

Closure of Oroantral Fistula With Buccal Fat Pad Flap and Endoscopic Drainage of the Maxillary Sinus

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Abstract: Oroantral fistula (OAF) is a pathologic communication between the oral cavity and the maxillary sinus. It is usually associated with maxillary sinusitis, where drainage of sinus infection is a mandatory step during closure of the fistula. The flap used for closure of OAF should be tension free, broadly based and well vascularized. The aim of this study was to assess the effectiveness of closure of OAF using buccal fat pad (BFP) flap with concomitant endoscopic middle meatal antrostomy for maxillary sinus drainage. Nineteen patients with chronic OAF were included in the study. Closure was performed using BFP with endoscopic middle meatal antrostomy. Preoperative and postoperative assessments were carried out. Patients were followed up for at least 1 year postoperatively. Complete closure of all OAFs was achieved with no recurrence or dehiscence. In conclusion, closure of OAF with BFP flap and concomitant endoscopic drainage of the maxillary sinus through the middle meatus is an effective, easy, and simple method. It has a high success rate with no effect on the vestibular depth or mouth opening.

Key Words: Buccal fat pad, maxillary sinusitis, nasal regurgitation, oroantral fistula

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Extraction of posterior maxillary teeth may be complicated with oroantral fistula (OAF). This is due to the close proximity of the roots of those teeth to the floor of the maxillary sinus that may be thinned out by dental infection.^{1–4} An OAF is a pathologic condition in which the oral and antral cavities have a permanent communication by a fibrous channel lined with epithelium.^{2,5} It may present with purulent discharge dripping through the fistula. Regurgitation of liquid food into the nose with offensive nasal

discharge may occur, also, nose blowing may result in leakage of air through the fistula into the mouth. However, leakage of air and fluid through the fistula is not necessarily present all the time, as the fistulous track may be blocked with granulations. Facial pain and headache is a common presentation due to sinus infection.^{6–8}

Variable methods for closure of OAF have been proposed, they include local and distant soft tissue flaps, autogenous bone grafts, allogeneous, and synthetic materials, each method having its own advantages and disadvantages.⁹ Recently, buccal fat pad (BFP) is increasingly being used in the repair of OAF and other oral defects worldwide. The BFP has a rich blood supply derived from branches of maxillary and facial arteries. In addition, it is a lobulated mass within a thin capsule that can be used easily as a pedicled flap.^{4,9}

Regardless of the closure method, the presence of maxillary sinus infection is a major contributing factor for failure and recurrence of the disease. Caldwell-Luc procedure has been used for many years to clean the maxillary sinus; owing to its disadvantages, endoscopic sinus surgery (ESS) has been introduced for sinus drainage.^{4,7,8,10} The aim of this study was to assess the effectiveness of closure of OAF using BFP flap with concomitant endoscopic middle meatal antrostomy for maxillary sinus drainage.

MATERIALS AND METHODS

Nineteen patients with chronic OAF were included in this multicenter study in the period from March 2015 to November 2017. Patients were 12 males and 7 females and their ages ranged between 18 and 52 years with a mean of 35 ± 6.2 years. Duration of the illness for at least 3 months is a prerequisite for inclusion in the study. Patients who underwent previous surgery attempting for closure of their fistulas were excluded. Also, those who have systemic diseases as diabetes, hypertension, or bleeding disorders were managed before inclusion in the study. Informed consent was obtained from the patients and the principles outlined in the Declaration of Helsinki were followed. In addition, the research protocol was approved by the ethics committee of our institutions.

Patients were subjected to the following:

Preoperative Assessment

Medical history was obtained from the patients, with emphasis on the symptoms suggestive of OAF. Physical examination was performed for measuring the size of the fistula and for assessment of the associated oral lesions. Nasal endoscopy was performed to detect any nasal pathology. Computed tomography for paranasal sinuses was also performed for all patients. Patients were informed to stop smoking and to do nasal saline irrigation for at least 1 week before surgery.

