

BUCCAL FAT PAD RECONSTRUCTION OF MALIGNANT BUCCAL MUCOSAL DEFECTS REVISITED in THE ERA OF FREE FLAPS: A SERIES OF SIX CASES

ENT

K Ramesh	Associate Professor, Government ENT Hospital, Koti, Hyderabad, Telangana, India.
Kiran Kumar M	Assistant Professor, Government ENT Hospital, Koti, Hyderabad, Telangana, India.
Vidyasagar Reddy A	Assistant Professor, Government ENT Hospital, Koti, Hyderabad, Telangana, India.
Nitya Goddanti	Assistant Professor, Government ENT Hospital, Koti, Hyderabad, Telangana, India.
B Reshma	Civil Assistant Surgeon, Government ENT Hospital, Koti, Hyderabad, Telangana, India.

ABSTRACT

Purpose: The aim of this study was to study and report the clinical experience of pedicled Buccal fat pad (BFP) in reconstructing malignant buccal mucosal defects. **Methods:** A retrospective study of 6 patients diagnosed with carcinoma of buccal mucosa were included in the study. The patients were assessed and operated over a period of 2 years between 2022-24. Wide excision of the primary tumor with reconstruction using pedicled buccal fat pad was performed. **Results:** Two out of these six cases suffered partial flap loss and one among them developed postoperative trismus. Pedicled BFP was found to be versatile, easy to harvest with faster healing. This study shows pedicled BFP to be an ideal choice of graft for small to medium sized malignant defects of cheek.

KEYWORDS

Buccal fat pad, carcinoma buccal mucosa, buccal mucosa defects, reconstruction

INTRODUCTION

Buccal mucosa is the most common (40%) site of oral cancers in Southeast Asian population. Consumption of betel quid that is culturally embedded in this region is a contributory factor. Small defects upto 2 cms can be closed primarily. Very superficial lesions could be left to heal by secondary intention or split skin grafts. Local flaps that were traditionally used for larger defects included Lateral tongue flap, Nasolabial flap, Temporo-parietal fascia flap and Facial artery musculomucosal flap (FAMM). Regional flaps like forehead flap or Platysma flap have also been used. The ideal choice of flap for large defects remained free flaps like, Radial forearm flap or thin Anterolateral thigh (ALT) flap.

Buccal fat pad (BFP) has been in use for the closure of oroantral and oronasal communications in the past. Pedicled BFP was first described by *Egvedi* in 1977 for the closure of oroantral fistulas¹. *Neder* in 1983 first used it as a free flap². *Tiedmann* et al. reported that BFP epithelialized within 2-3 weeks³. It's role in the reconstruction of intraoral malignant defects has only recently been tapped. The ease of harvesting, relatively few complications and impressive functional outcome have encouraged the use of pedicled BFP for selective intraoral defects.

Anatomical Considerations

Buccal fat pad (BFP) also known as **Bichat's fat** lies in the space between buccinator laterally and masticator medially. It is covered by a capsule and is divided into a body that lies behind the zygomatic arch and has four processes (temporal, buccal, superficial and deep temporal). Figure 1. a,b. It is the buccal process that is used in reconstructing oral defects as it is most superficial. BFP derives its blood supply from the buccal branch of maxillary artery, superficial temporal artery and buccal branch of facial artery. For this reason, the BFP can be considered as a pedicled graft with an axial pattern. Owing to its rich blood supply the healing is faster. The epithelialisation process lasts about 6 weeks and its covering epithelium and deep fibrous tissue complete its healing, regardless of the extent of graft coverage with oral mucosa. The BFP is fixed by ligaments to maxilla, zygomatic arch and infraorbital fissure. Damage to the ligaments or the capsule can lead to its prolapse into the oral cavity. Hence the focus has shifted to refining the method of harvesting the BFP graft.

It mainly functions by acting as a cushion between the masticator muscles when they contract and to counteract the negative pressure during suction in a new born. Its average volume is 9.6 ml and when properly dissected and mobilised, it provides a maximum of 6 x 5 x 3 cms of pedicled graft. The potential complications of harvesting BFP are less frequent like hematoma, infection (0.6%), facial nerve injury, partial necrosis (7.9%), and excessive scar formation (5.4%)⁴. The main

advantages of BFP are the ease of harvesting and low rate of complications. BFP does have its limitations, but, with good patient selection, it remains a good constructive option for small to medium sized oral defects.

