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Assessment of Treatment Approaches for Oroantral Communication and Fistulas

Oroantral Açıklık ve Fistüllerin Tedavi Yaklaşımlarının Değerlendirilmesi

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ABSTRACT

Objective: The aim of this study was to investigate and compare the treatment methods of large size oroantral defects (OADs) and their clinical outcomes.

Methods: Patients referred our clinic between 2017 and 2023 suffering from oroantral fistula (OAF) and cases of oroantral communication (OAC) larger than 5 mm during oral procedures were included in the study. The size, type, and cause of OAD; treatment method; and the patient's demographic data were recorded. Visual analogue scale (VAS), analgesic requirement, edema, and mouth opening measurements were obtained from preoperative and postoperative records at 3, 7, and 10 days after surgery.

Results: 23 patients (eight OAF and 15 OAC) was included in this study. Nine patients were treated with buccal advancement flap (BAF), ten with buccal fat pad (BFP) flap, and four with the press-fit technique. There were no problems with the healing process. One patient had a failed BFP and after 2 months, a second surgery was performed to fully cover the area. According to postoperative clinical outcomes, there was no significant difference between groups in the terms of VAS, analgesic requirement, edema, or trismus at any timepoint (*P*>.05). Although there was no significant difference observed between treatment groups, VAS scale and analgesic requirement was less with the press-fit methoid than BAF and BFP flap.

Conclusion: BAF, BFP flaps, and press-fit methods are reliable and well-known techniques for OAD management, however, further clinical studies with larger sample sizes are needed to create a treatment algorithm for OAD.

Keywords: oroantral communication, oroantral fistula, buccal flap, buccal fat pad, press-fit.

ÖZ

Amaç: Bu çalışmanın amacı, büyük boyuttaki oroantral defektlerin (OAD) tedavi yöntemlerini araştırmak ve klinik sonuçlarını karşılaştırmaktır.

Yöntemler: Bu çalışmaya 2017-2023 yılları arasında 5 mm'den büyük oroantral fistül (OAF) ve oroantral açıklık (OAC) nedeniyle kliniğimize başvuran hastalar dahil edildi. Defektin boyutu, tipi, nedeni, tedavi yöntemi ve hastaların demografik verileri kaydedildi. Preoperatif gün ile cerrahi sonrası 3., 7. ve 10. günlerde VAS ölçeği, analjezik ihtiyacı, ödem ve ağız açıklığı ölçümleri arşiv taraması ile kayıt altına alındı.

Bulgular: Çalışmaya 23 hasta (8 OAF, 15 OAC) dahil edildi. Hastaların 9'u bukkal kaydırma flebi (BAF), 10'u bukkal yağ pedi (BFP) ve 4'ü press-fit tekniği ile tedavi edildi. İyileşme sürecinde herhangi bir sorun yaşanmadı. Sadece bir hastada BFP uygulaması başarısız oldu; iki ay sonra yapılan ikinci cerrahi işlemle alan tamamen kapatıldı. Postoperatif klinik sonuçlara göre, gruplar arasında VAS ölçeği, analjezik ihtiyacı, ödem ve trismus açısından herhangi bir istatistiksel anlamlılık gözlenmedi (*P*>,05). Tüm parametreler arasında gruplar arasında anlamlı fark olmamakla birlikte, press-fit tekniğinde VAS ölçeği ve analjezik ihtiyacı BAF ve BFP yöntemlerine göre daha düşüktü.

