

Lateral Forehead Flap - An Effective and Efficient Alternative to Free Flap in Orofacial Tumour Reconstruction

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ABSTRACT

BACKGROUND

Lateral Forehead flap is very versatile as it is a good option for reconstruction of different types of nose and oral cavity defects and helps in an optimal, aesthetic, and functional result.

METHODS

This is a retrospective study conducted in the Department of Plastic Surgery among 25 cases with the indication of forehead flap from May 2017 to May 2018. Information was sourced from patient's case notes and operating theatre register.

RESULTS

Highest number of patients belonged to fourth and the fifth decade. The most common location of tumour was in the buccal mucosa seen in 48 % followed by alveolus GBS complex constituting 20 % followed by angle of mouth 16 % and maxilla in 16 %. Wide excision with adequate margin was done in 16 cases. Marginal mandibulectomy was done in 20 % and marginal maxillectomy in 16 %. Supra-omohyoid neck dissection was the most commonly done procedure constituting 20 % of all the neck dissections followed by modified neck dissection type II in 48 % cases. The smallest size of flap was 6 x 7 cms and the largest was 14 x 7.5 cm. The complication rate was also very less with tip necrosis in minor cases. 3 cases of post irradiation tumour resection defects (11) were reconstructed with this flap. There was no loss of the flap in our study.

CONCLUSIONS

Lateral forehead flap is ideal for reconstruction of oral cavity defects, defects of maxillary antrum, cheek defects and angle of the mouth defects. It is also useful in post radiotherapy patients where there is deficiency of recipient vessels, fibrosis of vessels.

KEYWORDS

Lateral Forehead Flap, Oral Cavity Defects, Supra-Omohyoid Neck Dissection, and Modified Neck Dissection

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BACKGROUND

Oral cancer is the sixth most common malignancy worldwide. According to Global Adult Tobacco Survey,¹ 34.6 % of adults in India; including 47.9 % of males and 20.3 % of females consume tobacco and it is the commonest cause of oral malignancy in the Indian subcontinent. It represents a significant challenge for the Plastic Surgeon to reconstruct and to restore the anatomy and maintain continuity of the intraoral surface and oropharynx. Advances in micro-vascular reconstructive techniques² has allowed for free flap reconstruction of oropharyngeal defects, with success rates of 90-95 %, with consequent limitation of pedicled flap reconstructions. But every patient is not an ideal candidate for a micro-vascular reconstructive procedure, and it is also not worth to say that every defect requires a free flap cover.

Very few patients present with early stage disease, added to this the reconstructive surgeon has to confront with elderly patients suffering from severe comorbidities, viz diabetes, hypertension, pulmonary compromise, pre-treated with radiotherapy. At times surgeon may be facing manpower crisis. In these circumstances free flap surgery, with its prolonged anesthesia and with paucity or fibrosed recipient vessels, requirement of extensive postoperative monitoring, is relatively contraindicated and therefore the need for locoregional extended forehead flap.

The Sushruta Samhita, describes a technique of using a flap from the forehead for nasal restoration. The extended lateral forehead flap (ELFF) or the lateral forehead flap was first introduced by Ian McGregor³ in 1963 to reconstruct an intraoral defect, he called it the temporal flap. McGregor and Millard⁴ each modified and utilized the flap for resurfacing various facial and intraoral defects. The use of lateral forehead flap is acknowledged as the ideal donor for mid face and oral cavity reconstruction due to its color, texture match, and robust vascularity. The wide arc of rotation usually does not compromise the blood supply, thus good vascularity is an additional benefit for wound healing. Present study done in patients with oral malignancy undergoing forehead flap.

METHODS

This is a retrospective study conducted in the Department of Plastic Surgery among 25 cases with the indication of forehead flap from May 2017 to May 2018. Information was sourced from patient's case notes and operating theatre register. Information retrieved included age, gender, indication for surgical reconstruction, side of forehead flap, duration of hospital stay, and complications. All patients agree with this publication and use of photographs.

Preoperative Planning

The precise location of the superficial temporal artery was identified and marked using palpatory method and confirmed with handheld Hunt- Leigh Doppler starting 1 cm anterior to the tragus till the termination in forehead.

The flap is raised based on either the right or left superficial temporal artery. The lateral forehead flap comprises whole of forehead just below the hairline superiorly and 1.5 cms above the eyebrow inferiorly, 1 cm lateral to the outer end of eyebrow and medially 1 cm in front of tragus. Tumescence is injected along the margins of flap and after a waiting period of 5-7 mins incision is commenced from lateral to base. The marginal incision is bevelled to give smooth transition from graft to surrounding skin. Flap is elevated above the peri cranial layer.