METHODS

This was a prospective study conducted over a period of 2 years from 2022-24 at Government ENT Hospital, Koti, Hyderabad, Telangana. A total of 6 cases (4 males and 2 females) were included with their ages ranging from 27-45 years. Primary malignant lesions limited to the buccal mucosa less than or equal to T3 irrespective of nodal status and without distant metastasis were selected. T4 lesions, lesions with <1 cm margin from angle of mouth, floor of mouth, retromolar trigone and those with a history of exposure to radiation were excluded from this study. An incisional biopsy of all the buccal mucosal lesions was first done which reported squamous cell carcinoma in all the 6 cases. All the patients underwent contrast enhanced computerised tomography (CECT) and Gadolinium enhanced Magnetic resonance imaging (Gd MRI) of head and neck to confirm the extension of primary and nodal involvement. Ultrasound (USG) guided fine needle aspiration cytology (FNAC) of the neck nodes was done in patients with N+ neck. Surgical management involved wide excision of the primary with a clear margin of 1 cm around the growth under general anaesthesia. The specimen was sent for Histopathological examination (HPE). Patients with N₀ neck underwent a prophylactic ipsilateral supraomohyoid neck dissection (SOHD) using the upper Mac fee incision. Patients with N₁ neck underwent a Modified Radical neck dissection (MRND) using the modified Schobinger approach. For the reconstruction of the primary defect, a small vertical mucosal incision was given anterior to the ramus of the mandible after adequate infiltration with 2% xylocaine BFP was delivered atraumatically after blunt dissection in Buccal space. The malignant defect was covered with BFP without any tension and sutured to margins with 3-0 Vicryl.

Patients were strictly prohibited from oral feeds or rinsing of mouth for 7 days and were advised nasogastric feeds. Graft was assessed daily and cleaned with saline soaked gauze twice daily. Patients were advised evaluation after 2 weeks, 1 month and every 3 months for 2 years. The following is a brief description of the 6 cases. Figure 2. a,b,c

Case 1

A 27 year old male presented with a 4 x 3 cms ulceroproliferative growth of the left buccal mucosa and a single palpable lymph node measuring 1.8 cms in level **Ib** with a H/O smoking for 15 years staged - **T₂N₁M₀**. Patient underwent wide excision of the primary with left MRND type III (Comprehensive neck dissection). Immediate postoperative period showed partial loss of flap. HPE of specimen was

reported as well differentiated squamous cell carcinoma with negative margins. Fibrotic scar developed around 6 months post-operatively resulting in grade 2 trismus. Device assisted jaw exercises using Heister jaw stretcher was advised after wound healing. Patient had partial improvement of trismus (grade 1) over a period of 6-8 months. Figures 3.a,b,c

Case 2

A 32 years old male presented with a 4 x 4cms ulceroproliferative growth of the buccal mucosa on the left with a history of tobacco chewing and smoking for 20 years. It was staged - $T_3N_0M_0$. The patient underwent wide excision of the primary along with left prophylactic supraomohyoid neck dissection. HPE revealed moderately differentiated squamous cell carcinoma with negative margins. Immediate postoperative period and subsequent follow ups up to 8 months were uneventful.

Figures 4. a,b,c

Case 3

A 36 years old male presented with a 4 x 5cms ulceroproliferative growth on right involving the buccal mucosa and retromolar trigone. Neck examination revealed multiple lymph nodes in level Ib, largest measuring 22mm, hence staged - $T_3N_{2b}M_0$. A wide excision of primary and ipsilateral MRND III was performed. HPE was suggestive of well differentiated squamous cell carcinoma with negative margins. In the immediate postoperative period a partial loss of graft was observed. He was lost to follow up after 8 months.

Figures 5. a,b,c

Case 4

A 45 years old female presented with a 3 x 3 cms exophytic lesion of right buccal mucosa with intact overlying mucosa. She had a history of tobacco chewing for 15 years and was staged - $T_2N_0M_0$. Wide excision of the primary with right SOHD neck dissection was planned. HPE showed a well differentiated SCC with negative margins. Immediate postoperative period and follow up upto 12 months was uneventful.

