

Comparison of palatal rotational flap with buccal advancement flap for the treatment of oroantral fistula

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ABSTRACT

Objective: To compared outcome of palatal rotational flap with buccal advancement flap for the treatment of oroantral fistula.

Methodology: This Randomized controlled clinical trial was performed in outpatient Department of Oral and Maxillofacial Surgery Unit, Punjab dental hospital, Lahore from June 2013 to December 2013. One hundred and twenty patients were included which were divided into two groups; Group A (buccal advancement flap) and Group B (palatal rotational flap). Both procedures were performed under local anesthesia. Oral penicillin and nasal decongestant were prescribed after the procedure.

Results: The mean±SD ages were 35.10±8.56 years of group A and 35.73±9.40 years in group B. There were 40 males and 20 females in group A, while in group B there were 42 males and 18 females. Male to female ratios were 2:1 and 2.4:1. Fifty two patients (86.6%) have success and 8 patients (13.4%) have no success in group A while in group B, 56 patients (93.3%) have success rate and 4 patients (6.7%) have no success rate. Statistically, there was no significant difference (P>0.05). There is no statistical difference in the outcome of oroantral fistula for both local and distant flaps.

Conclusion: Treatment options for OAC/OAF include various soft tissue flaps with or without bone grafting and the best method should be emphasized upon to achieve proper closure. Buccal advancement flaps are best suited for small fistulas while palatal rotational flap or a combination of the two gives best results for large oroantral fistulas.

Keywords: Buccal advancement flap, Palatal rotational flap, Oroantral fistula, Oroantral communication.

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Introduction

The traditional methods employed in the repair of oroantral communication can be broadly divided into local and distant flaps. Buccal advancement and palatal

rotational flaps are increasingly being employed in the repair of oroantral fistula and other oral defects worldwide.

Oroantral communication(OAC) is defined as pathological space created between the maxillary sinus

and oral cavity.¹ Oroantral communication or fistula are common complications in dentoalveolar and maxillofacial surgery and are often seen, especially after complicated tooth extraction in posterior maxillary teeth because of their close relationship to the maxillary sinus.^{2,3} The most common etiological factors for oroantral fistula is tooth extraction, infection, cystic lesions, maxillary tumors. The first premolars accounts for 5.3% of OACs, the second molars 45%, third molars 30% and the first molars 27.2%.⁴

Signs and symptoms include purulent discharge through fistula, entering of water into nose and air hisses from the fistula into the mouth. Radiological findings include sinus floor discontinuity, opacification of sinus, focal alveolar atrophy and associated periodontal disease. Surgery is indicated if the fistula does not heal within three weeks.⁵ Surgery aims to promote ventilation and aeration of maxillary sinus, to remove disease bone and to resects the thickened epithelium along the borders of fistula.⁵ Various techniques including local and distant flaps and grafts have been described for the closure of oroantral communication.⁴

Selection of treatment strategy is influenced by the amount and the condition of the tissue available for repair and the possible placement of implant for the future. Surgical success depends on the technique, the site and size of fistula and the presence or absence of sinus infection success of flap was determined as complete healing of flap without symptoms and signs of leakage.⁵ The most common surgical procedure used for the OAC/OAF repair is the buccal advancement flap designed by Rehrmann. In this procedure, a broad base trapezoid mucoperiosteal flap is created and sutured over the defect. Its broad base ensures adequate blood supply and consequently high success rate of 93 % had been reported. Disadvantage of this procedure include the risk of reduction of buccal sulcus depth which can interfere with prosthetic rehabilitation, maintenance of oral hygiene and manifest postoperative pain and swelling.⁶ Another method commonly used for the closure of Oroantral fistula is palatal rotational flap which has a success rate of 76%. A palatal flap anteriorly based or posteriorly based contain a large palatine vessel to ensure adequate blood flow. It is less vulnerable to rupture than buccal flap because of the thickness of palatal mucosa. Furthermore, the buccal sulcus depth remains intact. Negative aspect of palatal flap is denuded palatal donor area and soft tissue bulge at the axis of rotation. This

cause relatively greater discomfort for the patient compared with other soft tissue techniques.⁶

Few case reports and case series are available both nationally and internationally. Some studies consider buccal advancement flap an ideal method for treatment of oroantral fistula while others advocate the use of palatal rotational flap for closure of oroantral. No comparative study is available. The rationale of this study is to compare the outcome of two flaps for the closure of oroantral fistula so that we can suggest the flap with minimal surgical morbidity, patient's discomfort and better success to improve the patient quality of life.

