

## The Uses of Pedicled buccal Pad of Fat Flap in Reconstruction of Intra Oral Defects

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### ABSTRACT

**Introduction:** Different surgical techniques used for closure of various oral defects. While each one of these techniques has its limitation; the buccal pad of fat used in last quarter of last century as pedicle or free graft in reconstruction of small to medium, congenital and acquired defects showed good potentials for success. The present study used the BPF as pedicled flap to reconstruct intra oral defects. The study aimed to evaluate the success of buccal pad of fat pedicled flap in the reconstruction of intra oral defects. Outlining its indications, limitations and complications.

**Materials and Methods:** The study included 19 patients (17 males and 2 females) with age range between (1- 70 years), all patients were treated with pedicled BPF for intra oral defects (8 pts. with oro-antral communications, 5pts. with maxillary alveolar bone defects, 4 pts. with cleft palate, and 2 pts. with carcinoma of buccal mucosa), under general or local anesthesia. Follow-up period was for 3 months post-operatively,

**Results:**The results showed that 94.7% of patients had complete epithelization of flap and complete closure of the defect within 4-6 weeks. Only 1 pt. 5.3% had total flap loss with very small size of the BPF. In postoperative period, 5.3% of pts. complained from pain, trismus, vestibular obliteration, partial flap loss, all disappeared gradually within 1 month from the reconstruction.

**Conclusion:**The BPF is reliable, easy, safe method to reconstruct small and medium size intra oral defects of maximum size 5x4x3 cm, in maxilla from upper canine region to the soft palate, and in buccal mucosa from retro molar area to the commissure of the mouth.

**Key words:** BPF, intra oral defects, reconstruction. (J Bagh Coll Dentistry 2016; 28(1):121-126).

### INTRODUCTION

Oral cavity contains different structures and organs developed from different embryonic origins; so each part has unique characteristics that potentially affect the expression and path of disease and the way it's healed by Yousuf et al.<sup>(1)</sup>

Many intra oral defects were seen by every dentist in general and by every oral and maxillofacial surgeon specifically. These may cause discomfort to patient or even continue morbid conditions. Treatment for such defects seems to be annoying for both surgeons and patients with high rate of recurrence and failure<sup>(2)</sup>.

Different surgical techniques used for closure of various oral defects. Small fistulas following any surgical operation usually left to close spontaneously. Fistulas with medium size either repaired with primary closure, local palatal flaps, vestibular and buccal advanced mucosal flaps, skin graft, allogenic graft that are associated with ischemia and recurrence. Large fistulas are reconstructed with more complex operations by rotational flaps (regional), temporalis muscle flap, facial artery musculo-mucosal flaps and distant free flaps. These techniques being used are determined by the type of the defect and its size<sup>(3)</sup>

While each one of these techniques has its limitation, the buccal pad of fat shows good potentials for success including that the buccal pad of fat is an axial flap with rich blood supply taking its supply from 3 arteries (facial, transverse facial and internal maxillary), and their anastomosing branches<sup>(4)</sup>.

Another factor is due to its ease access to unique anatomical location as encapsulated mass fills the tissue space between masticatory muscles. The BPF has body and four processes that, its average weight is 10 g (8-12 g), average volume is 10 ml (8 -12ml), provides a 6x5x3 cm pedicled graft. BPF is larger and thicker in children and younger people and slightly thinner and smaller in older population. There is some relation between body weight and the size of buccal pad of fat but not distinct<sup>(5)</sup>.

Buccal pad of fat used in last quarter of last century as pedicle or free graft; in reconstruction of small to medium ,congenital and acquired, soft tissue and bony defects, including oro-nasal and oro-antral communications following dental extraction, excision of oral mucosal lesions; benign or malignant, and primary or secondary closure of palatal cleft<sup>(6)</sup>.

