

The Use of Buccal Fat Pad in Closure of Oroantral Communications; The Royal Medical Services Experience

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ABSTRACT

Objectives: To evaluate the use of the buccal fat pad in closure of oroantral communications.

Methods: Fifty three patients with different sizes of oroantral fistulas were treated with a pedicled buccal fat pad to close these defects between 2003 and 2008, with minimal follow up of two months. The age, sex, and etiology were recorded.

Results: Fifty three patients (34 males and 19 females) were treated, ranging age from 17 to 73 years. The reasons of the oroantral communication were due to dental extraction of upper premolars, molars, excision of cystic lesions, implant removal and different kinds of tumors. The procedure was successful among 52 patients. Postoperatively, the orally exposed fat gradually was transformed into a granulation-like tissue and epithelization developed within 3 weeks.

Conclusions: Use of the buccal fat pad is a safe and easy method to be used in oroantral communications closure and the procedure has wide applications and a high degree of success. Good vascularization, ease of access, and minimal donor site morbidity make it a reliable soft tissue graft.

Key words: Buccal fat pad, Fistula, Oroantral.

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Introduction

Oroantral Fistula (OAF) can be defined as a pathologic communication between oral cavity and maxillary sinus and is usually located between the antrum and vestibule. The oroantral communication is a term includes the oroantral fistula in addition to any communication more than 10 mm in diameter which might result from more extensive procedures like bullet injury and maxillectomy surgeries.^(1,2)

Oroantral fistulas most commonly arise because of tooth extraction, mostly follows removal of the maxillary first molars because there is, anatomically,

a close relationship between the root apices of these teeth and the antrum. OAF usually heal within 2 to 3 weeks if less than 2 mm in diameter, but when there is more than a 3-mm defect, or there is sinusitis or periodontal disease, the opening often persists.⁽²⁾ After 3 weeks, they are accepted as chronic, spontaneous healing is uncommon, and surgical correction is necessary. Although the surgical closure is successful in more than 95% of cases, inappropriate operation will result in closure failure.⁽²⁻⁵⁾

Variable methods for the closure of OAF have

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Table I. Distribution of causes of oroantral fistula

Cause	Frequency (%)
Extraction of max. 1 st molar	15 (28.3.)
Extraction of max. 2 nd molar	11 (20.8)
Extraction of max. 3 rd molar	3 (5.7)
Extraction of max. 1 st premolar	1 (1.9)
Extraction of max. 2 nd premolar	8 (15.1)
Excision of tumor	6 (11.3)
Implant removal	5 (9.4)
Enucleation of cystic lesion	4 (7.5)
Total	53 (100)

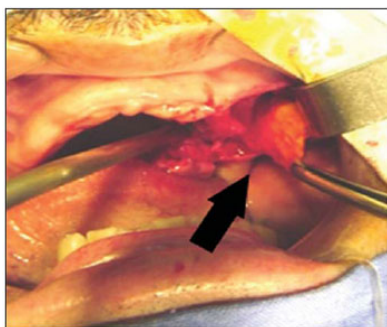


Fig 2. Exposure of the buccal fat pad



Fig 1. An already established oroantral fistula following extraction of upper right first molar

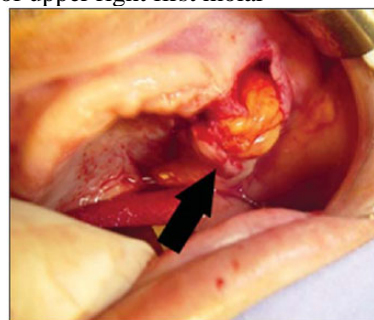


Fig. 3. Closing the fistula by the buccal fat pad Pedicle graft

been reported in the literature, most of them based on mobilizing the buccal sliding flap and palatal flap tissue and advancing the resultant flap into the defect. However, these procedures have not always provided satisfactory results.⁽⁵⁾ Numerous modifications of existing techniques were recommended for soft tissue closure of the fistulas. A pedicled graft of the buccal fat pad (BFP), which enables the closure of oral defects even up to an area of 60 × 50 mm and a thickness of 6 mm, has often been used for the reconstructions of intraoral defects since the procedure was first introduced by Egyedi.^(4,6-8)