Sonuç: BAF, BFP ve press-fit yöntemleri OAD yönetimi için güvenilir ve bilinen tekniklerdir. Ancak, OAD için bir tedavi algoritması oluşturmak amacıyla daha geniş örneklem büyüklüğüne sahip ileri klinik çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Oroantral açıklık, oroantral fistül, bukkal kaydırma flebi, bukkal yağ pedi, press-fit

INTRODUCTION

The roots of upper molar teeth can be located close to the sinuses, risking their perforation during extraction, known as oroantral communication (OAC). Factors, including cyst removal and trauma, can also cause OAC. Delayed treatment can lead to sinusitis in about 50% of patients within 48 hours and in 90% of patients after 2 weeks.[1] Thus, prompt management within 24 hours is advised for OAC. If epithelization occurs, oroantral fistulas (OAFs) can develop, which are more challenging to manage compared with OAC. Success rates drop from 95% for OAC to potentially 67% for OAF.[2]

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Several treatment techniques are available for managing oroantral defects (OADs), including buccal advancement flaps (BAFs), platelet-rich fibrin (PRF) applications, 8-ligature suture, buccal fat pad (BFP) flap, palatal advancement flap, or block grafts.[3-6] Despite various available techniques, the ideal choice of treatment method is not clearly defined. Factors to consider when managing OAFs, as indicated by Daif et al.,[7] include the location and size of the defect, its effect on adjacent teeth, the height of the alveolar ridge, the duration of OAF-related sinus infection, and the patient's medical status. Abuabara et al.[8] observed that perforations less than 3 mm in the sinus membrane can heal spontaneously. Another clinical study suggested that perforations less than 5 mm can also heal spontaneously, but perforations larger than 5 mm could require surgical interventions.[9] According to the literature, OADs larger than 5 mm are generally managed with well-vascularized soft tissue flaps or hard tissue grafts.

BAFs are a treatment option for OAD. With its ample base, BAFs have an excellent blood supply and its substantial tissue volume allows for tension-free closure of the defect, ensuring adequate blood flow. However, literature on the success rates of BAF in managing OAD is contentious. In some instances, particularly with large OAD, BAF applications can prove insufficient.[10] In such cases, BFP flaps are a viable option. BFP flaps—essentially preformed local soft tissue flaps—are favored for their good nutrition, easy accessibility, stem cell content, and straightforward application. However, despite its advantages, BFP flaps lack osteogenic properties, pose a risk for fat necrosis, and might necessitate a second surgery for implant placement.[11] In cases where future implant rehabilitation requires hard tissue augmentation, a common approach involves closing the area with block autografts. Donor sites within the oral cavity, such as maxillary tuberosity, ramus, and symphysis, are often used for these applications. While the press-fit technique is feasible for these block grafts, stabilization might not always be attainable, thus requiring the use of plates and screws.[12] Over the years, various options, such as prefabricated membranes, auricular cartilage, and distant flaps have been considered for managing large OADs.[6,13] However, there are few studies that investigate treatment options and their postoperative follow-ups for large OAD. The aim of this paper was to examine and compare the treatment of large size OADs and their follow-ups.

METHODS

This study was approved by Hacettepe University Health Sciences Research Ethics Committee (protocol number: GO 23/495 and date: 06/06/2023). The study included patients who were referred to our clinic between 2017 and 2023 suffering from OAF and cases where OAC occurred during oral procedures that were larger than 5 mm in size. Patients who had OAF, which was postnasal derange, had symptoms of acute sinusitis, and hyperemia around the fistula received antibiotics (amoxicillin 875 mg plus clavulanic acid 125 mg, 2x1, Glaxo Wellcome Production Mayenne, France) 2 weeks before surgery. Informed consent was obtained from all patients. Patients who had metabolic bone diseases, those who had received radiotherapy to head and neck region, and those who had any metastatic bone diseases were excluded from the study. The size, type and cause of OAD, treatment method, and the patient's demographic data were recorded. Also, edema and mouth opening measurements were obtained from preoperative and postoperative records at 3, 7, and 10 days post-surgery. Three lines were identified for edema measurements as A–C (tragus, lateral commissure), A–D (tragus, soft tissue pogonion), B–E (lateral canthus, inferior point of the angulus). Visual analogue scale (VAS) score records, analgesic requirement, and soft tissue dehiscence were evaluated at 3, 7, and 10 days post-surgery. Cone beam computerized tomography (CBCT) images were taken of the patients with OAF, and in cases of OAC, the size of defects were calculated with a Castroviejo caliper. Patients with missing information were excluded from the study. Informed consent forms were obtained from the patients before performing any surgical procedures.

