



FOREHEAD FLAP FOR RECONSTRUCTION OF OROFACIAL DEFECTS : A TERTIARY CARE CENTRE EXPERIENCE, WEST BENGAL, INDIA

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ABSTRACT **AIMS:** 1.To evaluate efficacy of pedicle forehead flap in facial & oral cavity soft tissue reconstruction. 2. To evaluate cosmetic appearance and functional outcome after reconstruction with forehead flap. 3. To assess long term outcomes following reconstruction with forehead flap.

MATERIALS AND METHODS: The present study was conducted in R.G.Kar medical college and hospital,Kolkata(W.B). Total 23 cases with orofacial reconstruction using forehead flap April 2014 to May 2019 were retrospectively studied. Information was sourced from patient's case notes and operating theatre register. Information retrieved included age, gender, indication for surgical reconstruction, type of forehead flap, duration of hospital stay and complications. All patients agree with this publication and use of photographs.

RESULTS: Results: A total of 23 patients were managed within the period reviewed and consisted of 17 (74%) males and 6 (26%) females. Tumor resection in 18 (78.26%) cases accounted for most defect and the nose was the commonest site of defect. Complete forehead flap was used in 15 (65.2%) of cases & rest by partial forehead . Postoperative complications was observed in 5 (21.7%) patients and consisted of failed flap in 1 (20%) patient, tumor recurrence in reconstructed site in 2 (40%) patients and infection at recipient site in 2 (40%) patients.

CONCLUSION: Forehead flap is an axial flap which provides large areas of skin and subcutaneous tissue which may be used in a variety of ways to cover nose, cheek, neck and intraoral defects. Though an old flap, it is one of the safest cutaneous flaps available in reconstructive surgery. It provides a good colour and texture match. It is a quickly and easily raised flap with good flap survival due to good vascular supply.

KEYWORDS : axial flap, Forehead flap, nasal reconstruction, cheek reconstruction

INTRODUCTION:

Cancers of the head and neck regions are the 6th most common cancers worldwide. Treatment option for these regions includes surgery, radiotherapy and/or chemotherapy. Primary modality of treatment is radical surgery where the mass has to be excised three dimensionally with a wide margin of safety. Patients often need excision of maxilla, mandible, and whole of cheek along with radical or modified radical neck dissection. Due to this extensive excision, a large defect is produced which needs reconstruction to provide both inner mucosal lining and outer skin covering. Recent trends favour the use of free flap where donor site vasculature is anatomised with recipient vasculature. Where there is no suitable facility or expertise for free flap, pedicled flaps may be utilised which serve the purpose. In this case series, forehead flaps were used to cover the defect after excision of oro-facial malignancies.

AIMS & OBJECTIVES:

This prospective study was carried out with the primary aim of evaluating the efficacy of pedicled forehead flap in facial & oral cavity soft tissue reconstruction. Moreover, the cosmetic appearance and functional outcome after reconstruction with forehead flap was assessed along with long term oncological outcome.

MATERIALS AND METHODS:

The present study was conducted in R.G.Kar medical college and hospital. Total 23 cases with orofacial reconstruction using forehead flap April 2014 to May 2019 were part the prospective study . Information was sourced from patient's case notes and operating theatre register. Information retrieved included age, gender, indication for surgical reconstruction, type of forehead flap, duration of hospital stay and complications. All patients agree with this publication and use of photographs.

Preoperative planning:

The superficial temporal artery was assessed preoperatively by palpatory method only.

Surgical procedure:

Reconstruction was carried out as a two or three (if debulking is necessary) stage procedure involving initial flap raising and transfer, followed by flap division usually after a period of three weeks, and finally debulking of the reconstructed site. When complete forehead flap was raised, split thickness skin graft from the thigh was used to cover the flap donor site intraoperatively & secured with sutures and a pressure dressing applied on the forehead to prevent hematoma collection under the skin graft.

RESULTS:

A total of 23 patients had orofacial reconstruction using forehead flap under general anesthesia within the period reviewed and this consisted of 17 (74%) males and 6 (26%) females, giving a male to female ratio of 2.8:1. Patients' ages ranged from 20 to 72 years [Figure 1].