The buccal fat pad is different from other subcutaneous fat tissue and can easily be used in some intraoral operative procedures. It can be used as a pedicled graft for coverage of intraoral defects such as seen after ablative surgery or in case of oroantral fistulas.^(6,7) Tideman *et al.* reported that the epithelialization of this uncovered BFP graft takes place readily within 2 to 3 weeks.⁽⁹⁾

For a long time the only surgical importance of this structure seemed to be herniation into the oral cavity or into the maxillary sinus in association with facial trauma.⁽¹⁰⁾ Only in the last quarter of this century has the buccal fat pad been used as a grafting source. In 1977, Egyedi reported the use of the buccal fat pad as a pedicled graft in closing oronasal fistula. Neder, in 1983, was the first to describe the use of the

buccal fat pad as a free graft for intraoral defects.^(7,11,12)

In this study we tried to evaluate our experience in the use of the buccal fat pad in closure of oroantral communication.

Methods

Between July 2003 and November 2008, the buccal fat pad was used to close oroantral fistula among 53 patients at Prince Hashem Bin Al-Hussein Hospital, Queen Alia Military Hospital, Princess Haya Bint Al-Hussein Hospitals, Prince Ali Bin Al-Hussein Hospital and King Hussein Medical Center, age ranged from 17 to 73 years, there were 34 males (64%) and 19 females (36%). All surgical procedures were performed by the authors themselves throughout their periodic rotation on the previously mentioned hospitals.

All of the patients presented with established oroantral fistulas i.e. the time of injury more than three weeks in cases of dental extraction. In cases of surgical defects due to tumor resection, cyst enucleation, and implant removal immediate closure was considered, the minimal follow up period was two months postoperatively. The factors considered were sex, age, cause of the OAF, and time of injury.

Preoperative antibiotics were used to eliminate infection and for all cases intraoperative antibiotics were administered. Caldwell-luc operation was

performed when necessary (to remove tooth remnants or foreign bodies).

The surgical technique:

After inducing local anesthesia (mepivacain 2% with 1:80,000 adrenaline), a circular incision with a 3-mm margin was made around the OAF, and the epithelial tract and any inflammatory tissue within the opening were completely excised. Two divergent cuts were then made from each end of the circular incision extending into the vestibule. The trapezoidal buccal mucoperiosteal flap was then reflected from the alveolar process and the lateral wall of the maxilla. The BFP was exposed through a 1-cm-long vertical incision in the reflected periosteum posterior to the zygomatic buttress. In some tumor cases, the buccal fat pad was already visible through the wide exposure and prolapsed into the defect. The BFP was gently advanced into the bony defect and secured to the palatal mucosa without tension with 4-0 vicryl sutures (Fig. 1, 2, 3). Finally, the mucoperiosteal flap was replaced in its original position, and sutures were inserted between the BFP and the buccal flap so that part of the BFP was exposed in the oral cavity and finally a stabilizing suture was placed between buccal flap and palatal mucosa. No surgical splint or dressings were used. Furthermore, the patient should be motivated to avoid intraoral negative pressure such as blowing the nose and to use antibiotics for prophylaxis (amoxycillin 500mg three times a day for 5 days).

Results

Out of the 53 patients there were 34 males (64%) and 19 females (36%), with an average age of 38 years, ranging from 17 to 73 years. Nine patients had hypertension, 7 diabetes mellitus, 3 hypertension and diabetes mellitus concomitantly, 5 cardiopathy, 2 asthma.