Statistical analysis

The suitability of quantitative variables for normal distribution was assessed using the Kolmogorov–Smirnov test. Variance homogeneity was examined with the Levene test. For non-normally distributed variables, independent groups were compared with the Mann–Whitney U test. Chi-squared analysis was performed to examine categorical variables. Parametric assumptions were met for comparisons involving more than two groups, and analysis of variance (ANOVA) was conducted. When parametric assumptions were not met in these cases, the Kruskal–Wallis test was used. The two-way ANOVA test was applied for repeated measurements, evaluating group and time interactions simultaneously. In instances of significant differences observed in comparisons involving more than two groups, post-hoc tests were conducted to further investigate the source of these differences. All p values were calculated as two-tailed, with the significance level set at 5% (P<.05). IBM SPSS 26 software was used for statistical analyses.

RESULTS

Between 2017 and 2023, 23 patients (12 female and 11 male) received treatment for OAD at Hacettepe University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery. The average age of the patients was 39.3±16.9 years (ranging 15–69 years) and the average follow up time was 8.8±3.2 months (ranging 2–50 months) Nine patients underwent treatment with BAF, ten patients received BFP flaps, and four patients received the press-fit technique. Statistical analyses revealed no significant differences between treatment methods according to systemic conditions (P=.772), age (P=.215), or sex (P=.648) of the patients. Demographic data and OAC and OAF characteristics are detailed in Table 1.

Eight patients with OAF and 15 with OAC were diagnosed. No significant difference was observed between groups (P=.254) regarding the distribution of OACs and OAFs. The mean defect size of all patients at the bone was measured as 8.4±3.1 mm mesiodistally and 8.9±3.6 mm buccolingually. The mean defect size was 7x8 mm in the BAF group, 7.3x6.7 mm in press-fit group, and 11x11.3 mm in BFP flap group. Although the mean defect size observed in BFP flap group was larger, there was no significant difference between groups in the terms of defect size (P=.131 mesiodistally, P=.373 buccolingually; Figure 1). The largest defect size (18.2–14.0 mm) was observed in a patient (patient 12) who had an OAF due to a secondary infection at the site where a plate and screw had been inserted after trauma occurred, 10 years earlier (Figure 2A). This patient underwent previous chemotherapy for acute lymphoblastic leukemia. The OAF manifested at the trauma site 1 month later, after chemotherapy had started. Considering the defect size (Figure 2B), soft tissue fistulation, and the patient's medical condition, BFP flap (Figure 2C) was the selected treatment instead of bony graft. The healing process was uneventful (Figure 2D).

Table 1. Descriptive statistics of age, sex, treatment, success status, type, and size of defects

Patient number	Age/sex	OAC or OAF	Cause of OAC or OAF	Size of defect (mm; MD–BP)	Treatment	Success status
Patient 1	37/M	OAC	Tooth extraction	5–4	BAF	S
Patient 2	51/F	OAC	Tooth extraction	5–5	BAF	S
Patient 3	69/F	OAC	Tooth extraction	7.8–13	BAF	S
Patient 4	62/M	OAC	Cyst enucleation	9–8	BAF	S
Patient 5	16/M	OAC	Cyst enucleation	8.9–11	BAF	S
Patient 6	25/F	OAC	Tooth extraction	6–10	BAF	S
Patient 7	36/F	OAC	Tooth extraction	5–6	BAF	S
Patient 8	25/F	OAF	Cyst enucleation	10–6.5	BAF	S
Patient 9	39/F	OAF	Tooth extraction	7.8–11.5	BAF	S
Patient 10	38/M	OAF	Tooth extraction	7.4–12	BFP flap	**US**
Patient 11	58/F	OAC	Cyst enucleation	10–13.3	BFP flap	S
Patient 12	51/M	OAF	Seconder infection	**18.2–14**	BFP flap	S
Patient 13	18/M	OAF	Tooth extraction	8.6–7	BFP flap	S
Patient 14	37/F	OAC	Tooth extraction	13–16	BFP flap	S
Patient 15	19/M	OAC	Odontoma enucleation	10.5–14.5	BFP flap	S
Patient 16	40/M	OAC	Tooth extraction	10–9.1	BFP flap	S
Patient 17	69/M	OAF	Tooth extraction	11–5	BFP flap	S
Patient 18	15/F	OAC	Tooth extraction	5.1–6.9	BFP flap	S
Patient 19	30/F	OAC	Tooth extraction	5–4	BFP flap	S
Patient 20	50/F	OAC	Fail of implant	9–8	Press fit	S
Patient 21	62/M	OAF	Tooth extraction	5–5	Press fit	S
Patient 22	25/M	OAC	Sinus lift	9–8	Press fit	S
Patient 23	32/F	OAF	Tooth extraction	6.5–6	Press fit	S

