The use of the pedicled buccal fat pad (BFP) and palatal rotating flaps in closure of oroantral communication and palatal defects

Ibrahim E. El-Hakim, Abdel Magid El-Fakharany

Abstract

The use of the buccal fat (BFP) and palatal rotating flaps for the closure of oro-antral communication and reconstruction of palatal defects was compared clinically. The BFP proved to be consistently successful in closing oro-antral fistulae and palatal defects resulting from tumour resection, preserving the normal anatomical architecture of the oral mucosa. No denuded area requiring secondary granulation was required as in the case of palatal flaps. In addition, no facial disfigurement was observed on the operated side.

BFP is considered a reliable, convenient method for closure of palatal defects and closure of oro-antral communication. It can also be considered as a reliable back-up procedure in the event of failure of other techniques.

Key words: Maxillary sinus; Oral fistula; Surgery, operative

Introduction

Surgery of the hard palate may end with oro-antral or oro-nasal communication, which interferes with speech and deglutition. These defects may be obturated with a prosthesis or closed with local flaps such as a buccal sliding flap (Moczair, 1930), a palatal pedicled flap (Awang, 1988), or doubled layer closure flaps using buccal and palatal tissues, but these procedures produce large denuded areas, result in decrease of vestibular sulcus and cannot be used to close large defects (Zide and Karas, 1992). Distant flaps such as the nasolabial flap (Georgiade *et al.*, 1969) and anteriorly or laterally based tongue flaps (Vaughan and Brown, 1983) have been tried. Grafting which includes the use of cancellous bone (Whitney *et al.*, 1980) and alloplastic materials such as gold foil (Shapiro and Moss, 1972), and poly-methylmetacrylate (Al-Sibahi and Shanoon, 1982) have also been tried.

The buccal fat pad (BFP) is a lobulated convex mass of fatty tissue covered by a very delicate membrane extending upward to reach the temporal fossa and inferiorly into the pterygomaxillary space (Vuillemin *et al.*, 1988). It was first described by Bichat in 1801. Its use for closure of oral defects with split skin graft was first identified by Egyedi, (1977). The proximity of the donor site to the recipient area permits rapid grafting without having the fatty tissues outside the body for too long, and this is considered an important factor in graft success (Neder, 1983).

The purpose of this study was to compare the use of the palatal rotating flap and the BFP for closure of oro-antral communication and for the repair of palatal defects resulting from tumour resection.

Methods and materials

Twenty-six patients (14 males and 12 females) were included in this study. The patients' ages ranged from 20 to 40 years, with a mean age of 30 years. Twenty patients suffered oro-antral communication following extraction of maxillary teeth, 10 of them gave a history of previous unsuccessful attempts at fistulae closure using different techniques (buccal sliding flaps, or the use of an iliac cortical bone graft). Six patients had palatal defects resulting from tumour resection; there were two cases of central giant cell tumours treated with hemimaxillectomy, two cases of polymorphic adenoma of the palate and a case of cementifying fibroma treated by excision of the tumour mass with safety margin, and a case of mucoepidermoid carcinoma of the palate treated with hemimaxillectomy followed by radiotherapy. Repair of the tumour cases was performed at the same time as the tumour resection. The diameter of the defects at the mucosal side ranged from 0.5–4 cm.

A pre-operative orthopantogram (OPG) and Water's radiographical examinations showed cloudiness of the involved maxillary antrum. Computed tomography (CT) scan of paranasal sinuses of tumour cases showed opacity of the maxillary sinus on the affected side. There were multiple radio-opaque areas along the peripheral margins of the defect, with bone erosion in the case treated with an iliac crest bone graft.

Surgical procedure

Sinus infection, if present, was treated with specific antibiotics according to the culture and sensitivity results. Pre-operative oral hygiene was kept by thorough scaling, pocket curettage and the use of antiseptic mouth-wash. The epithelial tracts of the fistulae were dissected out in the cases of chronic oroantral communication. A mucoperiosteal flap was reflected exposing the buccal cortical bone at the premolar-molar area.

