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Evaluation of versatility and effectiveness of pedicled buccal fat pad for reconstruction of oral defects

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Abstract---Objective: The aim of this study was to evaluate its efficacy and versatility of pedicled buccal fat pad for reconstruction of oral defects. Materials and Methods: The present study was undertaken on twenty adults patients reported to the Department of Oral and Maxillofacial Surgery of Desh Bhagat Dental College and Hospital, Mandi Gobindgarh. The patients were selected randomly irrespective of age, sex, caste, religion, socioeconomic status and nature of pathology. Results: Pedicled buccal fat pad was used for reconstruction in twenty patients. All the patients had uneventful healing period with minimal complication rate. In 3 patients partial dehiscence was observed on 7th postoperative day and in one patient infection was reported which was managed with the help of suitable antibiotics. Conclusion: It can be safely concluded that the use of buccal fat pad as a pedicled flap is an easy, well tolerated, and uncomplicated for reconstruction of small to medium sized defects.

Keywords---buccal fat, pedicled flap, reconstruction, oral defects.

Introduction

Reconstruction of the oral and maxillofacial region is a uniquely difficult task in its attempt to restore the individual's facial expression, articulation of speech and

deglutition. The maxillofacial surgeons usually deal with soft tissue defects, hard tissue defects or the combination of both.¹

Over the past 50 years the development and application of different methods has led to reliable reconstruction of the facial defects. These defects can be treated either with a conventional obturator or by surgical reconstruction. While deciding the options to use, there should be a progression from simple to complex treatments. Consideration should be given to primary closure, followed by local, then regional, and the finally distant pedicled or microsurgical free tissue transfer.²

The use of buccal fat pad has gained popularity since 1732 when Heister termed it the “glandular molaris”. But it was Bichat in 1802, who recognized the true nature of BFP.³Its usage has increased after Egyedi (1977) described it for closing oronasal and oroantral communications and as a versatile pedicled graft for closing post surgical maxillary defects.⁴

The buccal fat is an encapsulated mass of adipose tissue in the oro-maxillofacial region. This complex anatomical biconcave mass is present in the cheek which rests on the periosteum that covers the posterior of the maxilla, and bounded by the pterygopalatine fossa, buccinators and masseter muscles. It consists of a central body and four extensions: buccal, pterygoid, pterygopalatine and temporal. The size of the BFP is fairly constant among different individuals regardless of overall body weight and fat distribution. The mean weight of each fat pad is 9.3 gms and the mean volume is found to be 9.6ml.⁵Keeping in mind the wide range of applications and advantages of pedicled buccal fat pad the present study was carried out to evaluate its efficacy, versatility and the possible complications in intraoral reconstruction.

Materials and Methods

Twenty adult patients reported to Department Of Oral & Maxillofacial Surgery, Desh Bhagat Dental College and Hospital, Mandi Gobindgarh with acquired oral defects requiring primary or secondary reconstruction with pedicled buccal fat pad were included in this study. All the patients were screened for the suitability of treatment irrespective of age, sex, caste, religion, socioeconomic status. All the patients in the study underwent routine laboratory investigations (complete blood tests, ELISA) etc. and relevant radiographic evaluations pre-operatively. (Annexure 2)

Inclusion criteria

Small to moderate sized acquired intra oral defects.

Exclusion criteria

The patients presenting with acquired defects bigger than 5.5 X 4 cms, acute osteomyelitis of maxilla, systemic diseases, irradiated maxillae, active infection at the recipient site and surgical defects following malignant tumouresection were excluded from the study.

Surgical technique

The surgery was carried out under general anesthesia or local anesthesia with I.V. sedation. Following the treatment/excision of underlying pathology, a horizontal incision was made in the periosteum posterior to the area of zygomatic buttress. The body and the buccal extension of buccal fat pad were gently mobilized by blunt dissection, taking care not to disturb the delicate capsule and the vascular plexus and to preserve as wide a base as possible. Pressure on the cheek was applied to expose the fat through the incision. After the pad was dissected free from the surrounding tissues, it was grasped with vascular forceps, gently teased out, advanced and expanded over the defect either by direct rotation or by tunnelling under the mucosa, until the free adaptation was possible.