Once the flap is completely elevated a subcutaneous tunnel is created in the cheek above zygoma into the defect in the oral cavity. If the defect involves angle of the oral cavity the flap is routed externally into the oral cavity. This is advantageous as there is no fistulous communication. The donor area is covered with partial thickness skin graft. Primary dressing is done on fifth post-operative day, and flap division is usually done after three weeks. Most of the flap after giving inset in the oral cavity is discarded as the graft on the forehead is well settled. Feeding is done through Ryles tube. The key to success of this flap is identification, preservation, and careful dissection of superficial temporal artery at its base. Vasospasm of the vessel is avoided with continuous spraying of 2 % xylocaine over the vessel.

Data retrieved was analyzed using Microsoft Office Excel 2007. Findings from descriptive statistics were represented in the form of graphs, tables and charts.

RESULTS

A total of 25 cases from May 2017 to May 2018 were taken up in this study.

Age	No. of Patients	Percentage
31 - 40	4	16
41 - 50	8	32
51 - 60	6	24
61 - 70	6	24
71 - 80	2	8
Total	25	100
Gender		
Male	18	72
Female	7	28
Total	25	
Side		
Left	13	52
Right	12	48
location		
Buccal mucosa	12	48
alveolus GBS complex	5	20
angle of mouth	4	16
Maxilla	4	16
T - stage		
T1	5	20
T2	10	40
T3	6	24
T4 WITH RT AND CT	4	16

Table 1. Age and Gender Distribution in the Present Study

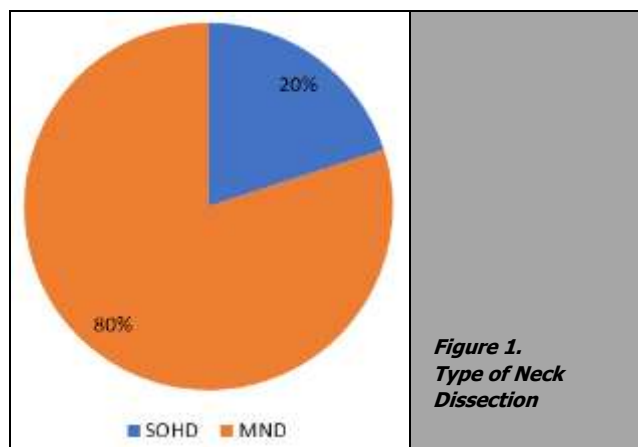
Out of 25 patients, 18 were male and 7 were female, a ratio of 2.57: 1. The highest number of patients belonged to fourth and the fifth decade. The oldest patient was a 75-year-old male patient, and a female patient with 72 years. Tumours are slightly on left side of face of 52 %.

The most common location of tumour was in the Buccal mucosa in 48 % followed by alveolus GBS complex constituting 20 % followed by angle of mouth 16 % and maxilla in 16 %. Most of the cases in study belong to T2 and T3 staging.

Type of Resection	No of Cases	Percentage
Wide excision	16	64
Marginal mandibulectomy	5	20
Maxillectomy	4	16

Table 2. Type of Tumour Resection

Wide excision with adequate margin was done in 16 cases. Marginal mandibulectomy was done in 20 % and marginal maxillectomy in 16 %.



Timing of Division of Flap	Number of Patients	Percentage
Within 3 weeks	6	24
After three weeks	16	64
Patients never turned up	3	12

Table 3. Timing of Second Procedure

Type of Complication	Number of Patients	Percentage
Tip Necrosis	2	8
Bleeding	2	8
Orocutaneous Fistula	4	16
Lagophthalmos	4	16
Dehiscence and Resuturing	3	12
SSG Donor site Delayed Healing	4	16

Table 4. Complications in Present Study



The neck was addressed in most cases. Supra-omohyoid neck dissection (SODH) was the most commonly done procedure constituting 20 % of all the neck dissection

followed by Modified neck dissection (MND) type II in 48 % cases. Size of the flap ranged from 6 x 7 cms to 14 x 7.5 cm. Debulking was done in 4 cases. Four patients developed lagophthalmos due to neuropraxia of frontal branch of facial nerve and all cases recovered once the flap was discarded. All the donor sites over forehead healed well without complications. There was no loss of the flap in our study.