Repair of the defects

Two techniques were studied in the repair of oroantral communications, the use of BFP and the use of a palatal rotating flap. The repair of palatal defects following tumour resection was performed using the BFP only. *Group I*: BFP was used in 19 patients; the fistulae in 13 cases resulted from maxillary teeth extraction and in six patients it resulted from tumour resection. *Group II*: A palatal rotating flap was used in seven patients suffering from oroantral fistulae; all resulted from teeth extraction.

Group I: The BFP. The BFP was approached by further deflection of the mucoperiosteal flap in the mucobuccal fold opposite the upper second molar until the BFP appeared in the mouth. The fat was then teased gently from its bed, with outside pressure on the cheek, until a sufficient quantity was obtained to obturate the defect without tension, then it was sutured to the surrounding mucosa using black silk sutures. The buccal mucoperiosteal flap was sutured to its original position without tension (Figures 1–3).
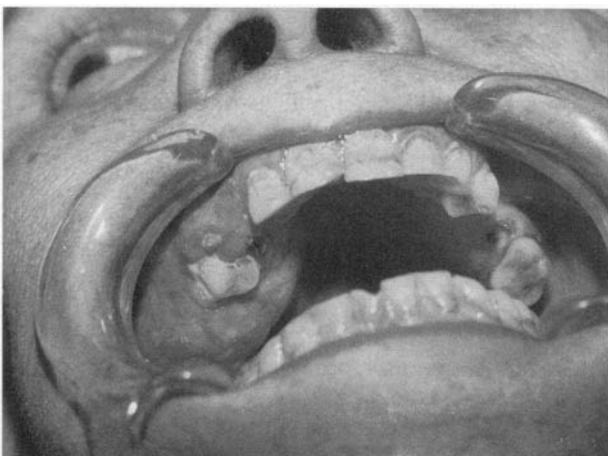

FIG. 1
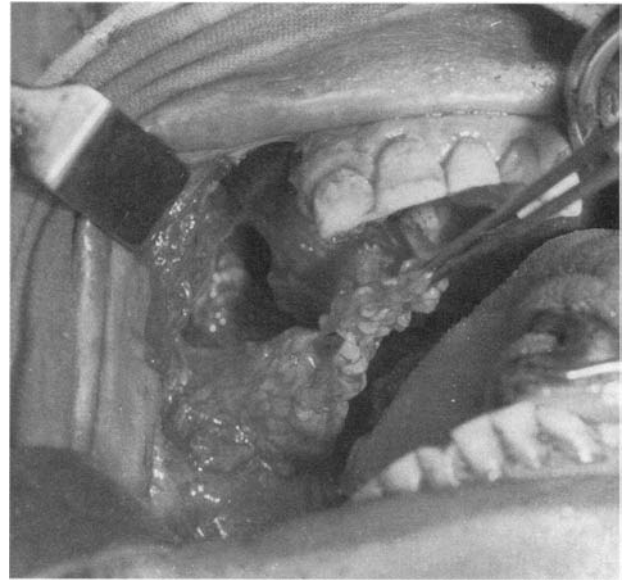Central giant cell granuloma of the right maxilla.

FIG. 2
The tumour resected and the BFP dissected to close the defect.

Group II: The palatal rotating flap. The palatal flap was designed with the greater palatine artery included in the flap, then a full thickness flap was raised, and a V-shaped incision was made at the region of the greatest bend to prevent flap wrinkling. The flap was then rotated and tunnelled to cover the surgical defect completely without tension (Figures 4 and 5).

Evaluation of the healing process

Patients were examined weekly for the first month, and then followed monthly for 12 months. Patients were evaluated for: signs of flap epithelialization;
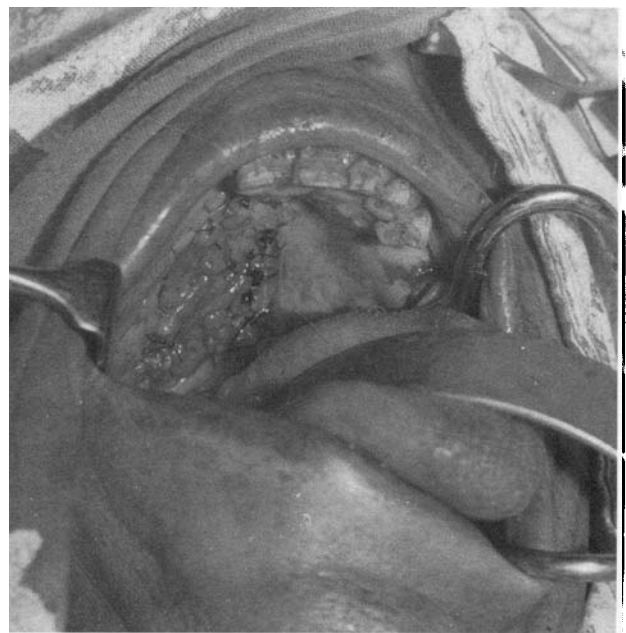