Figures 6. a,b,c

Case 5

A 42 years old male presented with a non healing ulcer of left buccal mucosa measuring 2.5 x 3 cms. Wedge biopsy of the lesion suggested squamous cell carcinoma. He had a history of smoking for 20 years. The tumor was staged - $T_2N_0M_0$. Wide excision of the primary along with left SOHD neck dissection was performed. HPE revealed moderately differentiated squamous cell carcinoma. Immediate postoperative period and subsequent follow up for 10 months was uneventful.

Figures 7. a,b,c

Case 6

A 38 years old female with an ulceroproliferative growth of the left buccal mucosa measuring 3.5 x 3 cms. A single lymph node measuring 17mm was present in level Ib. The staging of the tumor was - $T_2N_1M_0$ and she underwent wide excision of primary with comprehensive neck dissection (MRND III). HPE showed well differentiated squamous cell carcinoma. Immediate postoperative period and subsequent follow ups for 10 months were uneventful.

Figure 8

RESULTS

Of the 6 cases included in our study, 2 are female and 4 are male patients. The mean age of presentation was 36.66 ± 5.25 . The primary tumour involving buccal mucosa alone was seen in 5 patients, whereas, one had extension to ipsilateral retromolar trigone. The histopathological diagnosis in all the cases was squamous cell carcinoma, two of which were moderately differentiated and the others well differentiated.

In the immediate postoperative period all but 2 patients fared well. Two of them developed a partial loss of flap and one of which healed with fibrosis. Epithelialisation of BFP began at the end of first week and was completed by 4-6 weeks. None of these cases had hematoma or infection at the wound site. Margins of excised tumour were clear in all the cases, hence there wasn't a need for adjuvant treatment. After 3 months BFP was entirely replaced by normal mucosa with minimal fibrosis. None of the patients had recurrence of malignancy. Mean follow up period was 9 months. The mouth opening postoperatively was satisfactory in five patients. One of them developed grade 2

trismus and was advised jaw opening and stretching exercises but was lost to follow up.

DISCUSSION

BFP has an increased popularity due to its reliability, ease of harvest, low complication rate, rich vascularity and minimal donor site morbidity^{5,6}. Intraoral soft tissue defects can be caused by several causes⁸, and donor-site morbidity with additional scarring, together with longer operation time discourages the use of vascularized flaps especially for the reconstruction of small-to-medium-sized oral defects. BFP can provide a maximum of around 7 x 4 x 3 cms of pedicled graft and an average volume of 9.6ml. Body and the buccal extensions of BFP are accessible through oral cavity. Epithelialisation begins at the end of first week and is completed by 4-6 weeks.^{9,7} Samman et al.⁵ first reported about the histological nature of the healing process of the buccal pad fat. He stated that no fat cells were seen in sections taken from healed sites, indicating at least partial fibrosis of the fat tissue^{5,9}. BFP is an ideal graft for small to medium sized buccal mucosal defects. The other uses of BFP include repair of pre malignant lesions of oral cavity and oropharynx, repair of oro-antral fistulae, OSMF, medium sized maxillectomy defects (premolar to tuberosity region), defects of soft palate, hard palate and retromolar trigone. Potential complications of using BFP include partial necrosis (7.9%), scar formation (5.4%), infection, hematoma, injury of buccal branch of facial nerve. The success rate of buccal fat pad in the reconstruction of oral defects is quite high in all the previous articles^{5,10,11}. The technique is simple and it has been performed by different surgeons with a high success rate. The only disadvantage is that it can be used for only once.

CONCLUSION

BFP because of its access and rich blood supply appears to be one of the safest reconstructive methods for **small to medium (T1 and T2)** sized buccal mucosal malignant defects.

Abbreviations

BFP Buccal fat pad
HPE Histopathological examination
SCC Squamous cell carcinoma
SOHD Supraomohyoid neck dissection
FAMM Facial artery musculomucosal flap

Declarations

Funding

The author(s) received no financial support for the research, authorship and/or publication of this article.