Abbreviations: MD=mesiodistal. BP=buccolingual. F=female. M=male. OAC=oroantral communication. OAF=oroantral fistula. BAF=buccal advancement flap. BFP=buccal fat pad. S=successful. US=unsuccessful.

Table 2. Comparison of treatment methods according to parameter changes

Parameters	BAF (mean)				BFP flap (mean)				Press-fit (mean)				Significance (p value)	Partial Eta squared
Days	**Pre-op**	**3**	**7**	**10**	**Pre-op**	**3**	**7**	**10**	**Pre-op**	**3**	**7**	**10**		
A–C Line (cm)	11.2	11.6	11.1	10.9	11.2	12.2	11.3	11.26	11.3	12	11.5	10.8	.679	0.038
A–D Line (cm)	15.1	15.7	15	14.8	15.5	16.5	15.7	15.6	13.9	15.1	15.2	14.9	.162	0.166
B–E Line (cm)	10.3	10.6	10.1	10	10.7	11.7	11	10.8	10.1	11	10.8	10.2	.424	0.082
Mouth opening (mm)	44.1	39.1	43.2	44.5	43.8	32.2	38.6	41.6	44.2	34.2	45.8	44.5	.509	0.076
VAS score	-	3.2	1.1	0.3	-	4.2	1.5	0.7	-	2.5	0.8	1.1	.356	0.098
Analgesic requirement	-	3.9	2.2	1.3	-	3.3	3.3	2.1	-	1.6	1.9	1.2	.412	0.085

Abbreviations: BAF=buccal advancement flap. BFP=buccal fat pad. Pre-op=pre-operative. A–C=tragus, lateral commissure. A–D=tragus, soft tissue pogonion. B–E=lateral canthus, inferior point of the angulus.

Although the primary cause of OADs was identified as tooth extraction, which was seen in 15 patients (65.2%), no significant differences between treatment methods according to the cause of OAD were observed (*P*=.133). The initial treatment was ineffective in one patient (patient 10) who presented with an OAF after tooth extraction (Figure 3A). The OAF was initially covered with a BFP flap (Figure 3B) after the Caldwell–Luc procedure. Although no soft tissue dehiscence was observed at the 3-day follow-up, the OAF fully reopened at the 7-day (Figure 3C) possibly due to the patient being a smoker (Figure 3C). For the second surgery, fixation of a chin graft was planned (Figure 3E). The region was irrigated with a rifampicin saline solution (1:1) once a day for 2 weeks. The chin graft was applied to the region and stabilized with a screw (Figure 3D, 3F). Despite soft tissue dehiscence observed throughout the graft at follow-up, the graft was not removed from the region and used as a plug to resolve the patient's complaints—ie, fluid coming from the nose, closing oroantral passage, post-nasal drainage, or halitosis by day 10. The patient was checked weekly and at-home irrigation with saline solution was recommended. After 2 months, the graft was removed and the region was observed as covered with healthy soft tissue, which regenerated by itself. The healing process remained uneventful during the 8-month follow-up.

