Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 32s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Buccal Fat Pad as a Plastic Surgery Solution for Oroantral Fistula Repair in Maxillofacial Trauma

Fahim Ullah[1], Asadullah Awan[2], Irfan Ishaq[3], Masroor Ahmad Baloch[4], Naveed Ahmad Khan[5], Maria Batool Khan[6], Ekram ud Din[7]

[1]Assistant Professor Burn and Plastic Surgery, Burn and Plastic Surgery Center Hayatabad, Peshawar, Pakistan
[2]Assistant Professor Plastic Surgery Department, Dow International Medical College and Dow University of Health Science, Karachi, Pakistan
[3]Assistant Professor, Plastic Surgery Department, Avicenna Medical College, Lahore, Pakistan
[4]Assistant Professor, Plastic Surgery Department, Bolan Medical College/ Bolan Medical Complex Hospital, Quetta, Pakistan
[5]Associate Professor Plastic Surgery Department, University College of Medicine & Dentistry (UCMD), Lahore, Pakistan
[6]Senior Registrar, Oral and Maxillofacial Surgery Department, University College of Medicine & Dentistry (UCMD), Lahore, Pakistan
[7]Medical Officer, Surgical Department, District Headquarters Hospital Landikotal, District Khyber

Corresponding author:

Medical Officer, Surgical Department, District Headquarters Hospital Landikotal, District Khyber
Email: ee_aaaser@yahoo.com

Cite this paper as: Fahim Ullah, Asadullah Awan, Irfan Ishaq, Masroor Ahmad Baloch, Naveed Ahmad Khan, Maria Batool Khan, Ekram ud Din, (2025) Buccal Fat Pad as a Plastic Surgery Solution for Oroantral Fistula Repair in Maxillofacial Trauma. *Journal of Neonatal Surgery*, 14 (32s), 3455-3461.

ABSTRACT

Background: An oroantral fistula (OAF) is a pathological void or defect that forms a passage between the maxillary sinus and the oral cavity. This condition arises most commonly due to an extraction of a posterior maxillary tooth or any traumatic event involving the posterior maxilla region. Untreated OAFs can lead to chronic sinusitis, impaired oral function, and other infections. Closure of OAF with buccal fat pad flap has emerged as a simple and reliable technique because BFP is well vascularized supply. To assess the clinical outcomes of using the buccal fat pad flap in the surgical repair of oroantral fistulae, particularly in patients with maxillofacial trauma or extraction-related defects.

Methods: A prospective case series was conducted at Burn and plastic surgery center Hayatabad Peshawar from feburary 2023 to October 2024, enrolling 51 patients diagnosed with OAF. After detailed assessment, all patients underwent surgical closure using a pedicled BFP flap. Variables recorded included flap viability, presence of post-operative infection, and fistula closure at three-month follow-up. Associations between patient factors and surgical outcomes were analyzed.

Results: The mean age of participants was within the 30–45 year range, with a slight female predominance. Tooth extraction (41.2%) and trauma (35.3%) were the leading causes of OAF. The success rate of fistula closure was 84.3%. Flap viability was maintained in 76.5% of patients, while 19.6% experienced postoperative infection. Flap viability was significantly associated with closure outcome ($p < 0.05$), whereas smoking and comorbidities were not.

Conclusion: The buccal fat pad flap is an effective, minimally invasive solution for closing oroantral fistulae, particularly in trauma-related cases. Its high success rate, low complication profile, and adaptability make it a valuable option in oral and maxillofacial surgical practice.

Keywords: Oroantral fistula, Buccal fat pad, Maxillofacial trauma, Flap surgery, Oral surgery, Sinus communication..

1. INTRODUCTION:

An oroantral fistula (OAF) is a continuing pathological link between the oral cavity and the maxillary sinus. OAFs most often form as a complication of removing upper molars or premolars, because their roots are often near the maxillary sinus. Other causes include trauma, cystic lesions, tumor excision, and infections or surgical procedures on teeth. Without treatment an oroantral fistula can result in chronic maxillary sinusitis, problems with speaking, and eating or drinking, thereby greatly reducing a patient's quality of life [1-3].