### MATERIAL AND METHODS

The prospective of the current study included 19 patients (17 males and 2 females) with age range between (1- 70 years) mean age was (35.5 years). Four patients presented with cleft palate, 2

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patients with carcinoma in buccal mucosa, 5 patients with maxillary defect post excision of lesion, and 8 patients presented with chronic oro-antral fistula/communication.

Follow up period was between January 2014 and February 2015. Those patients attended to maxillofacial surgery department in Al-ShaheedGazi Al-Hariri Teaching Hospital for surgical specialties and AL-WASITI teaching hospital in Baghdad, all of them treated surgically by pedicled Buccal Pad of Fat flap. Four patients anesthetized with local anesthesia, 15 patients treated under general anesthesia.

### Treatment Protocol

All patients were measured for their body mass index pre-operatively (except one patient; which the decision of using BPF was made after excision of the buccal mucosa lesion. So the mass and height of that patient was measured post operatively) and grouped into 5 categories. This new method, used to assess the relation between body mass and the relative size of BPF, was not done before in such specific manner.

All patients were examined clinically for signs of infection by swab have been done for chronic defects. Any turbid color with offensive smell considered as infection and managed pre-operatively with antibiotics according to sensitivity for one week.

Nasal decongestant drops, imidazoline 0.1% (Otrivine nasal drops) ®, were prescribed postoperatively for patients with oro-antral fistula/communication (two drops in each nostril, 3 times daily for one week).

The duration of this study was for 13 months. Patients were followed at 1, 2, 4, 8, and 12 week interval, with documentation of patient's pre and postoperative data, and follow up results using special case sheet and photographs. Informed consent was signed by every patient or their legal care persons.

### Exclusion Criteria

1) Patients who received radiotherapy. 2) Palatal defect in premaxilla, anterior to inter canine imaginary line. 3) Those Patients who previously lost the BPF either by trauma, accidental herniation during surgery, or used for another operation. 4) Patients with medical problems who were unfit for general anesthesia. 5) Local defect infection at the operation site, until overcome the infection.

### Surgical Techniques

Four approaches used to deliver the BPF in this study attributed to the location and the

closeness of the defect to the BPF site in the following ways:

### Chronic Oro-Antral Communication/fistula

First, irrigation of the defect with normal saline 0.9%, then refreshment of defect margins and excision of fistula when present was completed by blade no.15.

Crestal incision with blade no.15 from defect margins extended along the mucosa of adjacent teeth followed by identification parotid duct then vertical one or two incision(s) on attached gingiva and extended to buccal mucosa. curved mosquito hemostat inserted along the bone, under the flap, through muscles using blunt dissection; the mosquito hemostat inserted closed and withdrew wide open to create a tunnel that allow BPF to herniate through. After delivering of BPF, it sutured with 3/0 silk suture to the palatal side of the defect. Mucoperiosteal flap was returned to its position and secured with 3/0 silk suture with minimum tension.

### Defect after Excision of Tumor of Maxilla

Horizontal incision was made on buccal mucosa 1cm above the parotid duct and 1cm length, without flap reflection, blunt dissection done with mosquito hemostat using the same technique by inserting it closed and withdrew wide open to form tunnel through which the BPF herniate.

### Cleft Palate

After bilateral full- thickness mucoperiosteal flaps were elevated, and the nasal and oral linings are closed in the midline; wide lateral raw bony surfaces and a lateral oro-antral perforation left.

The BPF delivered through horizontal incision 5mm length just lateral and behind to tuberosity, then adequate volume of the buccal fat pad flap was extruded to fill the gap over the exposed bone transposed into the lateral palatal region by gentle traction and sutured on each side by 3/0 Vicryl absorbable suture.

### Carcinoma of Buccal Mucosa

There was no need for special incision to deliver BPF. BPF was delivered directly from the same defect that occurred after removal of the carcinoma of the buccal mucosa. Blunt dissection carried out with mosquito hemostat through muscular layers of the cheek.

