



THE VERSATILITY OF BUCCAL FAT PAD IN ORAL AND MAXILLOFACIAL RECONSTRUCTION AND ITS OUTCOMES

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ABSTRACT

BACKGROUND: To study the versatility of buccal fat pad in oral and maxillofacial reconstruction and its outcomes.

METHOD: This study was undertaken to assess the use of buccal fat pad (BFP) as a pedicled graft to reconstruct medium-sized surgical defects of the oral soft tissues in 20 patients (n=20) like OSMF, OAC and Palatal non-healing ulcers etc. Two of all the defects were in the hard palate (10%), four were of OAC (20%), and fourteen in the cheek and oral commissure (70%). The BFP was left uncovered to epithelialize in all patients.

RESULT: 20 patients meeting the inclusion criteria were selected for the study and BFP was used for its reconstruction. BFP healed without any complications within 3 to 4 weeks in all the patients. Harvesting the graft proved to be extremely easy, and care was only necessary to avoid severing the supporting vascular plexus and the thin capsule covering the BFP.

CONCLUSION: The findings support our study that the BFP is a useful, easy, and uncomplicated alternative method for the reconstruction of small to medium-sized surgical defects of the oral soft tissues.

KEYWORDS: buccal fat pad; oroantral communication; oral submucous fibrosis; non-healing ulcers; BFP reconstruction.

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1. INTRODUCTION

Soft tissue coverage is an essential step for successful wound healing. Intraoral wounds have certain unique features compared to other wound sites. The soft tissue overlying the alveolar bone is relatively thin, and there is no fatty layer in the gingiva. Intraoral soft tissue defect can be induced by various diseases or complications.

After the first clinical use of the buccal fat pad (BFP) by Egyedi in 1977, its use has increased rapidly during these years.⁵ The buccal fat pad has become more and more popular for closing oro-nasal and oro-antral communications (OACs) in oral surgery.

The BFP is located within the masticatory space. As its name indicates, the pterygopalatine extension extends into the pterygopalatine fossa. The pterygoid extension extends into the pterygomandibular space, medial to the ramus, and surrounds the pterygoid muscles. The temporal extension has a superficial and deep portion. The superficial temporal portion is located between the temporalis muscle, its tendon, and the deep temporal fascia.⁴

The vascularization of the BFP is rich with an abundant capillary network derived from three branches of the maxillary artery: the deep temporal, buccal, and superior posterior alveolar arteries. Additional blood supply is derived from branches of the facial artery and from the transverse facial artery, which is a branch of the superficial temporal artery. These branches make a subcapsular plexus. Due to this rich blood supply, the BFP can be used as a pedicle graft. Also, it explains the great success rate of the BFP flap. The BFP has a very rich subcapsular capillary plexus. Arterioles go into the capsule, travel along the septa of the BFP, and finally make a capillary network among adipocytes. This circulation system is similar to the other white adipose tissues. However, the capillary plexus of the BFP is smaller and

its capillaries are wider. The venous drainage is provided by the facial vein. The BFP flap is therefore categorized as an axial flap¹.

Buccal fat pad has many possible functions: filling and allowing slippage of fascial spaces between mimetic muscles; enhancement of intermuscular motion, separating muscles of mastication from one another; to counteract negative pressure during suction in the newborn; protection and cushion of neurovascular bundles from injuries.

So, this present study was up taken to evaluate the versatility of buccal fat of pad in reconstruction of various oral and maxillofacial defects, its healing and associated complications.

2. MATERIALS AND METHOD

SOURCE OF DATA

20 patients between the age group of 18- 70 years irrespective of gender who reported to the Department of Oral and Maxillofacial Surgery, Darshan dental college and hospital Loyara, Udaipur (Rajasthan) who had oral defects.

Inclusion criteria:

1. Patients who are willing to participate in study.
2. Patients above 18 years.
3. Patients without systemic diseases or comorbidities (affecting bone metabolism).
4. Patients with controlled systemic/ metabolic diseases.

Exclusion criteria :

Medically compromised patients (systemic diseases affecting bone metabolism and having type 2 diabetes mellitus).