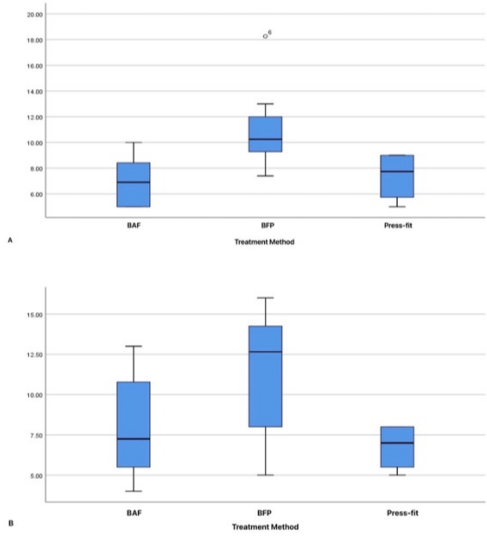

Figure 1. (A) The mesiodistal defect size of the treatment groups. **(B)** The buccolingual defect size of treatment groups. Abbreviations: BAF=buccal advancement flap. BFP=buccal fat pad.

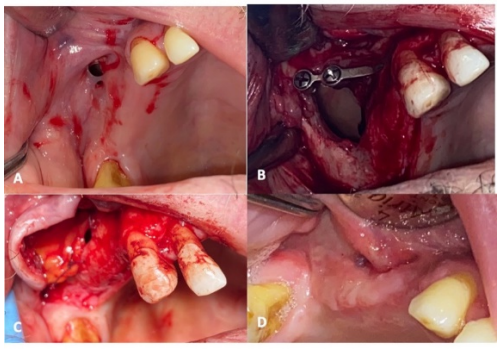

Figure 2. (A) The preoperative view of the OAF. **(B)** Intraoperative view of infected maxillary sinus cavity. **(C)** BFP flap application after the Caldwell–Luc procedure. **(D)** The healing of the OAF area 2 weeks post-surgery. Abbreviations: BFP=buccal fat pad. OAF=oroantral fistula.

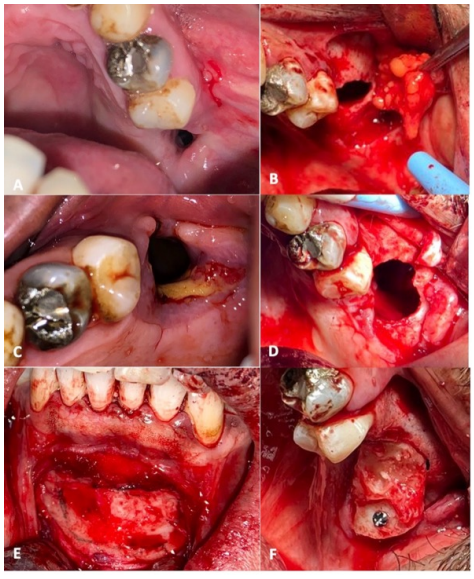

Figure 3. (A) The preoperative view of the OAF. **(B)** The intraoperative view of the OAF after the Caldwell–Luc procedure reflection of the BFP flap. **(C)** The reopening of the BFP flap at day 7. **(D)** The view of the OAF during the second surgery. **(E)** The preparation of donor site at the symphysis area. **(F)** The fixation of the symphysis graft to the recipient side. Abbreviations: BFP=buccal fat pad. OAF=oroantral fistula.