Operative Procedure

Under general anesthesia with oral endotracheal intubation, endoscopic middle meatal antrostomy was performed, with adequate widening of the middle meatus and removal of any sinus pathology on the side of the lesion. Retraction of the upper lip and

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The study was conducted as a multicenter study on the Departments of Otolaryngology of Cairo University, Beni Suef University, Fayoum University (Egypt) and Taibah University (Saudi Arabia). It was conducted in the period from March 2015 to November 2017.

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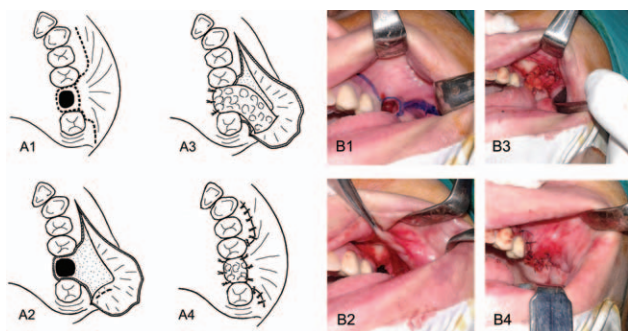


FIGURE 1. (A) An illustration of closure of oroantral fistula (OAF) with buccal fat pad (BFP) flap: A1, the incision line (dotted line); A2, elevation of trapezoidal mucoperiosteal flap, and incision of the periosteum at the zygomatic buttress (dotted line); A3, advancement of BFP to the OAF and suturing it to its edge; A4, repositioning and suturing of the trapezoidal mucoperiosteal flap. (B) Demonstration of the operative technique parallel to the illustration: B1, the incision line is marked; B2, the trapezoidal mucoperiosteal flap is elevated; B3, the BFP is advanced to cover the fistula; B4, the trapezoidal mucoperiosteal flap is repositioned.

cheek on the side of OAF was done. Incision marking and injection of lidocaine 2% with adrenaline 1:200,000 was carried out. Removal of the granulations within the fistulous track was done, with trimming of the fistula edge for refreshing. A trapezoidal mucoperiosteal buccal flap was elevated. A 1 cm incision in the periosteum behind the zygomatic buttress was performed to expose the buccal fat pad, with blunt dissection and gentle traction of it. A pedicled BFP flap was created and pulled to close the OAF without tension, and was sutured to the edge of the fistula using 4-0 Vicryl sutures. The trapezoidal mucoperiosteal flap was returned and was sutured in place and to the BFP flap (Fig. 1). Excessive mobilization of the trapezoidal flap may cause obliteration of the vestibular depth; so it was avoided, considering that the distal part of the BFP flap should be seen over the defect. At the end of the procedure, a piece of gauze soaked with antibiotic and steroid cream was inserted into the nose and middle meatus under endoscopic vision.

Postoperative Care

Patients were discharged from the hospital on the same operative day after removal of the nasal pack, with follow-up appointments weekly for 1 month then monthly afterward. Systemic antibiotics, analgesics, and nasal decongestants were prescribed for 1 week postoperatively. Patients were instructed to avoid smoking for at least 3 months and to avoid teeth brushing and eating on the operated side for at least 3 weeks. Also, blowing of the nose was avoided until healing. The follow-up duration ranged from 12 to 19 months with mean of 14 ± 1.8 months.

RESULTS

The study included 19 patients with OAF encountered after dental extraction. The defects were unilateral in all patients, on left side in 13 and on right side in 6. Lesions were situated in the alveolar region; there were 11 OAFs in the area of first molar and 8 OAFs in the area of second premolar. The size of the fistula ranged between 0.5 and 1.9 cm with a mean of 1.2 ± 0.3 cm at its greatest dimension. Nasal endoscopy showed congested middle meatus with polypoid mucosal thickening in 7 patients. Computed tomography showed bony defects and maxillary sinus opacity of variable degrees in all patients.

No operative or postoperative complications have been encountered. Excessive granulation within the fistulous track was noted and was excised in all patients. The BFP was harvested easily and it

closed the defect completely in all patients. The trapezoidal mucoperiosteal buccal flap covered the proximal part of the BFP flap. The fat was seen yellowish pink in color after 1 week, with the formation of strong granulation tissue after 2 weeks. Also, there was no effect on the vestibular depth or the mouth opening.