1. Operated failed cases of buccal fat pad.
2. Patients receiving radiation therapy or chemotherapy to the head and neck region.
3. Patients on long-term antibiotics or steroid therapy.

4. Patients who are not willing to participate in study.

3. METHODOLOGY

A. Patient selection: (Photograph 1 and 2)



Photograph. 1



Photograph2

Patients with any defect or lesions in oral cavity which fits the criteria of reconstruction with buccal fat pad were selected for the minor oral surgical procedure. A detailed case history was obtained, all patients underwent routine blood investigations. The procedure was carried out after obtaining an informed consent from the patient.

B. Surgical procedure:

- a) Local anesthesia with 2% lignocaine in 1:80000 adrenaline was administered in the maxillary vestibule on the ipsilateral side as the defect.
- b) At the level of the second molar at approximately 1cm above the mucogingival junction, a 2cm mucosal horizontal incision is made with Bard parker blade No. 15 in posterior incision.
- c) Bard parker blade no 15 used to incise the maxillary periosteum, along with mucosal incision.
- d) The closed beaks of a curved artery forceps were introduced through periosteal incision intending cranially in the area of second and third molars to create a submucosal tunnel.
- e) Blunt dissection through the buccinator and loose surrounding fascia allowed buccal pad of fat to herniate in to the mouth. (Photograph 3 and 4)



Photograph.3



Photograph. 4

f) After the pad is detached from the adjacent tissues grasp with vascular forceps, carefully take out and extended to the defect.

g) Closure was done with 3-0 silk sutures. **(Photograph 5 and 6)**



Photograph. 5



Photograph. 6

h) Post-operative instructions were given.

i) Analgesics and antibiotics were prescribed.

j) Sutures were removed on 7th postoperative day.

k) Patients were recalled after 1st month, 3rd month, 6th month and 12th month for follow up. **(Photograph 7 and 8)**



Photograph.7



Photograph. 8

C. Follow up Clinical evaluation:

The patients were recalled on 3rd, 5th and 7th day and after 1st month, 3rd month, 6th month and 12th month post-surgery for evaluation of soft tissue healing. Suture removal was done on 7th post-op day.

D. Data collection:

A detailed case history was obtained. The procedure was carried out after obtaining an informed consent from the patient. Patients were recalled after 7 days for suture removal and evaluation of soft tissue healing. Patients were recalled after 1st month, 3rd month, 6th month and 12th month for follow up.

4. RESULTS

The present study included 20 patients with intraoral soft tissue defects like oral submucous fibrosis, non-healing palatal ulcer, and oroantral fistula. Buccal fat pad reconstruction was done. Compilation of the data of the patients who underwent BFP surgery is summarized in **table 1**.

The **table 2** shows the maximum mouth opening pre- and post- surgery of operated

patients (N=14) with a mean pre- and post-operative value of 15.43 and 33.14 respectively. Standard deviation pre-operatively is 2.848 and post-operatively is 2.143. P- value was set at ≤ 0.05 .

Table 3 mentioned out of 20 pts on basis of age distribution in the study groups majority of the patients selected for study fell into three age groups 26-45 years > 46-70 years > 18-25 years.

According to gender distribution there were 20 patients out of which 08 were females (40%) and 12 males (60%) which shows in **table 4**.

Follow-up period of 12 months was taken for all the patients, the data was collected and noted in the Microsoft excel spreadsheet 2020.

Statistical Analysis for Social Sciences (SPSS) Version 21.0, IBM Inc was used for analysis. Paired t-test was applied to find the statistical significance between the groups. P values less than 0.05 was considered as statistically significant with a confidence interval of 95%.

Table I : Clinical summary of the patients who underwent pedicled buccal fat pad (BFP) grafting.