## RESULTS

Success criteria in this study were complete epithelization of the flap and the definite covering of the defect. Table 1 shows the demography,

clinical information and complications for the patients at the end of follow-up period.

Nineteen patients (17 males and 2 females) were treated in this study. The minimum age was 1 year. The age range was 1-70 years with mean age of 35.5 years. The majority of patients were males, 17 (89%), while females were only 2 (10.5%). The distribution of patients according to their BMI <sup>(7)</sup> (table 2) was 5.25% in severely underweighted group, 10.5% underweighted, 36.8% normal, 31.5% over weighted, and 15.7% obese class I.

The majority of defects reconstructed with BPF flap were of small size (> 5 cm<sup>2</sup>)73.75%, and only 26% of medium size (5-20 cm<sup>2</sup>), while no larger defect treated with this flap. Figure 1 shows case with history of tumor in posterior alveolar bone of maxilla which was treated by excision of tumor and reconstruction of the defect with BPF at the same time, and the results through follow up period shown in A, B, C, and D sequentially.

#### Complications

Only one patient (5.25%) had complete flap loss, but several patients had different complications.

**Pain:** 26% of patients complained from mild to moderate pain on the 1st post-operative day. After one week only 5% had little discomfort that subsided before the 2nd week.

**Dehiscence:** 10% of patients complained from partial loss of flap from the anterior part of the defect, one of them had spontaneous closure within one month while the other had total loss of flap and recurrence of the same defect within one week.

**Trismus:** 26.3% of patients had trismus on 1st post-operative day, which percentage decreased to 15% within one week, only 5% (1 patient) continued limited mouth opening for all 3 months period which was present since a long time pre-operatively.

**Halitosis:** 5% of patients had halitosis with bad oral hygiene, subsided within one month with active motivation about oral hygiene.

**Sulcus obliteration:** 21% of patients had vestibular sulcus obliteration, which return to normal size compared to adjacent area gradually in most of them, only 5% (1 patient) continued with obliterated vestibule throughout the follow up period.

No patient had either bleeding intra or/and post operatively, or nasal or oral discharge, nor depression on cheek extra orally.

**Table 1: Shows the Demography, Clinical Information, and Complication of all the Patients after the End of Follow up Period.**

	Age(yr.)	Sex	Defect type/cause	BMI	Size of defect(cm)	Complication after 3 months
1	1	F	Cleft palate	20.4	0.7×2.5	
2	2	M	Cleft palate	27	0.9×3	
3	1.6	M	Cleft palate	24.69	1×2.3	
4	13	M	Cleft palate	21.6	1.4×3	
5	70	M	C A buccal. mucosa	26.9	3.5×5	
6	51	M	C A buccal mucosa	25.7	3×4.6	Trismus
7	19	M	OAF	28.8	1.7×1.1	
8	64	M	OAF	20.44	0.9×1.3	
9	15	M	OAC	18	1.3×1.5	Total flap loss
10	44	M	OAF	24.5	1×1.5	
11	22	M	OAC	28.4	1.4×1.9	
12	41	M	OAF	31	0.8×0.9	
13	52	M	OAF	20.96	1.2×1.8	
14	32	M	OAF	29	0.8×1.1	
15	8	M	Tumor post. Alve.	15.4	1.5×2.1	
16	16	M	Tumor post. Palate	33.98	3×5	Sulcus obliteration
17	58	M	Tumor post. Alve.	19.1	2×3.4	
18	36	M	Tumor post. Alve.	30	1.3×2.2	
19	10	F	cyst excision	18	3×4.5	

Abbreviations: Alve: alveolar bone. M: male. F: female. Post: posterior. OAC: oro-antral communication. OAF: oro-antral fistula.