Complete closure of all OAFs was achieved within 1 month postoperatively and no dehiscence or recurrence was noted. After the 3rd month, the surface of the defect was covered with mucosa that crept from the surrounding tissues.

DISCUSSION

An OAF is a pathologic communication between the maxillary sinus and the oral cavity, mostly in the alveolus, resulting from trauma during endodontic treatment or tooth extraction that leaves a gap in the bone of the maxillary sinus floor. This gap is always contaminated with food and saliva, leading to bacterial infection and impaired healing.⁸ So, treatment of maxillary sinusitis is a mandatory step during closure of OAF.^{11,12} Endoscopic sinus surgery allows drainage of the maxillary sinus through its natural ostium in the middle meatus, so it is a more physiologic method than the old traditional Caldwell-Luc procedure.¹⁰

In this study, 19 patients with OAF were treated with closure of the defect with BFP flap and endoscopic drainage of the maxillary sinus through the middle meatus. Complete closure of OAF of all patients was achieved. Hanazawa et al¹ treated 14 patients with OAF with BFP flap, they achieved closure of the defect in 13 of their patients. Also, Jain et al⁹ treated 15 patients with OAF using BFP flap with closure of all fistulas obtained; however, they needed closure of large defects using 2 layers by covering the BFP with buccal mucosal flap. Haraji and Zare,¹³ in a series of 13 patients, reported that OAF closed with BFP healed without any esthetic disadvantages or disturbances of the masticatory function. Most studies suggest high success rate of BFP in the closure of OAF, even primarily after removal of odontogenic lesions.¹⁴ However, some disadvantages have been reported, such as mild obliteration of vestibular depth and recurrence of OAF in up to 7.5% of patients.¹⁵⁻¹⁷ In the previously mentioned studies, drainage of maxillary sinus infection was performed via Caldwell-Luc approach. However, Fusetti et al¹⁰ used ESS to clean the maxillary sinus in 8 patients with OAF and they achieved complete cure of their patients using mucoperiosteal flap in closure. Also, Procacci et al⁵ used the same method with support of mucoperiosteal flap using titanium mesh. They achieved closure of OAF in 11 out of 12 patients; however, the mesh was removed after wound healing in another surgical step.

Buccal mucosal flap is suitable for closure of small to moderate-sized (<1 cm) lateral or midalveolar fistulas. The major disadvantage of this technique is the loss of vestibular depth, which may need a secondary vestibuloplasty for denture wearing patients.^{2,4} Another procedure used for closure of OAF is the palatal mucoperiosteal flap which is usually based on the greater palatine artery. However, technical difficulties have been encountered with rotation of the flap including kinking of its blood supply with the possibility of necrosis.^{2,6} The BFP is mobilized as a pedicled flap that can be used for a large defect, it readily reepithelializes and it allows for replacement of the buccal mucoperiosteum without major effect on the vestibular depth.^{1,3,4,14}

Regardless of the closure method of OAF, 2 important points should be considered. First, the maxillary sinus must be rendered free of infection. Second, the flap used in closure should be tension free, broadly based and well vascularized.^{2,11} The BFP flap has a rich axial blood supply derived from the buccal and deep temporal branches of the maxillary artery and the transverse facial artery, which could explain its high success rate with rapid

epithelialization.^{16,18} For these advantages, some authors have considered the pedicled BFP flap to be the best choice for treatment of OAF especially if recurrent as it has a low failure rate.^{17,19}

This study may have some limitations that should be addressed. Dental extraction was the offending cause of OAFs in all our patients; however, these types of fistulas are unlike postirradiation and post-tumor excision fistulas which may be larger with excessive fibrosis of the surrounding tissues affecting the vascularity. Also, the study included a small sample of patients. So, we recommend future studies on a large number of patients having OAFs of different causes and sizes.

In conclusion, closure of OAF using BFP flap with concomitant endoscopic drainage of the maxillary sinus through the middle meatus is an effective, easy, and simple method. It has a high success rate with no effect on the vestibular depth or mouth opening.

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