Patient num	MMO in mm		VAS	Indication	Follow up	Healing
	Pre	Post				
1	N/A	N/A	1	Palatal Non healing ulcer	6 Months	Adequate
2	19	35	2	OSMF	12 months	Adequate
3	20	32	2	OSMF	15months	Adequate
4	15	34	2	OSMF	13 months	Adequate
5	13	33	2	OSMF	6 months	Adequate
6	15	30	2	OSMF	12 months	Adequate
7	18	38	2	OSMF	10 months	Adequate
8	N/A	N/A	1	OAC	1 month	Adequate
9	N/A	N/A	1	OAC	1 month	Adequate
10	N/A	N/A	3	OAC	2 months	Adequate
11	N/A	N/A	3	OAC	1 month	Adequate
12	N/A	N/A	2	Palatal Non healing ulcer	6 Months	Adequate
13	13	34	2	OSMF	8 months	Adequate
14	19	33	2	OSMF	12 months	Adequate
15	11	35	2	OSMF	15 months	Adequate
16	15	33	2	OSMF	6 Months	Adequate
17	17	34	3	OSMF	8 months	Adequate
18	12	32	1	OSMF	5 months	Adequate
19	16	30	3	OSMF	6 Months	Adequate
20	13	31	3	OSMF	7 months	Adequate

Table 2 shows maximum mouth opening pre- and post- surgery

	Mean	N	Std. Deviation	Std. Error Mean	P - value

MMO	Pre- Surgery	15.43	14	2.848	.761	≤ 0.05
	Post- Surgery	33.14	14	2.143	.573	≤ 0.05

Table 3 gives distribution of the study groups according to age

Age				
	Frequency	Percent	Valid Percent	Cumulative Percent
18-25 years	5	35.0	35.0	35.0
26-45 years	9	60.0	60.0	95.0
46-70 years	6	5.0	5.0	100
Total	20	100.0	100	

Table 4 gives distribution of the study groups according to gender.

Gender				
	Frequency	Percent	Valid Percent	Cumulative Percent
Male	12	60.0	60.0	100.0
Female	08	40.0	40.0	40.0
Total	20	100.0	100.0	

5. DISCUSSION

The buccal fat pad (BFP) is a mass of fatty tissue, distinct from subcutaneous fat, situated in the masticatory space close to the Stenson's duct. It extends along the anterior border of the masseter, deeply between the buccinator muscle medially and the mandible laterally, descending to the retromolar region. It consists of fat (approx. 10 mL in volume) covered by a fascial envelope.

Hassani et al. reported the use of the BPF with a mixture of autogenous bone graft in

sinus lifting procedure and covering the lateral wall of sinus for the first time. They believed that the BFP serves as both a physical barrier and a high vascularized bed for the bone graft. Tamura et al. used the BFP for augmentation of the vocal cord.⁴

Khouw et al. reported the use of the BFP for palatal reconstruction when it is combined with a superiorly based pharyngeal flap. They used this technique to lengthen the soft palate in patients with extensive necrotizing defects.⁴ In our study, we have used BFP in the palatal reconstruction of the defect with satisfactory results.

El Haddad et al. reported the use of the pedicled BFP for covering of class IV Miller gingival defects. The BFP provides a significant amount of keratinized tissue for the gingival recession of the maxillary molars.⁸

Recently, researchers increased their focus of interest on adipose tissue-derived stem cells, and the BFP was introduced as a source of stem cells. Farré-Guasch et al.⁴ had claimed that the BFP is a source of stem cells. ASCs present in adipose tissue are able to differentiate into several lineages and express multiple growth factors, which makes them suitable for clinical application.

Buccal process and body of BFP are ideal for grafting. It provides a graft of approximate size of 6 x 5 x 3 cm to 7 x 4 x 3 cm. Average thickness of this graft is 6 mm and weight is 9.3 gm. Area of the graft achieved is 10 cm² and a volume of 10 mL¹¹. BFP is mostly used for reconstruction of small to medium sized defects. The application of the BFP as a grafting source has earned popularity in the closure of intraoral defects in these recent years because of ease of access and high vascular supply.

Traditionally, in the treatment of Oroantral fistula, buccal advancement flaps and rotational palatal flaps were used. These flaps cause vestibular hollowing and therefore its use is limited. Newer methods like BFP were introduced which is a simple procedure and it gave higher success rate in healing of OAF. Here, complete removal of the infected tissue should be done, if not reperforation can occur. It has some limitations, as fistulas located at the anterior portions of the palate limit the length of the flap, in these cases it has to be passed over the molar teeth, which adds to the risk of it being bitten during chewing.