The interval from fistula development to repair varied from immediately in the same session to 2 years. In cases of tumor resection immediate reconstruction was performed in 3 cases of maxillary eosinophilic granuloma, two cases of maxillary squamous cell carcinoma, and another one of osteogenic sarcoma. The same was applied for patients with cystic lesions and faulty endosseous implants where immediate repair of OAF was possible at time of initial surgical management.

Thirty eight cases of OAF out of the 53 (71.7%) developed after removal of one of the maxillary

teeth. The remaining 15 cases were caused by excision of tumor (6 cases), implant removal (5 cases), and enucleation of cystic lesions (4 cases). The detailed distribution of causes is stated in (Table I). The size of the oroantral defects ranged from 3 to 20 mm in diameter.

The most frequent symptoms that patients suffered were those of acute sinusitis including fever, fatigue and malaise, and pain that increased upon bending forward. Five patients with acute sinusitis also had swelling of the periorbital tissues, and all 29 had a purulent discharge from the fistula. An isolated discharge and fluids leak through the nose was seen in 9 patients. Also, phonetic changes were observed in most of these patients. History of traumatic extraction was reported in 6 patients were in four of them a root fragments were retrieved from the antrum.

In five patients a complicated implant procedures which were performed in private clinics the associated peri-implant infection and faulty prosthesis where the main symptoms among them. On the other hand an intraoral swelling was the complaint of three patients two of them proved to have huge cystic lesions related to necrotic and endodontically treated maxillary first molar, and the last one the histopathological study revealed osteogenic sarcoma of the edentulous maxilla. In two patients a persistent ulcer was the main complaint they have squamous cell carcinoma. A severe periodontal destruction was seen in three eosinophilic granuloma patients. An accidentally found residual cystic lesion in two patients who never suffered, but a preprosthetic preparation of the maxilla by extracting multiple chronically infected roots but in the panoramic x-ray revealed the cystic lesions.

Not all the cases were fresh that is to say in 8 patients a failed OAF closure was attempted somewhere else. The dentist made several treatment trials before referring the patient to the maxillofacial surgeon. This fact accounted for the delay in diagnosis in such cases.

29 of these patients also had been suffering from acute sinusitis which in 20 of them was treated preoperatively with oral amoxicillin 500 mg three times daily, for one week combined with antral irrigations with normal saline. Postoperatively, oral 500 mg Amoxycillin three times daily for one week

In 9 cases of maxillary sinus pathology, a Caldwell-Luc operation was performed, which included sinus polyposis excision and inferior

meatal nasal anastomy. The sinus is then packed gently with medicated ribbon gauze which is removed after 48 hours. All our patients who underwent a Caldwell-luc operation received intraoperative and postoperative antimicrobial treatment with intravenous amoxicillin 1g three times daily in addition to oral metronidazole 250 mg two times daily for 5 days, and oral 500 mg two times daily for one week.

Twenty two patients were operated on under local anaesthesia which was applied to the palatal and buccal sides of the upper jaw, while in 31 patients general anaesthesia was necessary.

Clinically, in the typical course, the surface of the orally exposed fat became yellowish-white and then gradually became red within one week, which was likely due to the formation of young granulation tissue. This changed into a firmer granulation tissue during the second week, and it became completely epithelized, with a slight contraction of the wound, by 3 weeks postoperatively. No local infections were noticed.

The BFP failed in a residual pin point fistula just in one case, where it was employed to repair an oroantral communication near to the first maxillary premolar. Dealing with complications, we detected a partial necrosis of the flap in 2 of the 53 cases, with no clinical deficits, achieving a complete epithelization later. A total necrosis was not discovered.