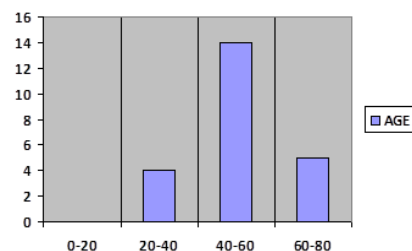


Figure 1. Age distribution

The aetiology of soft tissue defect was tumor resection in 18 (78.26%) cases, trauma in 3 (13%) cases, and infection in 2 (8.69%) cases [Table 1].

Table 1: Etiology of orofacial defect

ETIOLOGY	CASES FREQUENCY
TRAUMA	3
BENIGN TUMOUR EXCISION	2

MALIGNANT TUMOUR EXCISION	16
INFECTION	2

Road traffic crashes accounted for 2 (66.6%) of 3 cases of trauma associated soft tissue defects, while malignant tumor excision accounted for 16 (88.9%) of 18 cases associated with tumor excision. When site of defect is considered, the nose 12 (52.17%) had the highest frequency [Table 2].

Table 2: Site of orofacial defect

Site	Frequency
Nose	11
Cheek	8
Lip	2
Perimandibular/submandibular region	2

Complete forehead flap was used in 15 (65.2%) of cases while partial forehead flap was used in the remaining 8 (34.8%) cases [Figure 3]. Timing of flap division ranged from 21 to 65 days. All flaps were divided under general anesthesia.

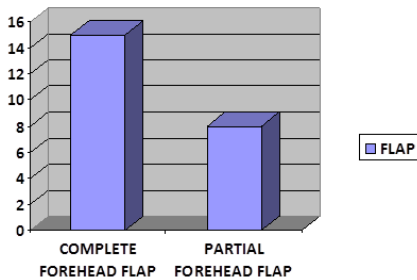


Figure 3. Types of forehead flap used

Of the 23 patients reviewed, the duration of hospital stay ranged from 24 to 146 days. Cosmetic appearance of the recipient area was found to be acceptable, however the donor area (forehead) suffers from loss of facial expression, particularly in total forehead flap. With regard to functional outcome in nose, there is acceptable cosmesis but the patients had nasal obstruction. In cheek and oral cavity, there was adequate closure of the defect but the patient had difficulty in swallowing and needed rehabilitation. There was satisfactory closure of the superficial skin defects. Postoperative complications [Table 3] was observed in 5 (21.7%) patients and consisted of failed flap in 1 (20%) patient, tumor recurrence in reconstructed site in 2 (40%) patients and infection at donor/recipient site in 2 (40%) patient.

Table 3: Complications noted following use of forehead flap

Complication	Frequency
Total flap failure	1
Epidemolysis	0
Infection	2
Tumor recurrence in flap recipient site	2
Tumor occurrence in flap donor site	0

The follow-up period was from 3 months to a maximum of 3 years. During follow up visits, the patients were examined for condition of the flap, condition of the donor site and endoscopic examination to detect any recurrence under the flap.

Recurrence under flap were seen in two cases within 3 years of primary surgery, which were managed with wide excision and reconstruction with another flap.

DISCUSSION:

Relevant anatomy:

Thorough understanding of the pattern of arterial supply of the forehead is absolutely essential for successful repair with forehead flaps. The major vessel of the lateral forehead region is the superficial temporal artery (STA) and its branches. The artery emerges in the superficial plane at a position just anterior to the tragus, which serves as the point from which the artery may be mobilized along with the flap. The STA ascends upwards and divides in front of the zygomatic process to form the anterior superficial temporal branch supplying the forehead and a posterior superficial branch which runs backward to

supply the scalp. In majority of cases the zygomatic artery arises from the trunk of the STA and in few it may come from the anterior superficial branch. The zygomatic and the anterior superficial branch are the chief arterial supply for the forehead flaps and failure to preserve the zygomatic has been stated to be a reason for failure. The forehead also receives blood supply centrally by two branches of the ophthalmic artery viz.- the supratrochlear artery(STA) and the supraorbital artery. Both these vessels supply bilaterally and are considered the workhorse for the midline based forehead flaps. Thus the blood supply to the forehead is provided by these four major arteries and their inter-connecting vessels thereby forming an extensive vascular network. Based on this anatomical knowledge various types of forehead flaps has been described. Narayanan described the bilobar and trilobar flaps which include tissue from both the forehead and the scalp to reconstruct the intraoral mucosa as well as the skin defect using a single flap. Bilobar flap is supplied by two terminal branches of the STA, the frontal and the parietal. Trilobar flap is used to reconstruct posteriorly placed defects and has a third vertical limb in addition to the bilobar flap.