The problem of OAF management evokes great concern in the field of oral and maxillofacial surgery. Various methods for

its closure have been reported, including buccal and palatal advancement flap closures, rotational flap closures, and grafting techniques. Unfortunately, these approaches have potential drawbacks like limited resources of tissue, high tension at closure leading to ischemia, morbidity and unfavorable cosmetic results at the donor site [4-6].

There is an increasing use of buccal fat pad (BFP) as a flap for intraoral reconstruction because it is a specialized encapsulated fat tissue located in the masticatory space. Starting from the 1970s, it became known to be dependable for reconstruction and easily obtainable. It has ample blood supply and has low complication rates at the donor site. In relation to the maxilla, BFP is close to the posterior maxilla which makes it useful for closing oroantral communications. Besides, BFP flaps heal rapidly, incorporate well with the surrounding tissues and since it's accessible in many cases, local anesthesia suffices [7-9].

This study was undertaken to evaluate the clinical effectiveness of the buccal fat pad flap in repairing oroantral fistulae, particularly in patients with trauma or extraction-related maxillary defects. It also aims to examine the impact of patient-related factors such as smoking and systemic comorbidities on surgical outcomes.

2. METHODOLOGY

This was a prospective interventional case series conducted over one year, from January 2023 to January 2024. Its primary aim was to assess the proficiency of the buccal fat pad (BFP) flap in closing oroantral fistulae (OAF) in patients with maxillofacial trauma or other associated deficits.

The study was conducted [Insert Hospital/Institute Name, City]. It is a tertiary care hospital with an active division of maxillofacial and plastic surgery. Ethical approval was granted by the Institutional Review Board prior to starting patient recruitment.

During the study period, 51 patients were enrolled consecutively. All participants had clinically diagnosed oroantral fistula which was either radiographically assessed or confirmed through probing. Inclusion criteria included:

Age above 18 years

Oroantral fistula secondary to trauma, tooth extraction, or cyst/tumor removal

Fistula persisting for more than 3 weeks

Willingness to undergo surgical repair and attend follow-up visits

Patients were excluded if they had:

Acute sinus infection at the time of evaluation

A history of previous surgical repair of the same fistula

Known malignancy in the maxillofacial region

Severe systemic illness precluding surgery under local anesthesia

Each patient underwent a detailed history and clinical examination, including evaluation of fistula size, location, and duration. Baseline laboratory tests and imaging (such as periapical radiographs or CBCT) were used to assess sinus involvement. Data on patient demographics, smoking status, and comorbidities were also recorded.

All procedures were performed by experienced surgeons under local or general anesthesia, depending on patient preference and fistula complexity. After local infiltration, a trapezoidal or envelope mucoperiosteal flap was raised to access the fistula. The margins of the fistulous tract were excised to promote fresh bleeding edges. The buccal fat pad was then carefully mobilized through a small blunt dissection from its anatomical space, preserving its vascular pedicle. The BFP was gently advanced into the defect without tension and secured using absorbable sutures. The mucosal flap was repositioned over the BFP and sutured to ensure two-layer closure when possible.

Patients were prescribed antibiotics and analgesics and were instructed to avoid nose-blowing, vigorous rinsing, and smoking. Regular follow-up visits were scheduled at 1 week, 3 weeks, 1 month, and 3 months post-surgery. Clinical assessment included evaluation of flap viability, epithelialization, infection, and fistula closure. Any complications such as partial necrosis or wound dehiscence were documented.

The primary outcome was successful closure of the fistula, defined as complete epithelial healing without communication between the oral cavity and maxillary sinus after 3 months. Secondary outcomes included flap viability and post-operative infection. The impact of patient factors such as smoking, comorbidities, and fistula size on surgical outcomes was also analyzed.