Discussion

Surgical repair of the oroantral fistula is one of the more challenging problems confronting the surgeon working in the maxillofacial region. The multiple techniques described in the literature over the last 50 years point to the lack of consensus for a uniformly successful procedure.⁽⁹⁾

An oroantral fistula may arise secondary to dental infection, osteomyelitis, the sequelae of radiation therapy, trauma, or the removal of maxillary cysts or tumors.⁽¹³⁾ The extraction of maxillary posterior teeth is the most common etiology of the oroantral fistula because of the proximity of the apices of the bicuspid and molars to the antrum, and the thinness of the antral floor (ranging from 1 to 7 mm). A fistula develops when the apices of upper teeth and the lining of the maxillary sinus are closely related. This is rarely the result of pathologic change, such as associated infection or cyst formation.⁽¹⁴⁾

Most small acute oroantral communications, 1 to 2 mm in diameter, heal spontaneously in the absence

of sinus infection. However, almost all oroantral defects larger than 5 mm and present for longer than 3 weeks will epithelialize into chronic oroantral fistulas requiring secondary surgical closure.

Treatment modalities to repair the oroantral fistula include local or distant soft tissue flaps, with or without autogenous grafts or alloplastic implants.⁽¹⁵⁾ Immediate repairs of the acute oroantral defect have a uniformly high success rate approaching 95%, but the success rate of secondary closure of the chronic oroantral fistula is reported to be as low as 67%. Two principles must be observed at time of OAF closure, first, the sinus must be rendered free of infection, and secondly a tension free well vascularized flap is used.^(15-17, 21) The BFP is the anterior extension of the masticatory fat pad which fills the space between the masticatory muscles. It has gained considerable importance during the past two decades. Apart from its importance as a donor site for free-fat grafting or a pedicle fat flap, it is also important in facial contouring in cosmetic surgery. The size of the BFP, is fairly constant among different individuals regardless of the overall body weight and fat distribution.^(9,22-24)

Several reports have shown that the BFP can be used safely in the closure of OAF after tooth removal.^(7,25-27) Tideman *et al.* reported that the epithelialization of this uncovered BFP graft takes place readily within 2 to 3 weeks.⁽⁹⁾

In this study, the frequency of occurrence of OAF was nearly the double in males than in females 64% to 36% respectively, which differs from that found in other studies,⁽²⁸⁻³⁰⁾ and agrees with what had been found by others.^(2,31) However, according to Lin and Bukachaevsky, females exhibit larger sinuses than males and should, therefore, be at greater risk of OAF.⁽³²⁾

Our results are consistent with results in the literature regarding the most frequent cause which was dental extraction.^(5,28,30) The OAFs in this study mostly occurred after extraction of the first and second molars, a finding which agrees with other reports.^(1,28,33) While in other studies the extraction of the second premolar was the most causative factor followed by the first molar.⁽⁵⁾

The drainage and adequate aeration of the sinus should be achieved in cases with mucosal thickening and cystic or polypoid degeneration of mucosa.^(1,13,32) Our results were concordant with the literature. According to Del Junco *et al* and Bluestone, a nasoastral window is essential for drainage, whereas equally good results were

achieved by treating sinus pathology with antibiotics and without drainage of the maxillary sinus into the nose. Bluestone reports that no surgical procedure is needed when the maxillary sinus is free of disease.⁽³⁴⁻³⁶⁾

The easy mobilization of the buccal fat pad and its excellent blood supply and minimal donor site morbidity make it an ideal flap. It can be very useful in older patients to reconstruct defects quickly under local anesthesia. Our results showed that the BFP is a safe, useful and effective procedure for closure of oroantral fistulas. In addition, it is useful procedure for reconstruction of hard palate defects, soft palate defects and coverage of bone augmentation procedures as recommended by other authors.^(37,38)

Conclusions

Use of the buccal fat pad is a safe and easy method to be used in oroantral fistula closure and the procedure has wide application and a high degree of success. Good vascularization, ease of access, and minimal donor site morbidity make it a reliable soft tissue graft.

The advantages of this were the simplicity and ease of the technique, the high success rate, the lack of a visible scar at the donor site, the minimal discomfort for the patient, and the low rate of complications.

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