**Figure 1: A) Tumor in Upper Left Side of the Palate and Alveolar Bone. B) Defect 3.5cm x5cm after Excision of Tumor. C) BPF Sutured to the Mucosa on the Defect Margins. D) 2 Weeks Post Operatively**

**Table 2: Relation between BMI, Relative Size of BPF and Defect Size**

BMI Group	No. of patients	Defect size	Relative size of BPF	Notes
15-16 Severely underweight	1	Small ( $\leq 5 \text{ cm}^2$ )	excess	
16-18.5 underweight	2	1 patient with small defect $1.9 \text{ cm}^2$	deficient	Very small BPF sutured under tension not enough to cover such small defect
		1 patient with Moderate defect	excess	
18.5-25 healthy weight	7	6 small	excess	
		1 moderate	excess	
25-30 Overweight	6	4 small	excess	
		2 moderate	adequate	
30-35 class I obesity	3	2 small	excess	
		1 moderate	adequate	

**DISCUSSION**

**Age:** In our present study we evaluated the relative volumetric changes in various age groups. It was found that the BPF was relatively larger in 1st age group of patients (1-10 years) which disagreed with Hining<sup>(8)</sup>, who wrote about reconstruction of the facial contour deformity with the buccal fat pad flap, and stated that the fat pad is larger in the infant and the size decreases with age. We agree with Xiao, et al<sup>(9)</sup>, as they measured the volume of the buccal fat pad in their study, which appeared to be a relatively

constant anatomical structure throughout patient's life.

**Incision:** it must be the smallest necessary to allow for delivering of BPF. Larger incisions, cause an excessive exit of BPF lobules, which afterwards, interferes in the surgical field which agree with Alkan et al.,<sup>(10)</sup> who stated that delivering of lager amount of BPF can cause hypertrophy and may need second operation forreduction. Furthermore, the place of the incision is dependent on the anatomical closeness to the defect more than any other factors, such as surgeon's preference.

**The surgical technique** is simple, and can be performed by different surgeons with different experiences. Careful manipulation of the flap is of paramount, in order not to extrude the BPF. Mechanical suction must be avoided once the BFP is exposed. Further, blunt dissection, can be done with one or two mosquito hemostat, one to gently pull out the emergent part and the other to dissect the oral mucosa and muscle surrounding the BFP. We disagree with Granizo. M. et al.,<sup>(11)</sup> because they mandated the use of two hemostats, while we used one hemostat in (68%) with no accounted difference.

**The capsule:** In this study, the capsule of BPF was preserved in 73.68% of the patients and although we couldn't preserve the thin capsule of BFP in 5 patients who had small to medium sized oral defects, complete epithelialization of BFP has occurred. It means that preservation of the capsule of the BPF is not crucial and it doesn't affect the end result of the procedure. This finding is not in agreement with Baumann and Ewers<sup>(12)</sup> as they stated that; it is very important to preserve the thin capsule of the BFP in order not to damage the small blood vessels. Our findings agree with Rapidis et al.<sup>(13)</sup>, Ferrari et al.,<sup>(14)</sup> and Shrivastava, et al.<sup>(15)</sup>; because they demonstrate that the size, tension and pedicle of the BFP were more important in the success of the procedure rather than preservation of the thin capsule, which partially provides its blood supply.

**Suture:** we think that types of suture material are not important as the tension on the margin of the flap. The sutures should be placed freely, to prevent tension necrosis of the flap. R. Martin-Granizo<sup>(11)</sup> stated that the sutures should be tension-free, to avoid partial necrosis at the edges of the BPF flap.

The largest defects covered in our study were a 5 x 3.5 cm maxillary defect and a 5 x 3 cm cheek mucosa defect. Rapidis<sup>(13)</sup> reported that; in maxillary defects measuring more than 4x4x3 cm, the possibility of partial dehiscence of the flap was high due to the impaired vascularity of the stretched ends of the flap while in buccal or retro mandibular defects which measured up to 7x5x2 cm, reconstruction is accomplished due to the underlying rich vascular bed.