Conflicts of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Authors' contribution

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by K Ramesh, Kiran Kumar M, Vidyasagar Reddy A, Nitya Goddanti and B Reshma. The first draft of the manuscript was written by Nitya Goddanti and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Ethics approval

The study protocol was approved by the institution ethics committee.

Consent to participate and publication

As this was a retrospective analysis of medical charts, no informed written consents were taken.

Table 1 – Patient Details, Tumour Description And Postoperative Outcome In The Current Series

Age (yrs)	Sex	Site	Size (cm)	HPE	Stage	Immediate Post Operative Period	Healing
27	M	BM	4X3	WDSCC	$T_3N_1M_0$	Partial loss	Fibrotic scar
32	M	BM	4X4	MDSCC	$T_3N_0M_0$	-	-
36	M	BM+ RMT	4X5	WDSCC	$T_3N_1M_0$	Partial loss	-
45	F	BM	3X3	WDSCC	$T_2N_0M_0$	-	-

42	M	BM	2.5X3	MDSCC	T ₂ N ₀ M ₀	-	-
38	F	BM	3.5X3	WDSCC	T ₂ N ₁ M ₀	-	-

M-male, F-female, BM-buccal mucosa, RMT-retromolar trigone, WDSCC-well differentiated squamous cell carcinoma, MDSCC-moderately differentiated squamous cell carcinoma, HPE - histopathological examination

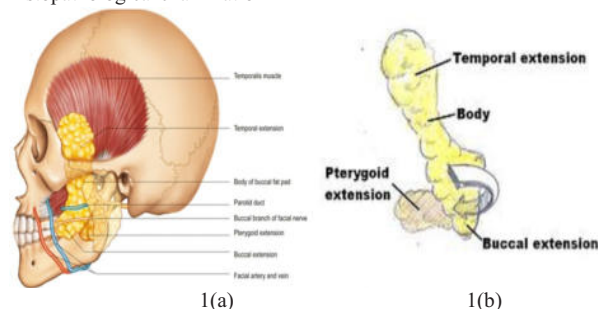


Figure 1 - Showing (1a) anatomy of Buccal fat pad, (1b) parts of Buccal fat pad

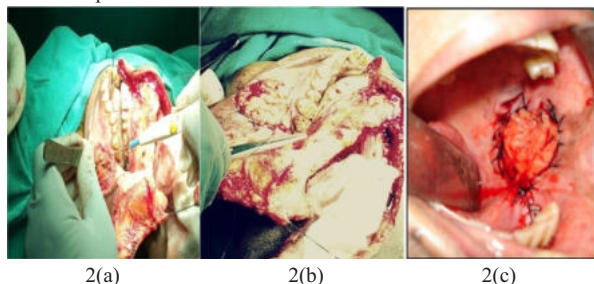


Figure 2 - Showing steps of wide excision and reconstruction (2a) showing wide excision of primary with at least 1cm margin, (2b) reconstruction of primary defect after delivering Buccal fat pad without tension, (2c) immediate post operative period showing healthy graft

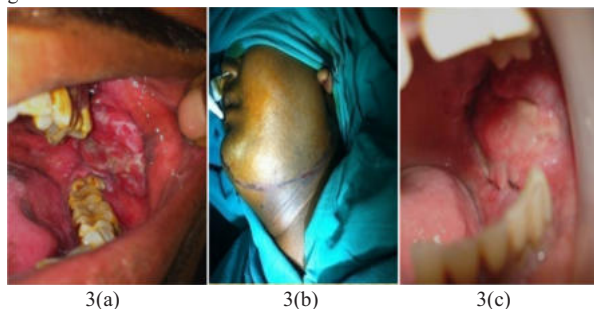


Figure 3 - Case 1 (3a) showing the tumour measuring 4 x 3 cms, (3b) showing marking of the incision i.e., Upper McFee extending to lower lip split for excision of primary and selective neck dissection (left MRND type III), (3c) Post-operative period showing posterior defect between Buccal fat pad and primary defect