FIG. 3
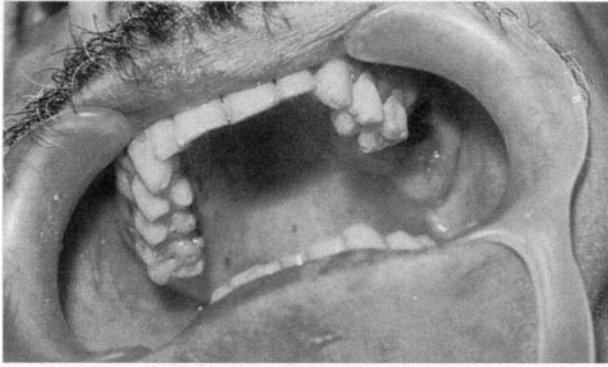The palatal defect closed with the BFP.

FIG. 4

Oroantral communication resulted from extraction of upper left first molar.

infection and fistulae recurrence; posterior nasal discharge; chewing and swallowing difficulties; speech disturbance.

Results

Clinical evaluation

Signs of the BFP epithelialization started at five days and was completed at three weeks post-operatively in all cases. The donor site started to heal at one week and was completely healed three weeks post-operatively.

The recipient site of the palatal flap started to heal at the second week, and the donor site began epithelialization two weeks post-operatively, although a palatal defect was still evident three weeks post-operatively (Figure 6).

Posterior nasal discharge

All patients included in this study complained of pre-operative posterior nasal discharge. This discharge decreased after one week in six patients treated with the BFP, and ceased in all patients after four weeks, while it continued in all patients treated with the palatal flap till the fourth post-operative week.

FIG. 5

The palatal pedicled flap raised and tunneled to close the oroantral communication.
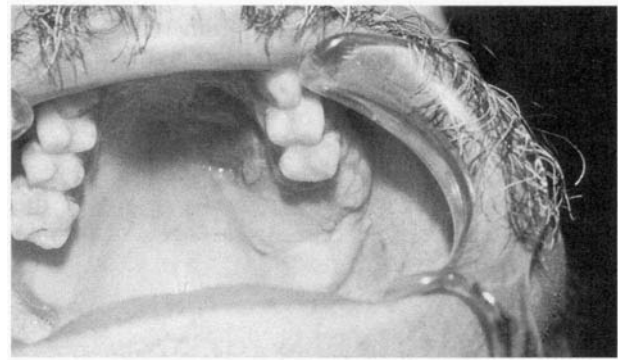

FIG. 6

Post-operative view of the healing of the palatal rotating flap. A residual defect can still be seen at the donor site.

Chewing and swallowing

Difficulties in chewing and swallowing were reported in all patients included in this study. This was attributed to food and fluid entrapment in the fistulae. Fifteen patients treated with BFP reported improvement in chewing and swallowing one week post-operatively, and four patients experienced some difficulties that improved the second post-operative week. However, a common complaint from all patients treated with the palatal flap was discomfort during food chewing from the painful bare bone area of the donor site. This complaint continued until the fourth post-operative week.

Speech disturbances

All patients treated with BFP who had been experiencing inconvenience with resonance of sounds pre-operation improved within the first month, and they were also more pleased with their sounds than those treated with the palatal flap.

