ORIGINAL ARTICLE CODEN: AAJMBG

A novel approach to closure of oroantral communication by a modified buccal mucosal flap: A prospective clinical study

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Received: 07th January 2026; ***Accepted:*** 20th February 2026; ***Published:*** 01st April 2026

Abstract: *Objectives:* The buccal mucosal flap is a good option for covering small and medium sized defects of oroantral communication (OAC) due to similar tissue characteristics, easy accessibility, tension free primary closure, unlikely dehiscence, maintenance of buccal sulcus depth, thoroughly vascularised flap, and easy implementation. *Background:* This prospective clinical study done on 30 patients with OAC, closure with single layer pedicled buccal mucosal flap and donor site coverage with buccal fat pad. *Methods:* In this technique pedicled buccal mucosal flap is dissected containing submucosal tissue, few fibers of buccinator at the flap base which provide strength and increased vascularity. The portion of flap covering the OAC is purely mucosal flap. Detailed clinical examination done to patients postoperatively for 30 days evaluates complications like wound dehiscence and flap necrosis at recipient site, fistula recurrence, sinusitis, scarring at donor site, reduced and difficulty in mouth opening. *Results:* Flap thickness of pedicled buccal mucosal flap is less, a single layer reconstruction with tissue histologically similar to the original tissue ensures better functional results and adequate barrier. It is simple to perform and well tolerated by the patients. *Conclusion:* Flap perfusion depends on pedicle width for arterial circulation and venous drainage; oral mucosa has rich blood supply, a random pattern flap contains partial thickness of the buccinator muscle can survive.
Keywords: Buccal Mucosal Flap, Oroantral Communication, Buccal Fat Pad.

Introduction

Perforation of maxillary sinus leading to the formation of oroantral communication is a relatively uncommon condition. It may occur as a complication of surgery, trauma, irradiation, infection, tumor or cyst. A communication of more than 5mm in diameter usually fails to close spontaneously and requires proper surgical closure [1]. Oroantral communication (OAC) is the opening created between the maxillary sinus and the oral cavity which if not treated successfully will lead to formation of oroantral fistula (OAF) or chronic sinus disease [2].

The commonest factor of an OAC is a dental extraction of maxillary posterior teeth usually the first or second molar. This complication of dental extraction occurs more likely if there is pre-existing periapical pathology or widely divergent roots of maxillary molars or age related pneumatisation of maxillary sinus or only maxillary molar tooth present which indicates evaluation through preoperative radiographs like intraoral periapical radiograph (IOPA) or orthopantomogram (OPG) [3-4].

Reconstruction of medium sized oral and pharyngeal defects after pathologic resections or traumatic avulsions with the same tissue is an optimal and ideal reconstruction. Reconstruction of a resected oral mucosa with skin flaps has some drawbacks including bad odor, color mismatch, over contouring, hair growth and dryness. Pedicled buccal mucosal flap has the advantage of replacing the lost tissue with the same type of tissue, however; it is limited in its length [5]. Buccinator muscle inclusion in this flap changes it structurally from a mucosal to a myomucosal flap;

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however there is an advantage of more blood supply to the flap. Facial artery myomucosal (FAMM) flap was introduced by Pribaz in 1992 [6].

It is an obliquely oriented intraoral cheek flap, anterior to stensen's duct, and contains buccal mucosa, buccinator muscle, facial artery and vein which are skeletonized. It is a pedicled flap that can be inferiorly or superiorly based [7-8]. Inferiorly based buccinator myomucosal island flap (inferiorly based BUMIF) was introduced by Zhao in 2003 [9]. It is an axial pattern flap and includes some fibers of orbicularis oris muscle and part of buccinator muscle, covered with buccal mucosa [10].

Material and Methods

Patients: After obtaining the informed consent from the patients, they were subjected to a thorough anamnesis. A total of 30 patients with OAC or OAF are operated by the same surgeon with aim of providing anatomical barrier with same tissue texture and single layer closure with pedicled buccal mucosal flap. Procedure under local anaesthesia is performed as an outpatient procedure; a prophylactic antibiotic cover Augmentin 625mg and Metrogyl 400mg to be followed postoperatively 8 hourly for 7 days along with antral regime and sinus precautions.

Patients evaluated for complications during follow up for 30 days involve detailed clinical examination. Postoperative complications assessed on 15th and 30th day are wound dehiscence and flap necrosis at recipient site; fistula recurrence; sinusitis; scarring at donor site; reduced and difficulty in mouth opening. All the patients are in the age group of 19-66 years from both male and female gender.

Surgical technique: We present pedicled buccal mucosal flap, a local random pattern flap for surgical repair of oroantral communication with aim to replace the lost tissue with same type of tissue to provide effective single layer closure. Incision is placed peripherally on the soft tissue present over superior aspect of tooth socket. Raising soft tissue gives clear visibility of whole length of the fistulous tract which is removed till the floor of maxillary sinus, thus helps to correctly identify the edges of the sinus lining on socket wall. No attempt is made to remove any more sinus lining from within the sinus confines and clearance of only the socket walls is performed. It is cumbersome to excise fistula with limited visibility in a tunnel and we find it surgically helpful to elevate complete soft tissue peripherally over the superior aspect of socket and Allis forceps are useful for grasping and holding tissue which is excised along the fistulous tract.