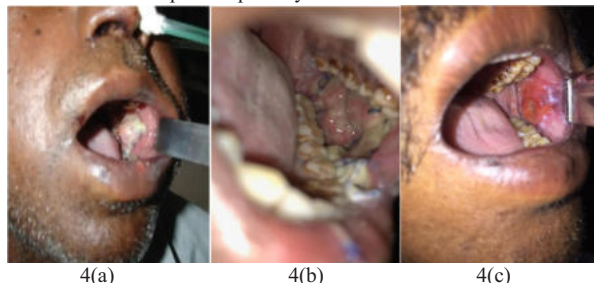


Figure 4 - Case 2 (4a) showing the tumour measuring 4 x 4 cms of left Buccal mucosa, (4b) showing graft uptake in the immediate post-operative period, (4c) 3 months post-operative period showing healthy mucosalisation of the graft

Figure 5 - Case 3 (5a) showing the tumour measuring 4 x 5 cms involving Right Buccal mucosa with extension to Retromolar trigone, (5b) showing immediate postoperative neck wound for Right MRND type III, (5c) Post-operative period showing healing defect region despite partial loss of flap in the immediate postoperative period.



5(a) 5(b) 5(c)



6(a) 6(b) 6(c)

Figure 6 - Case 4 (6a) showing immediate post operative status of healthy graft uptake, (6b) and (6c) showing immediate post operative neck wound (Upper McFee incision) with median lower lip split extension



7(a) 7(b) 7(c)

Figure 7 - Case 5 (7a) showing 4 x 4 cms ulceroproliferative growth of left Buccal mucosa, (7b) showing immediate postoperative graft uptake, (7c) Subsequent follow-up showing mucosalisation of defect region



Figure 8 - Case 6 showing ulceroproliferative growth of Right Buccal mucosa measuring 3 x 3 cms

REFERENCES

- Egyedi P. Utilization of the buccal fat pad for closure of oro-antral and/or oro-nasal communications. *J Maxillofac Surg* 1977;5:241-4.
- Neder A. Use of buccal fat pad for grafts. *Oral Surg Oral Med Oral Pathol* 1983;55:349-50.
- Tideman H, Bosanquet A, Scott J. Use of the buccal fat pad as a pedicled graft. *J Oral Maxillofac Surg* 1986;44:435-40.
- Bither S, Halli R, Kini Y. Buccal fat pad in intraoral defect reconstruction. *J Maxillofac Oral Surg*. 2013 Dec;12(4):451-5.
- Samman N, Cheung LK, Tideman H. The buccal fat pad in oral reconstruction. *Int J Oral Maxillofac Surg*. 1993;22(1):2-6. doi: 10.1016/S0901-5027(05)80346-7. [PubMed] [CrossRef] [Google Scholar] [RefList]
- Hanazawa Y, Itoh K, Mabashi T, Sato K. Closure of oro-antral communications using a pedicled buccal fat pad graft. *J Oral Maxillofac Surg*. 1995;53(7):771-775. doi: 10.1016/0278-2391(95)90329-1. [PubMed] [CrossRef] [Google Scholar] [RefList]
- Chao CK, Chang LC, Liu SY, Wang JJ. Histologic examination of pedicled buccal fat pad

- graft in oral submucous fibrosis. J Oral Maxillofac Surg. 2002;60(10):1131–1134. doi: 10.1053/joms.2002.34981. [PubMed] [CrossRef] [Google Scholar] [RefList]
8. Kim MK, Han W, Kim SG. The use of the buccal fat pad flap for oral reconstruction. Maxillofac Plast Reconstr Surg. 2017 Feb;39(1):5.
 9. Rapis AD, Alexandridis CA, Eleftheriadis E, Angelopoulos AP. The use of the buccal fat pad for reconstruction of oral defects: review of the literature and report of 15 cases. J Oral Maxillofac Surg. 2000;58(2):158–163. doi: 10.1016/S0278-2391(00)90330-6. [PubMed] [CrossRef] [Google Scholar] [RefList]
 10. Hao SP. Reconstruction of oral defects with the pedicled buccal fat pad ap. Otolaryngo Head Neck Surg. 2000; 122:863–867
 11. Baumann A, Ewers R. Application of the buccal fat pad in oral reconstruction. J Oral Maxillofac Surg. 2000; 58:389-92.