All collected data were entered and analyzed using SPSS (version 22). Descriptive statistics were used for demographic and clinical variables. Categorical variables were compared using Fisher's exact test due to the small sample size. A p-value of <0.05 was considered statistically significant.

3. RESULTS

The study population included 51 patients, with a slight female predominance (52.9%). Age distribution was fairly balanced, though a higher proportion (35.3%) were under 30 years, indicating that OAF repair using the buccal fat pad is often required in younger adults, likely due to trauma or extractions. Over half of the patients (54.9%) were smokers, and 51.0% had comorbidities such as diabetes or hypertension. These factors are clinically relevant as they may influence tissue healing and flap integration, although their direct effect on surgical outcomes was not statistically significant in this study.

Table 1: Demographic Characteristics of Patients (n = 51)

Variable	Category	n (%)
Age Group	<30 years	18 (35.3%)
	30–45 years	17 (33.3%)
	>45 years	16 (31.4%)
Gender	Male	24 (47.1%)
	Female	27 (52.9%)
Smoking Status	Smoker	28 (54.9%)
	Non-smoker	23 (45.1%)
Comorbidities	Present	26 (51.0%)
	Absent	25 (49.0%)

Tooth extraction was the most common cause of oroantral fistula (41.2%), followed by trauma (35.3%) and cyst removal (23.5%), emphasizing the maxillofacial surgical nature of the condition. The most affected site was the molar region (39.2%), consistent with its anatomical proximity to the maxillary sinus. Fistula sizes were relatively evenly distributed, with the majority (37.3%) between 6–10 mm. The left and right sides were nearly equally affected. These findings underscore the importance of careful surgical planning based on defect size and site to optimize flap coverage.

Table 2: Clinical Characteristics of Oroantral Fistula

Variable	Category	n (%)
Cause of Fistula	Tooth Extraction	21 (41.2%)
	Trauma	18 (35.3%)
	Cyst Removal	12 (23.5%)
Fistula Size	≤5 mm	15 (29.4%)
	6–10 mm	19 (37.3%)
	>10 mm	17 (33.3%)
Fistula Location	Molar	20 (39.2%)
	Premolar	16 (31.4%)
	Canine	15 (29.4%)
Side Affected	Left	27 (52.9%)
	Right	24 (47.1%)

The buccal fat pad flap showed high success in this cohort. Flap viability was maintained in 76.5% of cases, while partial necrosis occurred in 23.5%. Despite this, overall fistula closure was successful in 84.3% of patients. Post-operative infection occurred in 19.6% of cases, suggesting that while complications can arise, they were not always predictive of surgical failure. These results validate the BFP flap as a reliable reconstructive option in oroantral fistula repair, especially when performed with proper surgical technique and post-op care.

Table 3: Surgical Outcomes Using Buccal Fat Pad Flap

Variable	Category	n (%)
Flap Viability	Fully Viable	39 (76.5%)
	Partial Necrosis	12 (23.5%)
Post-op Infection	Present	10 (19.6%)
	Absent	41 (80.4%)
Fistula Closure	Successful	43 (84.3%)
	Unsuccessful	8 (15.7%)

Flap viability was significantly associated with surgical success ($p < 0.05$). Among patients with fully viable flaps, 97.4% (38 out of 39) achieved successful closure, compared to only 41.7% (5 out of 12) in those with partial necrosis. This underscores the critical role of flap health in achieving definitive repair. Ensuring tension-free placement and preserving vascular supply to the BFP are key to preventing necrosis and subsequent failure.

Table 4: Association between Flap Viability and Fistula Closure

Flap Viability	Successful	Unsuccessful	Total
Fully Viable	38	1	39
Partial Necrosis	5	7	12
p-value		< 0.05	

Although a higher proportion of smokers (21.4%) experienced unsuccessful closure compared to non-smokers (8.7%), this difference was not statistically significant ($p = 0.26$). While smoking is known to impair wound healing, the lack of a strong association here may be due to the relatively small sample size or effective surgical technique mitigating systemic risk factors. Nonetheless, smoking cessation should be advised preoperatively to improve outcomes.