**Relative volume of BPF:** we didn't see a close relation between body mass and the relative volume of the BPF even in very under weighted group (BMI=15 to 16) and in Obese Class I (Moderately obese, BMI= 30 to 35) But it must be noted that the BMI less than 15 (Very severely underweight) and BMI more than 40 (Obese Class III, Very severely obese), didn't present in our sample. Egyedi<sup>(5)</sup> claimed that there is some

relation between body mass and BPF but not distinct<sup>(10)</sup>. In this study, patients have been categorized into 5 groups (table 2) to clarify the relationship between the total body weight and BPF and we found that the BPF size related to the size of the cheek (muscle of mastication) and not to the total body weight. The relative volume was just adequate in larger 3 defects (medium size defects), and excess in 15 small and medium defects. Only in one patient (15 years old male) with small defect 13x15 mm (surface area 1.95 cm<sup>2</sup>) and his BMI was 18 (the under weighted category), the BPF was unexpectedly deficient. This boy already had hollow cheeks, so the deficient size of BPF may be due to his anatomical specifications (hollow cheeks).

**Vestibular Sulcus:** 5.25% of patients in this study have been left with vestibular loss after three months follow up period. It seems due to the excision of pathology involved the alveolar bone and part of the palate rather than the BPF flap itself. Ye et al<sup>(16)</sup> used the BPF in repairing maxillary oncological defects and gave the same explanation for vestibular loss.

**Skin Graft:** we used skin graft to cover BPF on buccal mucosa of the cheek in the 1<sup>st</sup> patient in this study. The result was partial loss of skin graft, and epithelization has occurred after that. This finding agrees with Granizo<sup>(11)</sup>; because he found that no benefits of BPF use in combination with dermal grafts, which (skin graft) are lost, epithelizing afterwards by secondary healing. While the idea was totally opposite from 4 decades of last century; Egyedi<sup>(5,10)</sup> used skin graft to cover the BPF.

**Trismus and mouth opening:** 26.25% of patients had trismus on 1st post-operative day, that percentage decreased to 15.8% within one week; only 5.2% (1 patient) had persistent limited mouth opening for all 3 months period. That patient was complaining from buccal mucosal carcinoma and excision of part of the muscles of the cheek has been done during operation. Baumann<sup>(12,17)</sup> gave the idea that trismus is a common complication due to oral tumor ablation, more than the BPF itself, so it often occurs in the buccal membrane and retro molar area.

In this study, one patient took radio therapy post operatively. No harm effect was seen on the viability of BPF pedicled flap used. This goes with Weimin<sup>(16,18)</sup> when they implied that postoperative radiotherapy did not influence the reconstruction of maxillary defects with BPF.

BFP used in this study in the reconstruction of different defect sizes in different locations, did not result in change of extra oral facial contour. Alkan et al.,<sup>(10)</sup> stated in their clinical observations that

the BFP used in various sizes for the repairing of intra-oral defects did not produce any change in facial contour. Nevertheless; Amin, et al<sup>(19)</sup>, reported one case with large oncological maxillary defect, more than 20cm<sup>2</sup>, complaining from hollowing of cheek, after repair with BPF.

Great care was given not to injure the buccal branch of facial nerve (examined by asking patients to blow their cheeks), nor to parotid duct (which examined clinically), which has been achieved by gentle blunt dissection, and leaving the BPF capsule intact whenever possible. These important structures usually run in close relation to the BPF capsule<sup>(20,21)</sup>. Zhang et al.,<sup>(22)</sup> stated that, the facial nerve and Stenson duct are seldom injured when the BFP is bluntly dissected along its capsule.

Although the number of patients included in the present study was not enough for significant conclusions to be made, the BFP is reliable, easy, safe method to reconstruct small and medium size intra oral defects of maximum size 5x4x3 cm, in maxilla from upper canine region to the soft palate and in buccal mucosa from retro molar area to the commissure of the mouth.

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