DISCUSSION

In our study males were more commonly affected than female with a ratio of 2.6: 1. In Rowland Agbara ET Study group males accounted for 71 % of their cases and the most commonly affected age group was in the 4th to 6th decade.^{4,5} The same age group was reported in Mohammad Ilyas Shaikh study.⁶ Advanced age is often associated with chronic cardiac failure, aortic valve stenosis, and decreased systolic function. This is well known, since low cardiac index cannot provide flap perfusion pressure and left ventricular failure guarantees loss of transferred tissue (Adams and Charlton, 2003). Perhaps patients with significant cardiac disease should undergo less ambitious surgery, although aesthetically less satisfactory. Elderly patients are prone to systemic complications of 40 %. These mainly involve pneumonia, sepsis, arrhythmias, acute coronary syndrome, and agitation because of electrolyte imbalances or other causes. Advanced age was investigated as an independent risk factor for microsurgery. Beausang et al.⁷ and Howard et al.⁸ classified age as a risk factor. Both right and left side of oral cavity were involved in almost same proportion.

Wide excision of the oral cavity tumour was done in majority of patients and the margin of the excision almost abutting onto the angle, and in some cases angle of lip had to be sacrificed, thus most of our flaps were routed externally, for oral cavity inset. Edges of the flap were moulded and used to reconstruct the lost lip defects by suturing the upper and lower edges of the flap to the remnant edges of the lip. These flaps showed initial congestion, due to kinking of the flap at the edge of lip, later in four to five days it relived following massage and use of Heisters dilator. The smallest size of the flap was 6 x 7 cms and the largest was 14 x 7.5 cm. The complication rate was also very less with tip necrosis in minor cases.

3 cases of post irradiation tumour resection, defects⁹ were reconstructed with this flap. In previously irradiated head and neck cases, the Surgeon encounters paucity of vessels, fibrosis of vessels and Free flaps require vigorous post op monitoring and occasionally may require re exploration and *- are associated with four time's greater risk of complications hence lateral forehead flap in these cases was successful. Wang, Lu MD* et al used this flap in 7 patients with 100 % results.¹⁰ Deutsch et al¹¹ recently presented conflicting data from 140 patients who underwent reconstruction with fibular free flap reconstruction of the mandible, suggesting inferior results with the addition of XRT either before or after surgery with over all complication rates of 45 %.

We had 2 patients presenting with recurrence in post op buccal mucosal defects reconstructed with radial forearm free flap. These two patients underwent tumour excision followed by reconstruction with forehead flap. One female patient with history of diabetes and hypertension and with heavy breasts forehead flap was used with stage 2 tumour oral cavity. In most patients, forehead flap was discarded after 3 weeks except in 4 cases where the flap subunit was returned on the request of patients. All these cases were done under regional anaesthesia.

In 4 cases of, antral carcinoma, following maxillectomy forehead flap was used for both lining of palate and cover over cheek. Sahu et al¹² reported that post maxillectomy defect reconstruction with forehead flap in single case, with good result. Flap for covering the hard palate avoids the need for obturator with problem of recurrent removal and reintroduction. Four patients developed lagophthalmos due to neuropraxia of frontal branch of facial nerve and all cases recovered once the flap was discarded. All the donor sites over forehead healed well without complications. There was no loss of the flap in our study. There are different flaps to reconstruct surgical defect in the head and neck region. There are many advantages of a local flap. They cause less morbidity and less donor site defect. The colour match of a local flap is better as compared to distant flap. The procedures are less expensive to the institute. They are less time consuming which is of added benefit for patient with comorbidities.

Many years prior to McGregor's 1963 publication on the extended forehead flap, Gillies and Millard stated in their book *The Principles and Arts of Plastic Surgery*, that "the tint of forehead skin so exactly matches that of the face and nose that it must be first choice. With some plastic juggling, the forehead defect can be camouflaged effectively." This quote brilliantly summarizes our points of discussion.

Finally, advantage of lateral forehead flap is that it replaces "Like-with Like", Less bulky than free flap with little risk of vascular compromise and it is Quicker to perform. The donor area is shiny and well accepted. No microsurgery training, equipment, meagre facility and trained personnel are required and is reliable in post-radiation/palliative reconstructive cases. Success rate with this flap is 100 % on par with any other free flap. Only disadvantage with this flap is that it requires two stage procedure, and obvious donor site visibility. The second stage procedure has the advantage of doing under local Anaesthesia.¹³

CONCLUSIONS

The overall aesthetic result of local flaps was satisfactory in majority of cases. Forehead flap proved to be a relatively easy and quick method for reconstructing facial defects. Raw area over the forehead was covered with a split skin graft. The deformity in the forehead was minor and well accepted. The forehead flap remains a reliable option in orofacial soft tissue defect reconstruction. It is easy to raise, can provide

coverage for wide defects, does not require patient repositioning and provides good textural, thickness and colour match when compared with the recipient site tissues. Lateral forehead flap is ideal for reconstruction of oral cavity defects, defects of maxillary antrum, cheek defects and angle of the mouth defects. It is also useful in post-radiotherapy patients where there is deficiency of recipient vessels, and fibrosis of vessels.

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