Table 5: Association between Smoking Status and Fistula Closure

Smoking Status	Successful	Unsuccessful	Total
Smoker	22	6	28
Non-smoker	21	2	23
p-value		0.26	

The presence of comorbidities did not significantly affect closure rates ($p = 0.30$). Patients with and without comorbid conditions had similar success rates (80.8% vs. 88.0%). This finding suggests that while comorbidities are potential risk factors for poor wound healing, they may not critically impair the success of a well-vascularized flap like the BFP. Proper preoperative optimization may further reduce any impact.

Table 6: Association between Comorbidities and Fistula Closure

Comorbidities	Successful	Unsuccessful	Total
Present	21	5	26
Absent	22	3	25
p-value		0.30	

Fistula size showed a borderline association with closure success ($p = 0.07$). All patients with fistulae ≤5 mm had successful outcomes, whereas the failure rate increased with size particularly for those >10 mm, where 29.4% experienced unsuccessful closure. Although not statistically significant, this trend indicates that larger defects may pose technical challenges and carry a higher risk of partial flap failure or tension-related dehiscence. This emphasizes the importance of early intervention and tailored surgical planning for larger fistulae.

Table 7: Association between Fistula Size and Fistula Closure

Fistula Size	Successful	Unsuccessful	Total
≤5 mm	15	0	15
6–10 mm	16	3	19
>10 mm	12	5	17
p-value		0.07	

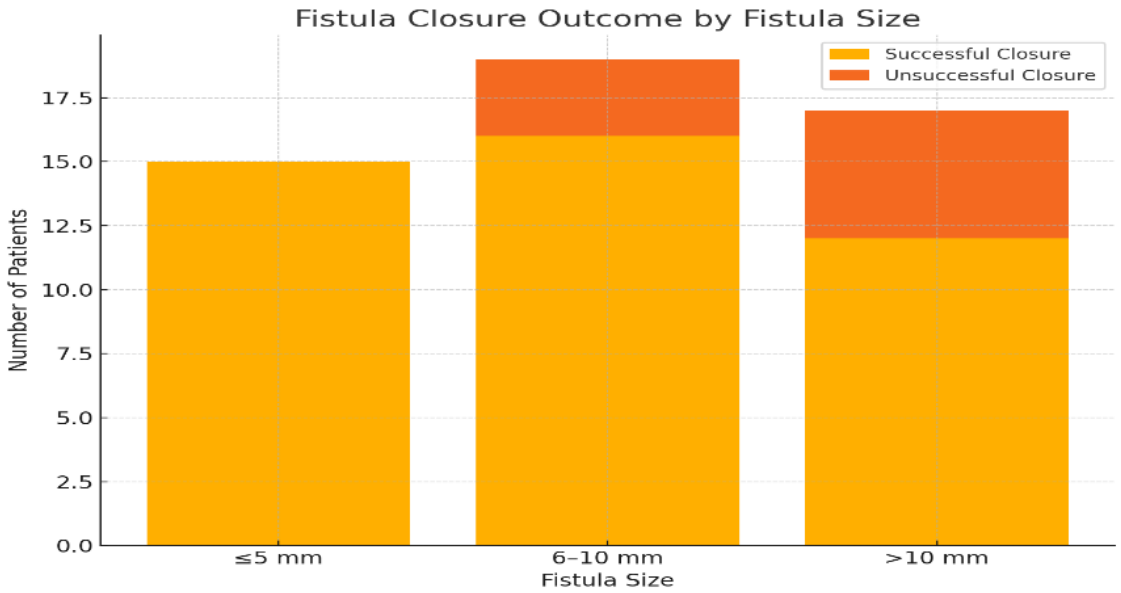

Figure 1: graph showing the fistula closure outcomes stratified by fistula size. It visually illustrates that smaller fistulae (≤5 mm) had a 100% closure success rate, while larger fistulae (>10 mm) showed a higher rate of unsuccessful closure.