For one of the patients, OAD occurred because of an implant explant that failed, which was applied with the trans-alveolar sinus lift approach. After the explant was applied, the press-fit technique was applied to the area and the healing period was uneventful. Five OACs were observed due to the enucleation of odontogenic lesions. Two of the OACs were managed with a BFP flap, and three were treated with BAFs. No complications were indicated during the follow-ups. In one patient (patient 22), the OAF developed after an unsuccessful lateral window sinus augmentation approach. A modified cul-de-sac approach was performed due to a large-sized sinus membrane perforation during augmentation; however, the patient presented to our clinic with symptoms of OAF 2 months later. The press-fit technique was planned, and a Caldwell–Luc procedure was performed (Figure 4A). The symphysis region was reflected, and although the defect measured 9x8 mm, we had no access to a trephine burr larger than 9 mm in diameter. Measurements were taken with a Castroviejo caliper and the donor site was prepared with a round burr (Figure 4B). The graft was placed using the press-fit technique with primary stability (Figure 4C) and no problems occurred during the 4-month follow-up.

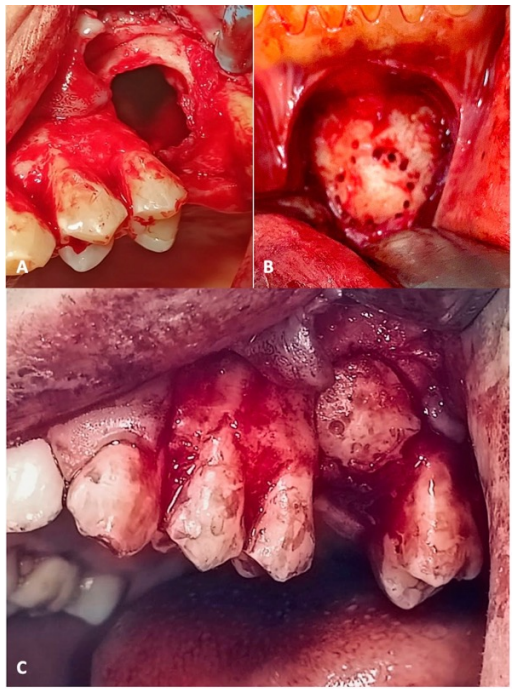

Figure 4. (A) Intraoperative view of the OAF after the Caldwell–Luc procedure. **(B)** Graft harvesting from the symphysis area with a round burr. **(C)** The view of recipient side with press-fitted graft. Abbreviations: OAF=oroantral fistula.

Clinical assessment revealed that in the BFP flap and press-fit groups, edema and trismus increased more than compared with the BAF group at day 3 follow-up; however, no significant differences were observed between groups at any timepoint according to A–C (P=.679, partial η^2=0.038), A–D (P=.162, partial η^2=0.166), B–E (P=.424, partial η^2=0.082) lines, or mouth opening (P=.509, partial η^2=0.076). In the press-fit groups, VAS score and analgesic requirement was lower than BFP flap and BAF groups; nevertheless, there was no difference between the groups in the terms of VAS score (P=.356, partial η^2=0.098) and analgesic requirements (P=.412, partial η^2=0.085) at any timepoint (Table 2).

DISCUSSION

Managing OADs in larger size defects can pose challenges and a definitive treatment framework has not been established. As such, various treatment methods are being evaluated in the literature. In this study, we investigated trismus, swelling, pain, success rates, and the analgesic requirements of BAF, BFP flap, and press-fit techniques for the closure of OAD. There were no significant differences between treatment methods in terms of any tested parameters.

As the literature suggests that the first 24–48 hours are crucial for OAC management, the decision of the treatment protocol depends on factors, such as the patient's medical status, size and location of the communication, inflammatory status of the maxillary sinus, and prosthetic rehabilitation options during the postoperative period.[2] It is reported that OACs smaller than 5 mm might heal spontaneously, but larger ones could require more advanced treatment methods. Conversely, BAF is a common technique used due to its simplicity, reliability, and versatility, with promising success rates for OAC closure;

however, studies recommend BAF for less than 5 mm communications.[4,6,14] On the contrary, there are studies showing promising results for applying BAF to OADs with defects larger than 5 mm.[15] In our study, BAF was applied to nine OADs with a mean defect size of 7x8 mm, and the healing process was uneventful for these patients. This difference might be associated with the type of defects, as most patients in the BAF group had OACs and the defects were covered immediately after opening. Only one patient had an OAF for which BAF was performed. Preoperative antibiotic treatment was given for 2 weeks to prevent complications considering the potential risks of postoperative infection. Additionally, during the closure process, the advanced flap without tension method was performed and the tissues were kept away from the OAD margins in the anastomosis area.