Discussion

The BFP is a mass of adipose tissue that extends posteriorly for 2 cm through the mucosa and the fibres of the buccinator muscle. The anatomy of the BFP is complex. It rests on the periosteum that covers the posterior aspect of the maxilla and is bounded by the buccinator muscle medially, masseter muscle and mandibular ramus laterally and the lateral pterygoid muscle superiorly. It consists of a main body and four extensions, the buccal, the pterygoid, and the superficial and deep temporal extensions. The main body lies above the parotid duct on the anterior border of the masseter muscle and extends deeply to lie on the posterior maxilla and forward along the buccal vestibule. The buccal extension is the most superficial and enters the cheek below the parotid duct. The pterygoid extension passes down and back to lie on the lateral surface of the pterygoid plates. The temporal extension passes upward, below the zygomatic arch and comprises the deep and superficial portions. The deep part lies directly on the temporalis muscle and its tendon, separating the muscle from the zygomatic arch. The blood supply is from the buccal and deep temporal branches of the maxillary artery, the superficial

temporal artery (transverse facial artery) and a small branch of the facial artery (Stuzin *et al.*, 1990; Samman *et al.*, 1993).

Surgically, the BFP is accessible through a horizontal incision posterior to the zygomatic buttress, and can be gently teased out of its bed and advanced into its new position. It can also be tunnelled under the mucosa, sutured into place or left uncovered (Tideman *et al.*, 1986; Hai, 1988). It usually epithelializes within two to three weeks, and there is no need to sever the graft pedicle at a later date.

It is not recommended to expose the BFP through an external approach, as this may be hazardous to the facial nerve branches that travel along its lateral surface. It is easily accessed through an intra-oral approach along the height of the buccal vestibule, through the existing surgical incision or through a horizontal buccal incision made at the region of the maxillary molar teeth, and extending posteriorly for 2 cm. The incision can be made 5 mm above the attached gingiva.

The fat should be handled gently and separated by blunt dissection, and some help can be obtained by applying pressure to the cheek together with gentle traction of the fat. A small perforation of the buccal mucosa and buccinator muscle allows a large portion of the BFP to extrude into the oral cavity (Messenger and Cloyd, 1977; Stuzin *et al.*, 1990).

The standard treatment for closure of palatal defects is transposition of mucoperiosteal flaps (Van-Der Wal and Mulder, 1992). However, this tends to fail in patients with defects more than 5 cm. The present study showed that the use of the BFP is simple, the fat can be used to graft a hemimaxillectomy defect, and also involves minimal surgical experience. Contrary to Stuzin *et al.*'s (1990) findings, our clinical observation showed that the BFP used for reconstruction of large palatal defects did not produce any change in facial contour or reduction in cheek fullness.

Potential complications of the use of the BFP are minimal, although haematoma, infection or even facial nerve injury has been reported. These can be avoided by careful incision in the buccinator fascia and limited dissection within the masticatory spaces. The use of the BFP is not recommended in patients with malar hypoplasia, or patients with thin cheeks as this may accentuate a gaunt appearance producing hollowing within the cheek, also it is not recommended for patients with Down's syndrome (Stuzin *et al.*, 1990). Our results confirm those of Tideman *et al.* (1986) that age and sex are not considered to be factors in case selection for the use of the BFP.

Even though the fat is generally considered to be poorly vascularized, post-operative radiotherapy, in this study, did not have any deleterious effects on the BFP flap, which may be attributed to the rich nutrient vessels of the BFP. Fujimora *et al.* (1990) assumed that the tranverse facial artery could remain intact and help to supply blood to the grafted fat during and after radiotherapy. Moreover, the highly developed capillary network in the BFP might presumably play an important role in the fat resistance to post-operative radiotherapy. If radiotherapy is planned post-operatively, it is recommended to dissect an adequate amount of the BFP during the operation to guarantee flap success. Tideman *et al.* (1986) recommended deferring radiotherapy until there was complete epithelialization of the flap.

The BFP proved to be consistently successful in closing oroantral fistulae and preserving the normal anatomical architecture of the oral mucosa, as there was no loss of vestibular depth, as in the case of using the buccal advanced flaps, and there was no denuded area requiring secondary granulation that may be painful, takes a longer time to heal and leaves scars as is evident in the case of palatal flaps. In addition, no facial disfigurement was observed on the operated side (Loh and Loh, 1991).

Because of ease of access and the rich blood supply, the use of BFP is considered a reliable, convenient method for closure of oroantral communications and palatal defects. It can also be considered as a reliable back-up procedure in the event of failure of other procedures (Stajeie, 1992).