4. DISCUSSION

This study demonstrates that the buccal fat pad (BFP) is a reliable, effective, and relatively simple flap for the closure of oroantral fistulae (OAF), particularly in patients with trauma-related or post-extraction maxillofacial defects. With a closure success rate of 84.3% and flap viability in over three-quarters of the cases, our findings support the continued use of BFP as a first-line surgical option in appropriately selected patients.

The success observed in our cohort aligns with several previously published studies [10, 11]. Studies reported over 90% success in using the buccal fat pad for similar defects, particularly when combined with careful surgical technique and minimal flap tension [12, 13]. Similarly, study emphasized the ease of access, rich vascular supply, and low donor site morbidity associated with the BFP, making it a dependable option even in challenging anatomic regions of the maxilla [14, 15].

In our study, partial flap necrosis occurred in 23.5% of patients, a rate slightly higher than what some authors have reported. However, the necrosis was typically minor and only resulted in fistula persistence in a small subset of cases. This finding emphasizes the importance of gentle handling of the flap, avoidance of over-stretching, and securing the pedicle properly to maintain perfusion [16, 17].

Interestingly, while more than half of our patients were smokers and/or had systemic comorbidities, these factors did not reach statistical significance in affecting closure outcomes. These results were in line with studies which found no strong association between smoking and BFP flap failure, though smoking cessation remains a widely endorsed recommendation to promote healing. Likewise, the presence of diabetes or other systemic illness did not significantly alter healing in our series, possibly due to the inherent vascularity of the buccal fat pad [18-20].

Fistula size showed a borderline association with failure ($p = 0.07$), with larger fistulae (>10 mm) more likely to remain unhealed. This supports the idea that while BFP can cover moderate to large defects, its effectiveness diminishes when the defect is extensive or poorly supported. For such cases, combining BFP with additional mucosal advancement or using

alternative techniques like palatal flaps or buccal advancement alone may be considered.

Our findings underscore the multidisciplinary nature of OAF management. The etiology and diagnosis lie in the realm of maxillofacial surgery, while the reconstructive technique draws from plastic surgery principles. This dual approach ensures comprehensive patient care treating both the defect and the underlying cause with precision.

Despite its strengths, the study has limitations. The sample size was relatively small, and long-term outcomes beyond three months were not assessed. Future studies could incorporate radiological follow-up, patient-reported outcomes (such as speech and eating function), and comparative analysis with other flap techniques.

5. CONCLUSION

The buccal fat pad flap is a safe, versatile, and effective solution for repairing oroantral fistulae, especially in trauma or post-extraction cases involving the maxillary molar region. It offers high success rates with minimal donor site morbidity and can be applied even in patients with systemic risk factors. While larger fistulae pose technical challenges, careful flap design and execution can yield favorable outcomes. Given its advantages and low complication rates, the BFP should remain a preferred option in the armamentarium of surgeons managing oroantral communications.

REFERENCES

[1] . Shukla, B., et al., Closure of oroantral fistula: Comparison between buccal fat pad and buccal advancement flap: A clinical study. National journal of maxillofacial surgery, 2021. 12(3): p. 404-409.

[2] . Esen, A. and S. Akkulah, Management of large oroantral fistulas caused by medication-related osteonecrosis with the combined sequestrectomy, buccal fat pad flap and platelet-rich fibrin. Journal of Maxillofacial and Oral Surgery, 2021. 20: p. 76-82.

[3] . Nelke, K., et al., Anatomical and surgical implications of the usage of bichat fat pad in oroantral communication, maxillary, palatal, and related surgeries—narrative review. Journal of clinical medicine, 2023. 12(15): p. 4909.