The pedicled buccal fat pad (BFP) was sutured to the palatal wound margins with 4-0 vicryl sutures. The pedicled flap was then covered with buccal mucoperiosteal flap wherever possible with the help of 4-0 black braided silk on atraumatic needle. The buccal fat pad was left uncovered to heal and epithelialize in case buccal flaps were insufficient in terms of quantity or quality. The patients were prescribed with suitable antibiotics, analgesics, anti-inflammatory drugs and nasal decongestants if required. All the patients were advised high calorie diet post-operatively. All the patients were instructed post-operatively regarding maintenance of oral hygiene, not to blow out cheeks, not to sneeze or cough rigorously, not to rinse rigorously, to avoid smoking and to avoid use of straws for cold drinks.

Follow up

The patients were followed up on 1st, 3rd, 7th, 21st and 42nd days postoperatively. The pedicled buccal fat pad was observed for flap or wound dehiscence, presence of infection, Mouth opening (measured with the help of vernier), Facial contour, Maxillary buccal sulcus depth, Foul smell, Colour, Pain (recorded as a subjective symptom), Graft epithelisation and other complication(s).

Results

The present study was conducted to evaluate the versatility and effectiveness of pedicled buccal fat pad for reconstruction of acquired intra oral surgical defects. The study group comprised of twenty patients. Twelve patients (60%) were female whereas eight patients (40%) were male. The age of the subjects ranged from 28-72 years with a mean of 52 years. In our study the right side of maxilla was found to be predominantly affected 14(70%) compared to left side 6(30%).

Fifteen of the patients included in the study were treated for the closure of oroantral communications. The common site for oroantral communications was the right side (80%) and the commonest tooth involved was the maxillary first molar (66.6%). Out of Fifteen, Nine patients were diagnosed with established chronic maxillary sinusitis whereas other 6 patients were found to have oroantral communication during the attempted surgical extractions of maxillary molars. Four patients of recently created communication were referred to our department by private dentist for the expert management of displaced roots into maxillary

sinus and subsequent closure of the communication. Two patients had accidentally created communication during extraction in our OPD. The patients of established chronic maxillary sinusitis were treated by Caldwell-Luc operation and the fistulas were closed with the help of pedicled buccal fat pad and Rehrman's buccal advancement flap. The recently created communications were closed with pedicled buccal fat pad and Rehrman's buccal flap once the displaced tooth roots were recovered.

One patient was diagnosed with ameloblastic fibroma, involving the right posterior maxilla, extending from canine to the second molar. The region was excised with safe margins and the resultant defect was covered using pedicled buccal fat pad only. One patient was diagnosed with central giant cell granuloma of the left maxilla, extending from #23 to #26. The lesion was excised and the resultant defect was covered with pedicled buccal fat pad. Another patient diagnosed with maxillary periapical cyst in relation to the left maxillary first molar. The cyst was enucleated and the primary closure was done with buccal fat pad and buccal flap.

One patient was diagnosed with pyogenic granuloma in the left edentulous ridge area extending from the canine region to the first molar region. The lesion was excised and reconstructed with pedicled buccal fat pad. One of the patients included in the study had dental implant placed immediately following the extraction of the left maxillary molar in the palatal root socket. The wound was then covered with buccal fat pad. (Table 1) The subjects were evaluated postoperatively on 1st, 3rd, 7th, 21st and 42nd days in terms of presence of infection, pain, flap or wound dehiscence, mouth opening, facial contour, maxillary buccal sulcus depth, foul smell, colour, graft epithelialisation and other complications.

There was no sign of flap dehiscence on the 1st postoperative day in all the patients. Partial loss of graft was seen on the 7th postoperative day in three patients. These patients were managed with the help of obturators and dressings till final epithelialisation. In rest of the patients, the healing was found to be satisfactory from 7th postoperative day onwards and healing was complete by 42nd postoperative day. Clinical signs of infection were seen on 3rd postoperative day in one of the patients of dental implants rehabilitation which could be controlled with the help of antibiotics. The infection resolved within a week's time. In rest of the patients no signs of infection were observed.