BFP flap and press-fit techniques are considered reliable options for large-size OADs.[16,17] The press-fit technique, widely used for implant applications in OADs since 2003, has promising success rates.[3,18] Er et al.[12] reported that the treatment of ten patients with OACs or OAFs had an 100% success rate. Watzak et al.[19] reported an 80.9% success rate for OAF closure. The authors indicated that the use of monocortical bone grafts harvested at intraoral donor sites is a safe and easy technique for repairing defects of the maxilla, especially OAFs in need of secondary closure.[12,19] In our study, the closure rate for OADs was 100%, and no complications occurred during the follow-up period. Although press-fit is an optimal method for OAD reconstruction, several parameters should be evaluated, such as residual alveolar bone height, adjacent teeth, and adaptation of the graft to the recipient site. One patient who underwent active chemotherapy in our study, had the largest OAD. In this case, the press-fit technique was not preferred due to the patient's medical status. As sufficient donor tissue could not be obtained from intraoral sites, a well-nourished BFP flap was applied to prevent potential graft failure, with uneventful healing. Descriptive statistics in our study did not reveal any significant difference between defect sizes for the different treatment groups. However, the mean defect size was lower in the BAF and press-fit groups compared with the BFP flap group. This difference could be attributed to BFP group's robust blood supply and the lack of a need for a substantial donor site.

The BFP flap is a vascularized and easily accessible flap for treating OADs. However, the potential for fat pad necrosis can lead to severe postoperative complications.[20] Park et al.[11] investigated the effectiveness of BFP flaps for managing OAFs and reported a 92% success rate. The authors indicated that OAF closure using a pedicled BFP flap had a high success rate. Another clinical study applied the BFP flap using the endoscopic approach for 19 patients with OAF, which had a postoperative process that was uneventful during the 1-year follow-up. The authors suggest that the BFP flap combination with endoscopic drainage of the maxillary sinus via the middle meatus is an effective, easy, and simple method with high success rate for the closure of OAFs.[21] Numerous studies suggest that BFP flaps are a meritorious option for OADs.[20,22] In our study, the success rate of BFP flaps was 90%. Fistulation occurred in only one patient due to heavy smoking, and a second surgery was performed with symphysis graft fixation. Although soft tissue dehiscence occurred, the graft served as an air-tag plug for OAF, and closure was achieved after 2 months by secondary epitalization. Various OAD treatment methods exist, but the key factor in the treatment is to create an air-tag plug between the antrum and the oral cavity. This plug can consist of hard tissue, soft tissue, a stemmed flap, or even synthetic material.

In the literature, there is inadequate knowledge about clinical outcomes, such as pain score, swelling, mouth opening, and the need for analgesics for OAD closure. Shukla et al. investigated clinical outcomes, such as trismus, pain, swelling, and mouth opening after BAF and BFP flap procedures for OAF closure. The authors indicated that BAF groups showed less pain and swelling and greater mouth opening than the BFP flap group. According to their results, BFP flap were a better option for OAF closure despite greater morbidity compared with BAF [10]. Nezafati et al. compared BAF and BFP flap treatments for postoperative clinical outcomes and showed that BAF was greater than BFP flap for clinical outcomes, which corroborates Shukla et al.[10,23] Another clinical study compared BFP flaps with the sandwich graft technique for OAD closure. According to their results, there was no significant difference between the groups in the terms of pain and swelling.[24] No differences were observed between the treatment groups in terms of swelling, trismus, VAS scores, and analgesic requirement. The differences regarding BAF outcomes between the literature and our study could be attributed to stress-free closure and excessive periosteum relaxation of the flap to provide tissue anastomosis away from the fistula site. Although there was no significant difference in terms analgesic requirement and pain score between treatment groups, in the press-fit group the analgesic requirement and pain score was lower compared with other groups, which could be associated with less time consumed during the intraoperative period or our small sample size.