In the present study, 20 patients with intraoral defects which were indicated for

reconstruction of oral defects with BFP were included. These intraoral defects included patients with OSMF (grade II & III), palatal defects and those with OAF. The average mouth opening (MIO) of the patients with OSMF was 15 to 20 mm. The intra-operative MIO ranged between 35 to 38 mm, which was limited to 20 -25 mm in the first post-operative week. MIO at around 4 weeks achieved was 30 – 35 mm after complete epithelization. Over a 15-month follow-up period, no evidence of dehiscence or recurrence was observed and BFP graft survived, thus proving successful.

Amin et al.¹¹ suggested using a cover or an oral closing device using acrylic resin (obturator) to protect stimulation and damage of the operated area. In our patients, we did all surgical procedures under aseptic protocols and under local anesthesia with satisfactory results.

BFP was proven successful in OAF closure. For the closure of the fistula, pedicled BFP was used. Absorbable sutures with minimal tension were placed. No reperforation, dehiscence or necrosis of the flap was observed after a period of 4 weeks.

Colella et al. who used BFP flap for large size fistulas and reported their experience on using BFP flap for intra-oral reconstruction after tumor removal.¹⁷ The present study showed use of BFP with small to moderate sized defects and the results were similar and satisfactory.

Chien et al.¹⁹ have calculated the width of the jaw opening after reconstruction using 3 different strategies : the forearm free flap, the skin graft, and the BFP flap. The widths in these cases were 7.4%, 24.5%, and 33.1%, respectively. In the included cases in this study, there were no instances of limited mouth opening after reconstruction.

Also, Hasibul et al.²⁰ showed similar results to our study. He concluded that BPF is a safe and effective interposition graft

material with advantages for correction of any small to medium surgical defects in intra oral region.

CLINICAL IMPLICATIONS OF THE STUDY:

- BFP can be placed in between hard and soft palate to prevent possible palatal fistula.
- The incidence of failure of BFP flap is low.
- After surgery prosthetic rehabilitation is feasible without limitations.
- BFP has minimal donor site morbidity
- BFP can be used in association with other flaps as a second layer.
- Evaluation of success rate of BFP in facial rejuvenation procedures and lipomas cases.

LIMITATION OF STUDY:

- The technique should be used with caution in aesthetic patient, because thinning of face is not desirable.
- Results in a decreased vestibular sulcus depth, thus it complicates the prosthetic rehabilitation.
- Appropriateness of BFP removal should be carefully evaluated since it involutes with age.
- Cheek distortions and mouth opening restrictions are limitations of the study.
- BFP can only be used once and limitations exist concerning the potential size of the defects to be covered.

SCOPE FOR FUTURE RESEARCH:

- Appropriateness of BFP procedures should be determined on case-to-case basis.
- Success of BFP along with flaps such as pedicled temporalis muscle flap can be further evaluated.
- Future studies of analyses of BFP using MRI volumetric analysis needs to be evaluated.

5. CONCLUSION

Soft tissue coverage is an essential step for successful wound healing. Intraoral wounds have certain unique features compared to other wound sites. The soft tissue overlying the alveolar bone is relatively thin, and there is no fatty layer in the gingiva. The buccal fat pad protrudes at the anterior border of the masseter muscle and extends to the parotid duct, where it rests on the buccopharyngeal fascia, which covers the buccinator muscle.

The buccal fat pad was used for reconstruction in the present study because it has abundant blood supplies from the maxillary artery and the superficial and deep temporal artery. There are rich capillary networks within the capsules that cover the fat pad. Arterioles enter the capsule from several directions and break up into capillary plexuses.

BFP can also be used in epithelialization without additional skin graft. The rich vascularity of BFP is an advantage when it is used in a poorly vascularized recipient site. However, its size is a limitation, and repeated usage may not be possible. As the flap is fragile, damage to the vascular pedicle may result in graft loss. Removal of too much of the buccal fat pad may induce facial disfigurement or mouth opening limitation. These limitations should be considered for the clinical application of BFP.

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