[4] . Pool, C., N. Goyal, and J.G. Lighthall, Novel Use of the Buccal Fat Pad for Sinocutaneous Fistulae Closure and a Review of Reconstructive Options. Annals of Otology, Rhinology & Laryngology, 2022. 131(3): p. 295-302.

[5] . Elshamaa, M.M., S.A. Elborolsy, and H. Mahran, Buccal Fat Pad Reinforce Buccal Advancement Flap Vs Rotational Palatal Flap in Chronic Oroantral Fistula Treatment. Egyptian Dental Journal, 2021. 67(4): p. 3013-3021.

[6] . Chekaraou, S.M., L. Benjelloun, and K.E. Harti, Management of oro-antral fistula: Two case reports and review. Annals of Medicine and Surgery, 2021. 69.

[7] . Mallesh, N. and M.V.A.H. Hussien, Study Of The Efficacy Of Pedicled Buccal Fat Pad Graft Technique In The Management Of Oro-Antral Communications. 2020.

[8] Kwon, M.-S., et al., Closure of oroantral fistula: a review of local flap techniques. Journal of the Korean Association of Oral and Maxillofacial Surgeons, 2020. 46(1): p. 58.

[9] . Samson, J., et al., Versatility of Buccal Pad of Fat in the Reconstruction of Oral and Maxillofacial Defects-A Review. Journal of Evolution of Medical and Dental Sciences, 2021. 10(38): p. 3441-3445.

[10] Arana-Fernández, B., et al., Oroantral Fistula Closure Using Double-Layered Flap: Greater Palatine Artery Flap and Buccal Fat Pad. Laryngoscope, 2023. 133(8).

[11] Mohammadi, A., A. Hassani, and O. Fazlisalehi, Use of buccal fat pad in facial cosmetic surgery. Integrated Procedures in Facial Cosmetic Surgery, 2021: p. 887-901.

[12] Rathod, N., B. Khobaragade, and K. Ganesan, Use of the temporal extension of the buccal fat pad for closure of oro-antral communications. International journal of oral and maxillofacial surgery, 2021. 50(12): p. 1638-1642.

[13] Ramadan, N., The use of buccal pad of fat versus leukocyte-platelet rich fibrin for closure of oroantral communication. Egyptian Dental Journal, 2020. 66(2-April (Oral Surgery)): p. 893-903.

[14] Bereczki-Temistocle, D.L., et al., Selecting the best surgical treatment methods in oro-antral communications. International journal of environmental research and public health, 2022. 19(21): p. 14543.

[15] Thanapaisal, C., et al., Buccal fat pad: adjunctive procedure for lateral defect coverage following primary palatoplasty. Plastic and Reconstructive Surgery, 2022. 149(5): p. 1180-1185.

[16] Mallesh, N., H. Hussien, and M. Akshatha, Evaluation of the effectiveness of pedicled buccal fat pad graft for repair of Oro-Antral communications. J. Evol. Med. Dent. Sci, 2020. 9: p. 613-619.

[17] Fatani, B., A. Fatani, and A. Alomar, Oro-antral communication and fistula: A review of the literature. Saudi J. Oral Dent. Res, 2020. 5: p. 575-581.

[18] Mahmoud, N.R., The use of buccal pad of fat versus leukocyte-platelet rich fibrin for closure of oroantral communication. DENTAL JOURNAL, 2020. 66(893): p. 903.

[19] Ramírez Almeida, J.R., et al., Use of pedicle Bichat fat pad as a resource for the closure of communications and oroantral fistulas: case report. Odontología Vital, 2020(33): p. 7-14.

[20] Younes ali, M., O. Heshmeh, and L. Alsabek, A new technique for closure of an immediate oroantral communication following tooth extraction by free buccal fat pad graft: Case report. Oral Surgery, 2022. 15(3): p. 412-417.