Methodology

This Randomized controlled clinical trial was performed in outpatient Department of Oral and Maxillofacial Surgery Unit, Punjab Dental Hospital, Lahore for a period of six months (14th June 2013 to 13th December 2013). One hundred and twenty patients (divided into 2 groups, 60 in each) were included in this study. Non-probability, purposive sampling was used for the study.

All patients having freshly formed large (>6mm) oroantral communications immediately after extraction and patients having history of tooth extraction with entering of water into nose and air hisses from the fistula into the mouth were included in the study while patients with any systemic problems affecting the healing process (diabetes), drug and alcohol abuse, those with smoking habits, previous sinus surgery, presence of intranasal foreign body and patient with sinus infection and need for Caldwell-Luc procedure were excluded from the study.

The study was conducted after the approval of the ethical committee. Fully informed written consent of the patients was taken. A structured proforma was used to record the patient's demographic data like patient's name, age and gender.

Patients were divided into two groups by using random number table into group A and group B. In group A, buccal advancement flap was used. In group B, palatal rotational flap was used. Both procedures were performed under local anesthesia. For the buccal advancement flap, after fistulectomy, two divergent mucoperiosteal incisions from the anterior and posterior edges of bony defect were made and extended superiorly to

the height of mucobuccal fold. This trapezoidal buccal flap was raised and then the periosteum on the undersurface of the flap was incised horizontally at multiple parallel points to allow the advancement of flap. After the anterior side of the flap was extended forward, the closure was provided over the bone with mattress suture from the buccal flap to palatal mucosa.

For palatal rotational flap, after fistulectomy, the greater palatine foramen with its vascular supply was identified by manual palpation of the palate. A full thickness incision was made lateral to the vascular supply and extended 2-3 mm short of the palatal side of the teeth. The incision was extended up to the palatal mucosa of lateral incisor. A full thickness mucoperiosteal flap was raised from anterior to posterior; care was taken as the vascular supply was approached. Once the flap was elevated, it was rotated and sutured on the donor site without any tension. Patient was recalled after 1 week for suture removal.

Oral penicillin and nasal decongestant were prescribed for all patients. They were instructed to avoid strong sneezing and to use a pipette while drinking and were kept under a soft diet. All the patients were assessed clinically by nose blow test at 1 week and 1 month after surgery for the assessment of surgical outcomes, positive nose blow test was indicate failure of flap.

Negative nose blow test was considered as success of flap. The test involves pinching of the nostrils together to occlude the patient's nose and asking the patient to blow gently through the nose while surgeon observed the flap area. If there was no passage of air or bubbling of blood then the test was considered as negative nose blow test. All the surgical procedures were performed by the researcher himself to control biasness.

The data was entered and analyzed using Statistical package for Social Sciences (SPSS version 17). Mean \pm SD was calculated for the quantitative variable like age. Frequencies and percentages were computed for categorical variables like gender and success of two groups of flap. Chi square test was used to compare the percentage of success between two groups. $P < 0.05$ was considered as statistically significant.

Results

Age distribution between the two groups shows that there were 20 patients (33.4%) in age group 20-30 years, 23 patients (38.3%) in age group 31-40 years and 17 (28.3%) in age group 41-50 years in buccal advancement flap group. While in the palatal rotational flap group, there were 21 patients (35%) in age group 20-30 years, 18 patients (30%) in age group 31-40 years and 21 patients (35%) in age group 41-50 years. The mean \pm SD ages were 35.10 \pm 8.56 and 35.73 \pm 9.40 years respectively (Table I).

According to genders, there were 40 males (66.6%) and 20 females (33.4%) in buccal advancement flap group, while in the palatal rotational flap group, there were 42 males (70%) and 18 females (30%). Male to female ratios were 2:1 and 2.4:1 respectively (Table II).

Table III showed the success of flap in patients of oroantral fistula, 52 patients (86.6%) have success and 8 patients (13.4%) have no success in buccal advancement flap group, while in palatal rotational flap group, 56 patients (93.3%) have success rate and 4 patients (6.7%) have no success rate. Statistically, there was no significant difference ($P > 0.05$).