References

Al-Sibahi, A., Shanoon, A. (1982) The use of soft polymethylmethacrylate in the closure of oroantral fistula. *Journal of Oral and Maxillofacial Surgery* **40:** 165–166.

Awang, M. (1988) Closure of oroantral fistula. *International Journal of Oral and Maxillofacial Surgery*.

Bichat, F. X. (1801) Anatomic generale: Appliquée à la physiologie et al médecine. Paris. Cited in Stuzin, J. M., Wagstrom, L., Kawamoto, H., Wolfe, A. (1990). The anatomy and clinical applications of the BFP. *Plastic and Reconstructive Surgery* **85:** 29–37.

Egyedi, P. (1977) Utilization of the BFP for closure of oroantral and oronasal communications. *Journal of Maxillofacial Surgery* **5:** 241–244.

Fujimora, N., Nagura, H., Enomoto, S. (1990) Grafting of the BFP for palatal defects. *Journal of Craniomaxillofacial Surgery* **18:** 219–222.

Georgiade, N., Maldick, R., Thome, F. (1969) The nasolabial tunnel flap. *Plastic and Reconstructive Surgery* **43:** 463–465.

Hai, H. K. (1988) Repair of palatal defects with unlined buccal fat pad grafts. *Oral Surgery, Oral Medicine and Oral Pathology* **65:** 523–525.

Loh, F. C., Loh, H. S. (1991) Use of BFP for correction of intra-oral defects. *Journal of Oral and Maxillofacial Surgery* **49:** 413–416.

Messenger, K. L., Cloyd, W. (1977) Traumatic herniation of the buccal fat pad, report of a case. *Journal of Oral Surgery* **43:** 41–43.

Moczair, M. (1930) Nouvo methodo operatiopela chisura dela fistole de seno mascea se di origina dentale. *Stomatol (Roma)* **28:** 1087.

Neder, A. (1983) Use of BFP for grafts. *Oral Surgery, Oral Medicine and Oral Pathology* **55:** 349–350.

Samman, N., Cheung, L., Tideman, H. (1993) The BFP in oral reconstruction. *International Journal of Oral and Maxillofacial Surgery* **22:** 2–6.

Shapiro, D., Moss, M. (1972) Gold plate closure of oroantral fistula. *Journal of Prosthetic Dentistry* **27:** 203–206.

Stajeie, Z. (1992) The BFP in the closure of oroantral communications: a study of 56 cases. *Journal of Craniomaxillofacial Surgery* **20:** 193–197.

Stuzin, J. M., Wagstrom, L., Kawamoto, H., Wolfe, A. (1990) The anatomy and clinical applications of the BFP. *Plastic and Reconstructive Surgery* **85:** 29–37.

Tideman, H., Bosanquet, A., Scott, J. (1986) Use of the BFP as a pedicled graft. *Journal of Oral and Maxillofacial Surgery* **44:** 435–440.

Van-Der Wal, K., Mulder, J. (1992) The temporal muscle flap for closure of large palatal defects in CLP patients. *International Journal of Oral and Maxillofacial Surgery* **21**: 3–5.

Vaughan, E., Brown, A. (1983) The versatility of the lateral tongue flap in the reconstruction of defects of the oral cavity. *British Journal of Oral Surgery* **21**: 1–4.

Vuillemin, T., Raveh, J., Ramon, Y. (1988) Reconstruction of the maxilla with bone graft supported by the BFP. *Journal of Oral and Maxillofacial Surgery* **46**: 100–105.

Whitney, J., Hammer, W., Elliott, M., Tucker, D. (1990) The use of cancellous bone for closure of oroantral and oronasal defects. *Journal of Oral Surgery* **38**: 679–681.

Zide, M. F., Karas, N. D. (1992) Hydroxylapatite block closure of oroantral fistulas: report of cases. *Journal of Oral and Maxillofacial Surgery* **50**: 71–75.

Address for correspondence:
Dr Ibrahim E. El-Hakim,
6 El-Gendy Street,
Hadayek Helwan 11433,
Cairo
Egypt.

Fax: +2 02 3690289
e-mail: Imelhakim@Frcu.Eun.Eg