Majority (74 %) of patients reconstructed in the present study were males. One of the reason can be attributed to the fact that males in our society are generally less concerned with aesthetics when compared to females. It is likely that these male patients were motivated as a result of functional limitations such as speech and feeding rather than aesthetics. The age of the patients ranged from 20-72 years and this highlight the wide range of patient age group that can be successfully reconstructed using this flap. Neoplasia was the main aetiological factor(78.26%) for orofacial defect, followed by Trauma (mainly road traffic crash).In contrast to Agbara et al[1], who observed Trauma the main aetiological factor in there study.

Complete forehead flap was the most common type of flap used, accounting for 65.2% of all forehead flaps in our study.This collaborate with 72.1% in the study by Agbara et al[1], while in contrast to other studies [2,3] that reported partial forehead flaps as the most common type used. This difference may be related to the site (Fig.2) and size of the soft tissue defect.

Of the partial forehead flaps, the median forehead flap which is based on supratrochlear artery bilaterally and the angular artery, offers the shortest distance of rotation(fig 4A). In contrast, the paramedian flap which is based on the supratrochlear artery on one side with contributions from the angular and supraorbital artery (depending on the width of the flap) offers a wider arc of rotation and thus increased cover of the defect(fig.4B)



Fig. 4A,B: showing reconstruction by median & paramedian forehead flaps

Agbara et al[1] in there study classified forehead flap as either complete (if the whole forehead tissue between hairline and supraorbital rim was mobilized from a point perpendicular to the lateral canthal region on one side to the corresponding point or beyond on the contralateral side) or partial (if only a part of the forehead tissue was mobilized).

Shah JP [4] in his study described folded forehead flap for reconstruction of full-thickness defects of the cheek. A simplified technique for reconstruction of through-and-through full-thickness defects of the cheek following resection of cancer. The standard forehead flap was employed with an extended application, whereby it is folded over itself twice to provide both an inner and an outer lining. This alternative technique appears to be a reliable and quick way of obtaining both cover and lining for reconstruction of through-and-through defects of the cheek (fig. 5A & B).



Figure 5A. Forehead flap reconstruction of cheek defect post squamous cell carcinoma excision. (A) Preoperative view;



Fig.5 B :Post-operative folded forehead flap reconstruction of full-thickness defects of the cheek

With regard to the timing of flap division, majority of the cases had flap divided at 3 weeks or less. This is in correlation to other reports [5,6] in which the flap was divided at similar interval. Early division of forehead flaps as at 4-6 days has been documented with minimal complications. However, it is recommended that early flap division should not be undertaken in active smokers and in patients with bleeding disorders to avoid complications[7,8]

The forehead flap carries with itself some disadvantages like facial disfiguring and bulkiness of flap. Complications noted in this study are shown in Table 3. Infective complications were observed in two patients who were reconstructed using complete forehead flap. This increased tendency for infection with complete forehead flap may be related to the large surface area of the flap exposed.

Total flap failure was recorded in 1 case, showed flap necrosis requiring revision surgery. The most likely cause of this flap necrosis is due to injury to zygomatic artery during harvesting of flap or during passage of flap medial to the narrow zygomatic tunnel. Recurrence under flap were seen in two cases within 3 years of primary surgery, which were managed with wide excision and reconstruction with another flap. Cosmetic appearance: of the recipient area was acceptable, however the donor area (forehead) suffers from loss of facial expression, particularly in total forehead flap

CONCLUSION:

Forehead flap is an axial flap which provides large areas of skin and subcutaneous tissue which may be used in a variety of ways to cover nose, cheek, neck and intraoral defects. Though an old flap, it is one of the safest cutaneous flaps available in reconstructive surgery. It can be quickly and easily raised with good flap survival due to good vascular supply. It does not require patient repositioning and provides good textural, thickness and colour match when compared with the recipient site tissues. Nowadays its routine use has largely been superseded by musculocutaneous and free tissue transfer.

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Conflicts of interest

There are no conflicts of interest.

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