Table No I: Frequency and percentage of ages in both groups (n = 120)

Age (years)	Buccal advancement flap (n= 60)	Palatal rotational flap (n= 60)
20 – 30	20(33.4%)	21(35%)
31 – 40	23(38.3%)	18(30%)
41 – 50	17(28.3%)	21(35%)
Mean \pm SD	35.10 \pm 8.56	35.73 \pm 9.40

Table No II: Frequency and percentage of genders in both groups (n = 120)

Gender	Buccal advancement flap (n = 60)	Palatal rotational flap (n = 60)
Male	40(66.6%)	42(70%)
Female	20(33.4%)	18(30%)
Male to female ratio	2:1	2.4:1

Table No III: Comparison of success rate in both groups (n = 120)

Success	Buccal advancement flap (n = 60)	Palatal rotational flap (n = 60)
Yes	52(86.6%)	56(93.3%)
No	8(13.4%)	4(6.7%)

$$\chi^2 = 1.481, df = 1, p = 0.224$$

Discussion

Oroantral fistula (OAF) represents a complication of maxillary posterior tooth extraction which occurs due to multiple factors including lack of a sinus bone floor, direct apposition of the maxillary lining above the maxillary posterior teeth, alveolar bone resorption due to periodontal disease etc. Trauma and traumatic extraction can destroy the bony barrier between the oral cavity and the maxillary sinus.⁷

In the current study oroantral fistula (OAF) was more common in males (66.6%) than females (33.4%). The male to female ratio was 2:1. Qureshi et al⁸ reported that OAF was more common in males (61.7%) than females (38.3%). The male to female ratio was 1.6:1. Delgado et al also reported that OAF was 58% were males and 42% were females with male to female ratio of 1.4:1.⁹ The study of Hirata et al¹⁰ showed that the rate of oroantral fistula is significantly higher in males with a male to female ratio of 1.7:1.

Generally the age for the patients at the time of presentation was 20 to 50 years with the mean age of 35.10±6.56 years. Qureshi et al⁸ reported that the mean age of 34.03±10.56 years. Similarly, Guven¹¹ and Elarbi¹² findings are also correlates with the results of the present study.

Numerous surgical procedures have been advocated for closure of OAC/OAF which prevents undesirable and harmful consequences of persistent OAC/OAF. These procedures may be categorised into local flaps, distant flaps and grafting. These include rotating or advancing soft tissues such as buccal flap, palatal flap, submucosal tissue, buccal fat pad and tongue flap.¹³

The buccal advancement procedure was used in group A, in those cases, which had a small opening and deep buccal sulcus. In group A, 52 cases were

successful and 8 failed. Zide¹⁴ and Akram belmehdi et al¹⁵ have criticized the buccal advancement flap for the decreased depth of the sulcus. However Eneroth¹⁶ and Ritul patel et al¹⁷ showed the reduced depth of the sulcus to be a temporary problem and in the era of dental implants may not be of much concern. These authors used models of the patient before and after surgery and showed that the reduced depth became normal after 8 weeks.

In the Group B, palatal rotation flap procedure was performed. In this group only four cases failed due to the postoperative sinusitis. According to Anavi et al¹⁸, palatal rotation flap is recommended for the late repair of oroantral fistula owing to its good vascularization, excellent thickness and tissue bulk and easy accessibility. It also allows for the maintenance of the vestibular-sulcus depth. It is particularly indicated in cases of unsuccessful buccal flap closure. Donor site necrosis is a very rare complication of palatal rotational flaps. Contrary to this, Erdegon et al¹⁹ reported a case of 43-year-old female, Type I diabetic patient with a chronic oroantral fistula in the right second molar region. The patient had bony necrosis in the donor site following palatal rotational flap operation. K.Blal et al²⁰ recommends that the pedicled palatal periosteal flap technique is a simple and predictable method for the closure of OAF and overcomes the major drawbacks of the popular techniques.

Conclusion

Treatment options for OAC/OAF include various soft tissue flaps with or without bone grafting and the best method should be emphasized upon to achieve proper closure. A proper diagnosis and proper surgical technique is mandatory to close a large oroantral fistula. Buccal advancement and palatal rotation flaps are the most commonly used flaps. Both these flaps were equally successful for the closure of OAF as evident in the current study. Buccal advancement flaps are best suited for small fistulas while palatal rotational flap or a combination of the two gives best results for large oroantral fistulas. Strict instructions should be given to the patient to avoid creation of negative pressure in the oral cavity and nasal

decongestants/steroidal anti-inflammatory spray should be prescribed.

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