A 26 gauge stainless steel wire is used to take the mesiodistal and buccopalatal dimension of socket by bending it and measurements are transferred to the adjacent buccal mucosa. A trapezoidal flap based on facial artery is outlined on buccal mucosa. The flap is gently dissected involving buccal mucosa with submucosal tissue and few buccinator muscle fibers are included at flap base to preserve more vascularity and provide strength to the flap. The flap width should be slightly greater than the defect and length should be sufficient to allow free tissue transfer and tension free closure over the socket. After raising the flap, dissection is performed posteriosuperiorly through the same horizontal incision present superiorly on buccal mucosa.

A fine mosquito forceps are introduced into the buccal space to expose the buccal fat pad which is gently pulled to preserve the thin, delicate fascial envelope surrounding the fat as illustrated (Fig. 1). Fat is sutured with 4-0 vicryl to cover the donor site and pedicled buccal mucosal flap is sutured over the socket (Fig. 2).

Fig-1: Pedicled buccal mucosal flap held with a skin hook and buccal fat pad is sutured over the donor site. Soft tissue of attached gingiva, vestibular sulcus and buccal mucosa opposite to maxillary teeth region is not raised for this flap.

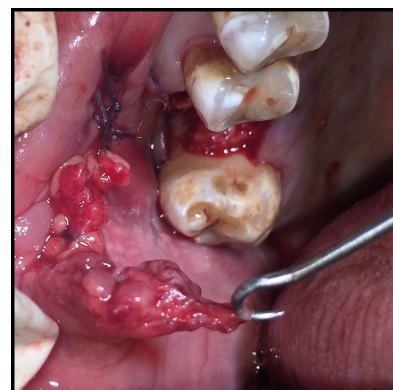

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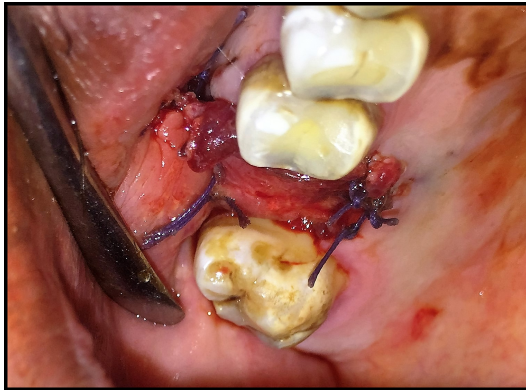
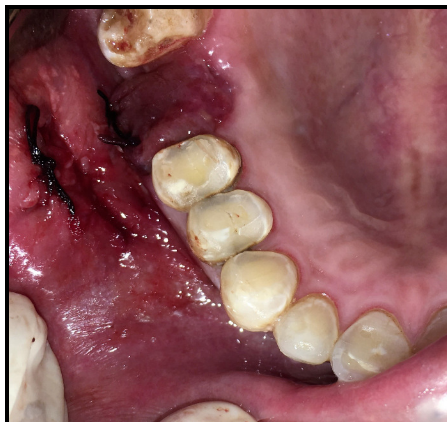
Fig-2: Pedicled buccal mucosal flap sutured with primary closure over the socket.



Patient should avoid excessive mouth opening postoperatively that may result in detachment of sutures at recipient site and the pedicle may be injured or severed during mastication. The pedicle is divided postoperatively after 2 weeks (Fig. 3).

Fig-3: Division of pedicle after 2 weeks and no reduction in buccal vestibule depth.

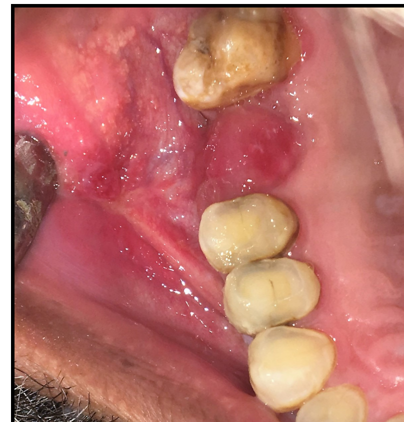


Results

Our experience with pedicled buccal mucosal flap, a local random pattern flap for closure of OAC or OAF as a mode of primary reconstruction in our surgical practice offers readily available tissue with excellent functional as well as anatomical single layer closure and less morbidity. Replacing the lost tissue with the robust tissue of same texture and tissue bulk is a pertinent objective to be looked while doing any reconstruction. Postoperative clinical evaluation for 30 days shows maintenance of buccal sulcus depth, an abundant band of keratinized mucosa over the grated area, and complete closure of oroantral fistula (Fig. 4).

