

## Oroantral Fistula: A Short Review

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### Abstract

Oral surgeons very commonly encounter complications like oroantral communications and fistulas in day to day practice. An abnormal communication between maxillary sinus and oral cavity is known as Oroantral Communication [OAC]. When there is an epithelialization of oroantral communication, it leads to the formation of oroantral fistula. An unnatural pathological communication between the maxillary antrum and the oral cavity which results mostly due to exodontia is known as oroantral fistula [1,17]. Various types of local flaps, distant flaps, combination of flaps, various types of grafts, buccal fat pad are being used for the surgical management of oroantral fistulas [1].

This article describes causes, symptoms, diagnosis and management of oroantral fistulas as well as highlights various surgical treatment options for oroantral fistula.

**Keywords:** Buccal Advancement Flap; Buccal Fat Pad; Maxillary Sinus; Maxillary Sinusitis; Oroantral Communication [OAC]; Oroantral Fistula [OAF]

### Introduction

Fistula is an unnatural connection between two internal organs or tube-like communication joining an internal organ to the body surface. As far as maxillofacial region is concerned, fistulas can be divided into intra-oral fistulas and oro-cutaneous fistulas. Oronasal fistulas and oroantral fistulas are examples of intraoral fistulas. Orocutaneous fistulas are the connection between skin surface and oral cavity [13].

Oral & maxillofacial surgeons come across complications like Oroantral Communication [OAC] and Oroantral Fistula [OAF], commonly after the extraction of maxillary molars and premolars [1]. There is a close anatomical relation of maxillary posterior teeth to maxillary antrum which leads to the spread of odontogenic infections into the maxillary sinus [16].

The pathological connection between maxillary sinus and oral cavity is known as the Oroantral Communication [OAC]. Oroantral Communication [OAC] can turn into oroantral fistula [OAF] [2]. An unnatural pathological communication between the maxillary antrum and the oral cavity which results mostly due to exodontia is known as oroantral fistula [17]. Oroantral fistula is a sequela of oroantral communication after the epithelialization. Epithelialization occurs due to migration of oral epithelium into the oroantral communication. About 48 hrs. to 72 hrs are required for the process of epithelialization [2]. Oroantral fistula develops an epithelium like the pseudo stratified ciliated columnar respiratory cells of the maxillary sinus as well as same as those of the squamous epithelium of the oral mucosa [2]. There are three types of oroantral fistulas, depending on the location, i.e., alveolo-sinusal OAF, palato-sinusal OAF and vestibulo-sinusal OAF [2]. The risk of formation of oroantral communication is less in children because of the smaller volume of the sinus [24].

This short review will discuss about etiology and diagnosis of oroantral fistula and will briefly highlight various options for surgical management of oroantral fistula.

## Discussion

There are various etiological factors or causes which lead to the formation of oroantral fistula [OAF]. The most common cause is the extraction of maxillary molars and premolars. If oro-facial anatomy is considered, maxillary molars and premolars are located very close to the maxillary antrum and projection of their roots is within the maxillary antrum. Hence, extraction of maxillary molars and premolars is the most common cause which can lead to development of oroantral defect. The bony barrier between the maxillary antrum and roots of maxillary molars & premolars varies in thickness from total absence to 12 mm. Hence, Oroantral Fistula [OAF] can result after extraction of maxillary posterior teeth as well as after the root canal treatment of maxillary posterior teeth, due to mechanical injury to the maxillary sinus mucosa [16]. Maxillary tuberosity fracture, periapical infections of molars and pathological entities like cysts & tumors are some of the causes which can lead to oroantral fistulas. Neoplasm, iatrogenic injuries and Paget's disease are also some of the etiological factors of oroantral fistula [20]. Maxillofacial trauma, osteomyelitis and radiation therapy can also result into formation of oroantral fistulas [22]. Sometimes, Oroantral Communication [OAC] can occur after dental implant placement in maxillary posterior teeth region of jaw [21]. Oroantral Fistula [OAF] can also occur following indirect sinus elevation procedure, prior to dental implant placement in the maxillary posterior region of jaw. But this is a rare complication of indirect sinus elevation procedure [23].

The patient suffering from oroantral fistula complains of altered nasal resonance & nasal regurgitation of fluid. But some patients can be asymptomatic. The complication which most commonly takes place as a sequela of the formation of oroantral communication is the "maxillary sinusitis" [25]. If patient got maxillary sinusitis, he may suffer from unilateral nasal obstruction, foul odour and taste or rhinorrhea [16]. Almost half of sinusitis cases show occurrence on the third day after the formation of oroantral communication [21,25]. On clinical inspection, operator can notice oroantral fistula. "Cotton-wisp test", "nose blowing test" and "mouth mirror test" are various tests which can be done to diagnose oroantral fistula clinically. The patient is told to close his nostrils with his hand & to blow down the nose, but his mouth should be open. In this position, above mentioned three tests are being performed. If there is presence of oroantral fistula, whistling sound will be heard or air-bubbles, fluid secretions will be seen around an opening, it indicates the presence of Oroantral Fistula [nose-blowing test].

In “cotton-wisp test”, operator must place cotton wisp near the orifice, to rule out oroantral fistula. In “mouth mirror test”, mouth mirror is placed at orifice, if fogging is seen on the mouth mirror, it indicates the presence of OAF. But the radiographic examination reveals the presence of OAF more accurately. Some authors claimed that a three-day exposure of the maxillary sinus shows an oroantral defect on radiographic examination [18]. “Cone beam computed tomography” is the recent radiographic tool which can be effectively used for diagnosing and detecting the presence of oroantral defect [16].

## **Management of Oroantral Fistula [OAF]**

### **Perioperative Management**

Before performing any surgical procedure to repair an oroantral defect, irrigation of operating site with saline and followed by diluted saline is very much important to eliminate infection [1].

### **Operative Management**

The oroantral defects, which are smaller than 2 mm in diameter, can heal spontaneously but, the larger defects will require surgical management. An immediate closure of oroantral fistulas proves more successful and the success rate is up to 95 % whereas, the secondary closure of oroantral fistula shows low success rate, i.e., up to 67 % [1].

Various surgical procedures have been proposed for the closure of oroantral fistulas. Different types of local flaps, distant flaps, combination of flaps, various types of grafts, buccal fat pad are being used for the surgical management of oroantral fistulas [1]. While operating oroantral fistulas, two rules should be taken into consideration. The first rule is that maxillary sinus should be free of any type of infection as well as there should be adequate nasal drainage. The closure of oroantral fistula should be tension-free and the flap should have broad base & should be well vascularized is the second rule [1].

### **Various Options Available for the Surgical Management of Oroantral Fistula are as Given Below**

**Flaps:** Local and distant flaps as well as combination of flaps can be used for closure of OAF.

#### **Local Flaps**

#### **Buccal Flaps**

In treating oroantral fistulas with buccal flaps, operator should excise an oroantral fistula surgically and must remove total epithelialized margins. Two vertical releasing incisions are made extending towards mucobuccal folds and trapezoidal flap is elevated. The flap is then advanced towards the defect and water-tight closure is done [1,2,4].

The implication of a buccal flap along with a thin layer of buccinator muscle for the surgical management of oroantral fistula was described in 1930. This was the first type of buccal flap technique described for OAF closure and was proposed by Axhausen [1,2,4].

A buccal sliding flap technique was first proposed by Berger. This technique was first described for small to medium sized fistulas, present either laterally or on the alveolar ridge. Rehrmann proposed the use of buccal sliding flap in 1936. Moczair also described the buccal sliding flap technique in which the surgeon shifts the flap one tooth distally [1,2,4].

Rotating gingiva- vestibular flap technique was described by Krompotie and Bagtain and it proved beneficial for immediate closure of oroantral defects [1].

### **Palatal Flaps**

The palatal pedicle flap for the closure of oroantral fistula was first described by Ashley in 1939. In this technique, after excision of fistula and all epithelialized margins, the palatal fibromucosa is incised for raising the flap with posterior base. The greater palatine artery supplies this flap. This palatal flap is raised and advanced towards the defect and tension-free closure should be performed. The closure of OAF with palatal flap gives good results in premolar area as compared to molar area. In molar area, excessive tension might be created which may lead to ischemia. If there is excessive rotation of flap, it can lead to flap necrosis. But the palatal flap is also having advantages like high vascularity and good thickness. There are various modifications of palatal flap like the anteriorly based palatal flap, the divided flap and the tunnel palatal flap. Ehrl used the palatal pedicle flap for treating large fistulas of diameter of 1 cm [1,2,4].

### **Combination of Flaps**

A two-flap technique for the surgical closure of oroantral fistula was described by Ziembra. This technique gives stable epithelial covering to the superior as well as inferior surface of repaired defect. All this lead to decrease in postoperative infection, breakdown of wound & recurrence. Batra et al. had described a double layer flap closure to repair oroantral fistula. Combined palatal-buccal flap technique was proposed by Hassan et al. which was beneficial for the late closure of small to medium sized oroantral fistulas [1].

### **Distant Flaps**

Distant flaps like tongue flaps and temporalis muscle flap can also be used for the closure of oroantral fistula [4].

### **Buccal Fat Pad**

This is commonly performed option. Buccal Fat Pad [BFP] can be used as pedicellate graft for reconstructing intra-oral defects. The anatomical location of buccal fat pad is favorable which provides ease and buccal fat pad can be harvested with minimal dissection. It is having good blood supply & is easy to mobilize. There are low rates of failure and complications are associated with buccal fat pad. This surgical technique takes less time and can be performed under local anaesthesia. But there are chances of decrease in vestibular height in this type of surgery. Buccal fat pad is a good option where there is a damage to alveolar, palatal or buccal mucoperiosteum and for repairing large defects in the maxillary tuberosity area. The size of oroantral fistula plays an important role in the success of buccal fat pad. For small to medium sized defects, other options prove more beneficial. Buccal fat pad can be effectively used with medium to large defects [1,4,8,10,18].

## **Bone Autografts**

Various bone autografts can also be used for the repair of oroantral fistulas as given below [1]

- Autografts harvested from extraction sockets
- Intraoral sites like mandible
- Distant sites like iliac crest
- Press - fitting monocortical bone grafts
- Auricular cartilage [1]

## **Third Molar Transplantation**

The technique of third molar transplantation for the closure of oroantral fistula was proposed by Yoshimasa et al. The advantage of this technique is that it does not need postoperative prosthodontic rehabilitation [1].

## **Sandwich Technique**

This technique was proposed by Ogunsalu. In this technique, in between two sheaths of a bio-resorbable membrane, bone grafting material is sandwiched, and this is used for the hard tissue closure of oroantral fistula.

## **Guided Tissue Regeneration [GTR]**

This technique has been described by Scattarella et al. In this technique, an autologous bone graft is integrated with xenologous particulate bone graft and this is covered by GTR membrane which is non-reabsorbable and expandable in nature [1].

## **Lypophillized Fibrin Seal**

The sealant mixture such as lypophillized fibrin seal can be administered for the closure of oroantral fistulas. This lypophillized fibrin sealant mixture can be applied above the maxillary sinus floor which acts as a protection for the clot [1,4].

## **Nonporous Hydroxyapatite [HA] Blocks**

This technique was given by Zide et al. In 1992. In this technique, 26 – gauge wire is used to secure the hydroxyapatite block to the alveolar ridge. This membrane helps for protection of the blood clot [1,4].

## **Gold foil / Gold plate / Aluminium foil / Titanium plate**

The literature is present supporting the application of various metals like gold, aluminum, titanium etc. For the repair of oroantral fistulas [4].

## **LASER Light**

This is one of the recent treatment options for the management of oroantral fistulas. In this, low doses of LASER light have been recommended as per the literature available [1,4].

### **Endoscopic Sinus Surgery**

Endoscopic sinus surgery can be successfully used in patients with oroantral fistulas suffering from chronic maxillary sinusitis [12,16].

### **Postoperative Management**

For achieving good results after the surgical closure of oroantral fistulas, proper postoperative care is of prime importance. The patients are advised to consume soft food and to consume fluid from contralateral side. This will avoid injury to the operated site. Administration of steam inhalation can also be advised to moisten the airway. Patient should be prohibited to do smoking and to use straw as well as nose blowing & sneezing should also be restricted. All these precautions should be taken to avoid stress at the operated site [1]. Antibiotics, analgesics and nasal decongestants should be prescribed postoperatively. Regular follow up of the patient should be maintained and at each follow-up visit proper clinical examination of operated site should be performed to rule out the presence of oroantral fistula.

### **Conclusion**

There are various treatment options for the surgical management of Oroantral Fistula [OAF]. Operator should choose an appropriate treatment option after taking into consideration the location and size of the defect. If operator is planning for any type of flap for the closure of oroantral fistula, the availability of flap should also be taken into consideration. Presence of any pre-existing infection and the time interval between the occurrence of oroantral defects are also to be taken into consideration before planning the treatment [17]. General health of the patient should also be taken into consideration before planning any treatment [1,17]. As per the recent literature, “Endoscopic Sinus Surgery” proves successful for closure of oroantral fistulas [16].

For successful management of oroantral fistulas, elimination of sinusitis, surgical excision of fistula, followed by accurate postoperative management is necessary.

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