The pain was recorded as a subjective symptom. The patients were asked to categorise pain as mild, moderate and severe. Moderate pain was present in all of the patients on the 1st and 3rd postoperative days. In two patients mild pain persisted for more than fifteen postoperative days. Other patients in the study had painless follow up period from 7th postoperative day onwards. Foul odour was present in three patients on the 1st postoperative day and in one patient on 7th postoperative day. The patients were asked to maintain proper oral hygiene and were prescribed antiseptic mouthwash. Foul odour was not observed in any of the patients after the 21st postoperative day.

The change of colour of the pedicled buccal fat pad was evaluated. There were no signs of colour change on the 1st and 3rd postoperative days. Eight patients showed colour change from yellow to cherry red on the 7th postoperative day and twelve other patients show colour change to cherry red by 15th postoperative day onwards. All the patients showed definite colour change from yellow to red by 21st postoperative day (Figure 1-4). All of the patients showed complete epithelialisation on 21st postoperative day. (Table 2) Postoperative mouth opening was measured with the help of vernier callipers between maxillary and mandibular central incisors in mm and ranged from 11 to 20 mm on 1st postoperative day as compared to 22 to 40 mm preoperative day. Mouth opening gradually increased after the 7th postoperative day. In a three patients mild obliteration of the buccal vestibule was observed. The buccal vestibular depth became normal by 42nd postoperative day resulting in no postoperative prosthodontic complication. Cheek deformity was observed in four patients which gradually became normal by the 42nd postoperative day. (Table 3)

Table 1: Etiology wise distribution of study patients

S. No.	Type of defect	No. of patients
1	Oro Antral communications	15
2	Ameloblastic fibroma	1
3	Maxillary periapical cyst	1
4	Pyogenic granuloma	1
5	Central giant cell granuloma	1
6	others	1

Table 2: Post operative parameters

Parameters	Results	Study period				
		1 ST DAY	3 RD DAY	7 TH DAY	21 ST DAY	42 ND DAY
Pain	Present	20	20	2	0	0
	Absent	0	0	18	20	20
Infection	Present	0	1	1	0	0
	Absent	20	19	19	20	20
Foul smell	Present	3	3	1	0	0
	Absent	17	17	19	20	20
Flap dehiscence	Present	0	0	3	0	0
	Absent	20	20	17	20	20
Colour	Present	0	0	8	20	20
	Absent	20	20	12	0	0
Graft epithelisation	Present	0	0	0	20	20
	Absent	20	20	20	0	0
Other complications	Present	0	0	0	0	0
	Absent	20	20	20	20	20

Table 3: Comparison of mouth opening

Follow up days	Mean mouth opening
PRE-OPERATIVE	35.5 mm
1 st post operative day	16.45 mm
3 rd post operative day	19.6 mm
7 th post operative day	23.9 mm
21 st post operative day	30.6 mm
42 nd post operative day	35.95 mm



Figure 1: Preoperative



Figure 2: Mobilization of BFP



Figure 3: BFP sutured at the recipient site



Figure 4: Postoperative

Discussion

It is in general agreement that any defect within the maxillofacial region, acquired or congenital should be restored to its form and function. In the literature, a wide range of pedicled flaps, their uses, advantages and disadvantages have been discussed. The literature suggests a wide range of applications of pedicled buccal fat pad. It was first successfully used for the closure of OAF by Poeschl et al (2009).⁴ The study was undertaken on 12 female patients and 8 male patients 20 patients with intraoral defects to evaluate the effectiveness and versatility of pedicled buccal fat pad.

Tideman et al (1986) also used buccal fat pad in twelve patients ranging from 32 to 90 years. They suggested that age would not seem to be a factor for selection of patient, so buccal fat pad could be used in all the patients irrespective of age.⁶ In our study, the age of the subjects ranged from 28 to 72 years. The fifteen subjects of oroantral communications, nine were diagnosed with chronic maxillary sinusitis. The patients of established maxillary sinusitis (60%) were treated by Caldwell Luc operation and the communications were closed primarily. In a study by Hanazawa et al (2000) eleven of the cases (78.5%) were treated with Caldwell Luc operation with OAF closure performed at the same time.⁷

