tip [Figure 4a] due to maltreated abscess on the tip of the nose. Her deformity was corrected by right-side paramedian forehead flap [Figure 4b and c]. We opted for right side since there was more tissue loss on the right side. The cartilaginous support for the nasal and collumella was achieved by costochondral graft. The postoperative outcome was too satisfactory [Figure 4d].

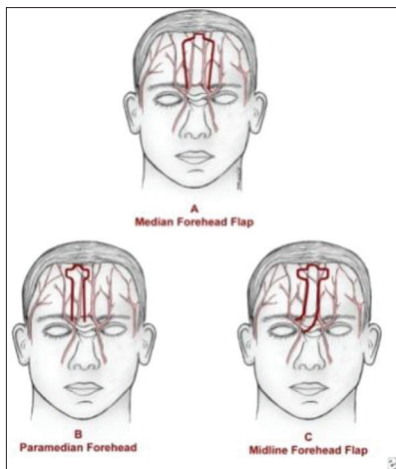


Figure 1: Vascular supply of median and paramedian forehead flaps



Figure 2: (a) Preoperative ulcer; (b) forehead flap with pedicle in position; (c) forehead flap 1 week postoperative



Figure 3: (a) Preoperative photograph; (b) intraoperative photograph; (c) postoperative photograph



Figure 4: (a) Preoperative nasal defect; (b) forehead flap markings; (c) forehead flap positioned and sutured; (d) 1 month postoperative

DISCUSSION

Forehead flap was used by Sushruta in 600 BC for nasal reconstruction. This flap provides similar color, texture, and structure. Reliability of success of this flap is a major advantage which comes from the adequate blood supply and local availability of feeder vessels, i.e. supratrochlear/supraorbital vessels, and is a reason of its popularity.^[6] The flap is perfused randomly from the adjacent skin, through the frontalis muscle, and axially through its vertical muscles. The primary blood supply is through supratrochlear vessels with multiple anastomoses to the dorsal, and supraorbital and angular arteries. Usually the forehead flaps are about 5 cm in height from the eyebrow to the hairline; this measurement may be useful in estimating the tissue availability for reconstruction. It is used for reconstruction of defects which are more than 2 cm in diameter.^[7] The flap is basically a two-stage procedure. Stage one involves marking for designing of flap, elevation, and insertion. Stage 2 involves the division of pedicle and reshaping of the tissues to achieve the normal anatomy of the area. With all these advantages, there are two main limitations, viz., the arc of rotation may compromise the blood supply of the flap and sometimes presence of unwanted hairs makes the area unesthetic. However, this can be managed by laser hair removal, electrolysis, application of depilatory creams, or cauterizing each hair follicle at the time of pedicle transfer or division.^[8]

When designing the flap, it is important to consider the surrounding anatomy and do presurgical evaluation of areas of tissue recruitment and areas that are sensitive to tissue distortion and cause unnatural reconstruction. While raising a forehead flap, possible distortion of hairline, eyebrow, eyelid, and canthi should be addressed. The low pivot point of a paramedian flap provides easy tissue movement toward the defect,

leaving hairy scalp. It is also necessary that designing of flap should ensure that the scars rest within the relaxed skin tension lines and close parallel to the lines of maximal extensibility.^[9] Medical condition of the patient should be thoroughly evaluated as history of any radiation, immune compromise, diabetes, and smoking increase the complications and reduce the success of reconstruction. To prevent infection, the surgical sites should be thoroughly prepared by using antibacterial agents before surgery, and sterile technique should be used throughout. The likelihood of hypertrophic scars and keloid should be estimated. This can simply be done by examining the various areas of the body exposed to any previous trauma.

The forehead donor may be dealt in three different ways – skin grafted, left to heal by secondary intention, or primary closure of the forehead defect.^[10] In our all three cases, we performed primary closure.

Because of excellent blood supply, necrosis of forehead flap occurs rarely, and if it occurs, it is due to excessive tension of pedicle, ignoring the past history of trauma to the pedicle or excessive flap thinning. Although infections are uncommon, acute infections may occur due to failure in following aseptic technique.

This flap is a versatile flap not only for nasal reconstruction but also for adjacent areas. Further, a few indications which can be added to the existing indications are management of large nevi of nose and defects of face which are in the diametric range of pedicle. In the first case, we found it suitable as it was not altering the anatomic position of medial canthus which was expected to be compromised by the excision of lesion followed by advancement flap. In the second case, we used this flap to excise and reconstruct the nasal skin in the patient with large nevus of the face. This procedure was done

as a part of step-by-step excision and reconstruction of this congenital defect. In this patient 2, we did the nose first because the patient herself wanted nose to be done first. In the third case, we used this flap to excise and reconstruct the large lesion extending from the nasolabial groove since better surgical results were anticipated in comparison to local advancement flap. The outcome of surgical reconstruction is uneventful, and the forehead flap can not only be used for nasal reconstruction but also in the management of large nevi of the face and in the reconstruction of acquired or congenital defects in the range of axis of rotation of flap, provided the rotation does not compromise the vascular supply of the flap.

CONCLUSION

The forehead flap is a versatile flap for reconstruction defects in its diametric range. It is technically simple, straightforward, and complication free if done carefully. Excellent color and texture matching are additional advantages.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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