CONCLUSION

To perform a successful OAD closure and choose the right treatment method, it is crucial to evaluate the size and localization of the OAD, the infectious status of the maxillary sinus, the patient's medical condition and habits, the need for hard tissue reconstruction in the future, and having an air-tag plug between the antrum and oral cavity, which is the most important result for these patients. BAF, BFP flap, and press-fit methods are reliable and trusted techniques for OAD treatment; however, further clinical studies with larger sample sizes are needed for defining correct and detailed frameworks for OAD treatment.

Ethics committee approval: This study was approved by the Hacettepe University Health Sciences Research Ethics Committee with GO date: 06/06/2023 and protocol number: 23/495.

Informed consent: Written informed consent was obtained from patients for all clinical data and images presented in this study. Patient identities were kept confidential, and no personal data was shared..

Peer-review: Externally peer-reviewed.

Author contributions: Concept–IA; design–IA, SA; supervision–AA; resources–AEK; materials–IA, AEK; data collection and processing–IA, AEK; analysis and interpretation–IA, SA; literature search–IA; manuscript writing–IA, SA; critical review–AA; and other contributions–SA.

Conflict of interest: All authors state no conflicts of interest.

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Use of artificial intelligence: No AI-assisted tools, models, or technologies were used to generate scientific content in the preparation of this manuscript. All analyses, interpretations, and writing processes were performed by the author(s).

Consent statement: Written informed consent was obtained from all patients for the use of their clinical data and images in this study. All personal identifiers were removed to ensure patient confidentiality.

Etik Komite Onayı: Bu çalışma Hacettepe Üniversitesi Sağlık Bilimleri Araştırmaları Etik Kurulu tarafından tarih: 06.06.2023GO 23/495 protokol numarası ile onaylandı.

Hasta Onamı: Bu çalışmada sunulan tüm klinik veriler ve görüntüler için hastalardan yazılı aydınlatılmış onam alınmıştır. Hastaların kimlik bilgilerinin gizliliği korunmuş ve hiçbir kişisel veri paylaşılmamıştır.

Hakem Değerlendirmesi: Dış bağımsız.

Yazar Katkıları: Fikir – IA; Tasarım – IA, SA; Denetim - AA; Kaynaklar - AEK; Malzemeler – IA, AEK; Veri Toplama ve/veya İşleme – IA, AEK; Analiz ve/veya Yorum – IA, SA; Literatür Taraması - IA; Makaleyi Yazan – IA, SA; Eleştirel İnceleme - AA; Diğer – SA.

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REFERENCES

1. Wassmund M. *Lehrbuch der praktischen Chirurgie des Mundes und der Kiefer*. 1935.
2. Anavi Y, Gal G, Silfen R, Calderon S. Palatal rotation-advancement flap for delayed repair of oroantral fistula: a retrospective evaluation of 63 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2003;96:527-534.
3. Haas R, Watzak G, Baron M, Tepper G, Mailath G, Watzek G. A preliminary study of monocortical bone grafts for oroantral fistula closure. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2003;96:263-266.
4. Hunger S, Krennmair S, Krennmair G, Otto S, Postl L, Nadalini DM. Platelet-rich fibrin vs buccal advancement flap for closure of oroantral communications: a prospective clinical study. *Clin Oral Investig*. 2023;27:2713-2724.
5. Kwon MS, Lee BS, Choi BJ, et al. Closure of oroantral fistula: a review of local flap techniques. *J Korean Assoc Oral Maxillofac Surg*. 2020;46:58-64.
6. Parvini P, Obreja K, Begić A, et al. Decision-making in closure of oroantral communication and fistula. *Int J Implant Dent*. 2019;5:1-11.
7. Daif ET. