

# Various types of flaps in the management of oroantral fistula: A review literature

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## **Abstract:**

### **Background:**

*Surgical repair of the oroantral fistula is one among the controversial things revolving around the surgeons working in the oral and maxillofacial region. This review article aimed to discuss the concepts and consensus revolving around the surgical management of oro antral fistula. The multiple techniques described in various literatures over the last 4 to 5 decades to arrive at the uniformly successful procedure for the closure of the oro antral fistula. In simplest terms, treatment modalities to repair the oroantral fistula include local or distant soft tissue flaps, with or without autogenous grafts or alloplastic implants. Immediate repairs of the acute oroantral defect have a uniformly high success rate, but the success rate of secondary closure of the chronic oroantral fistula is reported to be as low comparatively.*

### **Conclusion:**

*The long-term closure of the oroantral fistula challenges all surgeons working in the oral and maxillofacial region. A historical review of the more valid techniques has been presented. A protocol for oroantral fistula closure is offered ie; the buccal sliding flap for little (5 to 10 mm) lateral or midalveolar defects; the palatal rotation flap for little (5 to 10 mm) palatal or midalveolar defects; the anterior-based dorsal tongue flap for moderate (10 to 20 mm) anterior defects; and the temporalis flap is reserved for larger (>2 cm) posterior defects. Thus with the advancing trends in oral and maxillofacial surgery the techniques are evolving more and more to achieve desired result with much higher prognosis.*

**Keywords:** *Vascularized soft tissue flap, palatal flaps, buccal flaps, tongue flaps...*

## **1. Introduction:**

An oroantral fistula may arise secondary to dental infection, osteomyelitis or from the sequelae of radiation therapy or from trauma, or the removal of maxillary cysts or tumors[1]. Maxillary posterior teeth extraction is one of the most common etiology for the occurrence of oroantral fistula due to the proximity of the apices of the bicuspid and molars to the antrum, and the thinness of the antral floor approximately ranging from 1 to 7 mm[2]. Most small acute oroantral communications are 1 to 2 mm in diameter that heal spontaneously provide there must be absence of sinus infection[3]. Most of the oro antral fistula larger than 5 mm present more than 3 weeks will epithelialize into chronic oroantral fistulas that may require secondary surgical closure[4]. This oroantral fistula will develop between the pseudostratified ciliated columnar respiratory epithelium of the maxillary antrum and the squamous epithelium of the oral mucosa.

The two important principles must be observed in the closure of oro antral fistula[6] First, the sinus must be rendered free of infection with adequate nasal drainage. This may necessitate a Caldwell-Luc procedure with

nasal antrostomy or endoscopic sinus surgery. The use of appropriate sinus antibiotics in addition to topical or systemic decongestants is necessary perioperatively, along with nasal precautions. Always broad base of the flap with tension free closure is preferred.

## 2. Discussion:

Local soft tissue flaps:

There are lot of soft tissue flap procedures available to achieve surgical closure of the oroantral fistula. These techniques have included local or distant flaps, randomly or axially based, with single or double layered closure. The local flaps essentially include variations of the buccal sliding flap and the palatal rotation flap.

Buccal advancement flaps:

Axhause et al [7] at 1930, used a buccal mucosal flap with a thin layer of buccinator muscle to close an oroantral defect. Berger et al at 1939 first described, a buccal sliding flap that is still valid today to close small to moderate-sized (<1 cm) lateral or midalveolar oroantral fistulas. The margins of the fistula are probed with a 25-gauge needle, keeping in mind that the osseous defect is considerably larger than the soft tissue fistula. The fistula is excised sharply with 15 blade and taken back to healthy bone. From the anterior and posterior edges of the bony defect, two divergent incisions are made sharply through mucoperiosteum to bone and carried superiorly to the height of the mucobuccal fold. This trapezoidal buccal flap is elevated with periosteal elevator; the periosteum on the undersurface of the flap is incised horizontally at multiple parallel points as necessary to allow advancement of the flap.

The sinus may be debrided through the bony defect or Caldwell-Luc procedure may be performed after forward extension of the anterior limb of the flap. Closure is accomplished over bone with mattress sutures from the buccal flap to palatal mucosa. The major disadvantage of this technique is the loss of vestibular depth, which may necessitate a secondary vestibuloplasty for the denture wearing patient.

A modification of the buccal sliding flap is the buccal fat pad graft, first described by Egyedi et al [9] in 1977 and further refined by Stajcic et al [10] Hanazawa et al [11]. The pedicled buccal fat pad graft is suitable for larger defects that are greater than 2 cm, readily reepithelializes, and allows for replacement of the mucoperiosteal flap without loss of vestibular depth. The axial blood supply is derived predominantly from the buccal and deep temporal branches of the maxillary artery and the transverse facial artery. After the trapezoidal buccal mucoperiosteal flap is raised, a 1-cm vertical incision is made in the reflected periosteum posterior to the zygomatic buttress to allow exposure and advancement of the buccal fat pad over the bony defect where it is sutured to the palatal mucosa.

Palatal flaps:

Welty et al [12] in 1920 first described a palatal sliding mucoperiosteal flap and Ashley et al [13] in 1939 first described a long palatal rotation flap to close an oroantral fistula. Several variations on the palatal rotation flap may be found in the literature; all are axial flaps based on the greater palatine artery. The width of the anterior extent of the flap is less than 2 cm should be slightly wider than the diameter of the bony defect, and its length should be adequate to allow lateral rotation, repositioning, and suturing to the buccal mucosa without tension. Technical difficulties have been encountered with palatal rotation flaps including kinking the greater palatine artery bunching the flap at its axis of rotation, and painful exposed bone at the anterior donor site. Therefore, a host of modifications have evolved including the palatal island flap of James et al, the split thickness submucosal flap of [14] in 1980, and the double-layered closures advocated by Fickling et al [15] and Rintala et al [16].

The palatal island flap remains the most versatile. After fistulectomy, a template of the osseous defect is outlined on the anterior aspect of the proposed palatal flap. A full thickness mucoperiosteal flap is raised, starting anteriorly and proceeding posteriorly until the greater palatine neurovascular bundle is seen exiting its foramen. The neurovascular bundle is dissected free from the undersurface of the mobilized palatal flap

to the anterior island, which is now sectioned from the posterior flap, which is returned to the donor site. The island with its intact neurovascular bundle is now tunneled under a bridge of intact palatal tissue, rotated over the bony defect and sutured circumferentially. The main advantages of this flap are the flexibility for lateral rotation and less exposed raw bone, but the vascular pedicle is vulnerable to trauma.

#### Distant flaps:

The two most useful distant soft tissue flaps are the tongue flap and temporalis flap. Both provide an excellent bulk of tissue for closure of sizable defects. However, both techniques are general anesthetic procedures with significant potential morbidity (hemorrhage, infection, flap failure). In 1956, Klopp et al and Schurter et al [17] first described to use a pedicled lateral tongue flap for closure of a hard and soft palate defect after ablative cancer surgery. In 1966, GuerreroSantos et al and Altamirano et al[18] used an anteriorly-based dorsal tongue flap to repair a cleft palate. In 1979, Sachs et al [19] used a posteriorly-based lateral tongue flap to close a persistent oroantral fistula.

In general anteriorly-based tongue flaps are more useful in the treatment of hard palate defects, whereas the posteriorly-based flap is indicated for larger posterior soft palate defects. Bracka et al [20] in 1981 described animal studies of the lingual vascular tree. The resultant rich submucosal vascular plexus provides the blood supply for this random pattern flap. A two-layered closure is preferable; flaps from the fistula margin are everted to form the nasal floor closure when possible. An anteriorly-based dorsal tongue flap is raised 2.5 to 3.0 cm wide at its base, or 20% wider than the defect. The flap can be extended 5 to 6 cm in length, but stopping short of the main gustatory papillae. The flap should be 5 to 6 mm in thickness to include several millimeters of muscle to protect the submucosal vascular plexus.

The donor site is closed in layers to avoid hematoma formation. The flap is advanced over the defect and sutures passed circumferentially to the buccal and palatal mucosa before all knots are tied. The tongue may be sutured to the upper lip or maxillary incisors; intermaxillary fixation is not usually necessary. After 3 weeks, the pedicle may be returned to the donor site under local anesthesia and light sedation. The flap is trimmed as necessary at monthly intervals, starting 3 months after return of the pedicle. Massengil et al [21] in 1970 reported no remarkable disturbances of speech articulation, glossal mobility, or velopharyngeal closure associated with the tongue flap.

Other distant flaps for closure of sizable fistulas include the temporalis myofascial flap and microvascular transfers. Godfrey et al [22] in 1993 reported a transbuccal obliteration of the antrum for a chronic oroantral fistula with an ipsilateral temporo-parietal myofascial flap. The temporalis flap is a true axial flap based on the deep temporal arteries off the internal maxillary artery. It reliably provides a large bulk of tissue with excellent travel to the maxillary midline and as far anteriorly as the ipsilateral canine. A hemicoronal approach is used to expose and mobilize the temporalis muscle, with or without zygomatic osteotomy and the flap is advanced transbuccally into the oral cavity. Skin grafts are not necessary as the flap readily epithelializes.

### 3. Conclusion:

The long-term closure of the oroantral fistula challenges all surgeons working within the maxillofacial arena. A historical review of the more valid techniques has been presented. A protocol for oroantral fistula closure is offered ie; the buccal sliding flap for little (5 to 10 ram) lateral or midalveolar defects; the palatal rotation flap for little (5 to 10 ram) palatal or midalveolar defects; the anterior-based dorsal tongue flap for moderate (10 to 20 mm) anterior defects; and the temporalis flap is reserved for larger (>2 cm) posterior defects.

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