In the present study, there were four (20%) patients for benign odontogenic lesions. The lesions were excised and the resultant defect was closed primarily either with buccal fat pad alone or with buccal flap if available. There has been a lot of discussion in the literature about the size & location of the defect easily restorable with BFP. It was easier to use pedicled BFP for the reconstruction of maxillary post excision defects owing to the close anatomic locations. However, it can be applied in areas ranging from the angle of the mouth to the retro molar trigone and palate. When properly dissected and mobilized, the BFP provides a 7 X 4 X 3cms pedicled graft.⁸

Pedicled BFP in conjunction with pedicled mucosal flaps also helps to lengthen the soft palate without tension on the nasal side.⁹ The advantages of BFP like lack of a visible scar at the donor site, minimal discomfort for the patients, and the low rate of complications make it a preferred flap for submucous fibrosis also than any other local and distant flaps. Other use of pedicled BFP mentioned in the literature was to cover the mucosal defects after ablation of pathologies in the buccal mucosa.¹⁰ BFP can also be used as a useful adjunct to autogenous or alloplastic temporomandibular joint reconstruction after TMJ ankylosis release.¹¹ The miscellaneous uses of pedicled buccal fat pad include vocal cord augmentation, elongation of soft palate.⁹

In the present study the process of epithelisation was observed from the colour change of the flap. Change of colour from yellow to cherry red could be observed in eight patients by 7th post operative day and all the patients showed definite colour change to cherry red by the 15th postoperative day. The initial change of colour to red was presumably due to the formation of young granulation tissue and the final colour change owed to the complete epithelisation of the graft.⁷ In our present study, all the patients showed complete epithelisation by 21st post

operative day. This is in agreement with the established facts in the literature.^{8,12,13}

In the present study, no sign of flap dehiscence was observed on the first post operative day. This could be due to impaired vascularity owing to the stretched ends of flap that were sutured to the remaining palatal mucosa or when the defect size is large.⁸ Infection is a potential post operative complication of any surgical procedure but our results suggest that it was not true for buccal fat pad as we observed infection in only one patient, which could be attributed to the allograft (Hydroxyapatite) used along with BFP. Tideman et al (1986) mentioned that epithelisation had similar results of one patient (8.3) of post operative infection in their study group of twelve patients.⁶ In our study, postoperative pain was found to be moderate in nature on 1st and 3rd postoperative days. In a study conducted by Poeschel et al (2009), pain persisted in three patients (1.8%) for more than two weeks in the series of one hundred and sixty one patients.⁴

Excess fat transfer can lead to a post operative cheek deformity.¹³ In present study cheek deformity was observed in four patients (20%), which gradually became normal by the 42nd postoperative day. Amin et al (2005), in their series of 24 patient's detected one patient (4%) developed a feel of hollowness of cheek post surgery.¹⁴ Pedicled BFP transfer is oftenly found associated with a complaint of reduced mouth opening.¹² To this effect we measured and compared pre and post operative maximum interincisal mouth opening. It was found that in all of the subjects, mouth opening was reduced on 1st and 3rd postoperative days but gradually return to normal by 42nd day with the help of mouth opening excercises. Our observations were similar to the ones in the literature.⁸

Obliteration of the vestibular depth has been the obvious disadvantage of the buccal flaps leading to difficult prosthetic rehabilitation, but it is not true in case of buccal fat pad, which can lead to mild and temporary obliteration of the vestibule.¹⁵ Although in literature the foul odour has never been reported so far, yet in the present study the incidence of foul odour was 15% (3 patients). In the present study the bad oral hygiene was found to be the probable reason for it. One of the patient in whom the foul odour was present on the 1st postoperative day resulted in infection of the pedicled graft on 3rd postoperative day. There are few other uncommon complications associated with pedicled BFP such as the facial nerve damage, transient cheek hematoma and haemorrhage, but in our study we didnot encounter any of such complication.¹⁶

Conclusion

The present study attributes the success of the pedicled BFP to its rich vascular supply, less donor site morbidity, reliability, ease of harvest and lower complication rate. Thus it can be safely concluded that the use of buccal fat pad as a pedicled is an easy, well tolerated and uncomplicated technique for reconstruction of small to medium size defect.

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