Other added advantages include tension free primary closure, rapid healing, less chances for dehiscence, thoroughly vascularised flap availability with easy handling harvesting, donor site coverage with buccal fat pad [11-12].

Fig-4: Complete closure of oroantral communication and maintenance of buccal sulcus depth after 30 days.



Buccal fat pad transposition makes healing effective with complete epithelisation at donor site. Exposed buccal fat pad in the oral cavity clinically and histologically is proven to help in rapid mucosalization and transforms from fat tissue to loose connective tissue with granulation and final maturation to a stratified squamous epithelium in three weeks [13].

A bar graph shown in (Fig. 5) describes wound dehiscence/flap necrosis, fistula recurrence, sinusitis, scarring at donor site, reduced and difficulty in mouth opening on 15th and 30th day postoperatively. Sinusitis is present in 36.7% patients on 15th day and is 6.7% on 30th day. 63.3% patients did not show any symptoms of sinusitis on 15th day and 93.3% in this group had no sinusitis on 30th day. Fistula recurrence is present in 6.7% patients on 15th day and is 6.7% on 30th day while as 93.3% patients did not present with oroantral fistula on 15th day and none of these patients presented with fistula on 30th day.

Wound dehiscence and flap necrosis is present in 36.7% patients on 15th day and is 6.7% on 30th day while as on 15th day 63.3% patients had no wound dehiscence or flap necrosis and on 30th day 93.3% patients in this group

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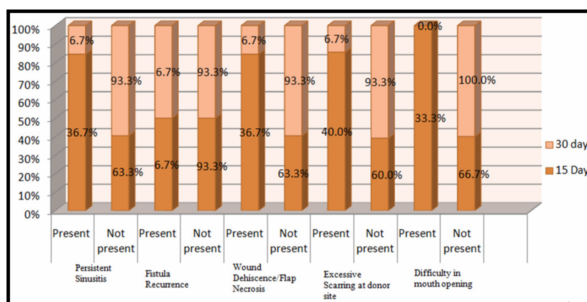
presented with complete healed socket. Scarring at donor site is present in 40% patients on 15th day and 6.7% patients on 30th day. 60% patients did not present with scarring on 15th day and 93.3% patients in this group presented with no scarring at donor site on 30th day. Difficulty in mouth opening is present in 33.3% patients on 15th day and on 30th day these patients presented with normal mouth opening. 66.7% patients had no difficulty in mouth opening on 15th day and same mouth they presented on 30th day.

Fig-5: A bar graph shows results on 15th and 30th day postoperatively by evaluating complications; sinusitis, fistula recurrence, wound dehiscence/flap necrosis, scarring at donor site, difficulty in mouth opening.



Discussion

Reasons associated with higher risk of recurrent OAC are infection of maxillary sinus and infection of OAC or OAF after surgical repair that may happen if there is pre-existing sinus disease, thus in initial stage should be managed by precisely selecting antibiotics at proper dosage. Wound dehiscence of sutures after surgical repair of OAC or OAF can occur probably due to lack of bone support at the border of incision line or due to infection caused by inadequate antibiotic coverage or patient not following proper postoperative instructions given in maxillary sinus floor closure. Buccal mucosa is elastic and thin with scope of saliva production [14].

It is supported by the buccinator muscle. This muscle is supplied by the branches from the maxillary and facial artery [15]. The posterior part of this muscle is supplied by the buccal branch of maxillary artery [16].

The facial artery myomucosal flap has a narrow strip of buccinator muscle included in the flap and most of the posterior branches of buccal artery are transsected during the procedure, hence FAMM is not a true musculomucosal flap and has two minor drawbacks. Firstly the pedicle may be injured or severed during mastication. Secondly the mucosal paddle is somewhat bulky. These drawbacks are balanced by the absence of morbidity at donor site [17]. Thus for large defects, buccinator myomucosal island flap is a preferred alternative due to its dual vascular pattern adding versatility [18-19]. Both FAMM and BUMIF need donor site coverage for large flaps and second stage procedure for division of pedicle [20].

Conclusion

The buccal mucosal flap is a good option and ensures excellent functional and single layer primary closure for covering small and medium sized defects of oroantral communication (OAC) due to similar tissue characteristics, easy accessibility, tension free primary closure, unlikely dehiscence, maintenance of buccal sulcus depth, thoroughly vascularised and purely mucosal flap, easy implementation.

Acknowledgement

I would like to express my sincere gratitude to my beloved teacher Prof. Dr. B. H. Sripathi Rao and Prof. Dr. Syed Sayeed Ahmed for their invaluable guidance and unwavering support.

Financial Support and sponsorship: Nil

Conflicts of interest: There are no conflicts of interest.

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Cite this article as: Haji IUH, Siddiq M, Dash N, Medhi H and Dixit S. A novel approach to closure of oroantral communication by a modified buccal mucosal flap: A prospective clinical study. *Al Ameen J Med Sci* 2026; 19(2): 131-135.

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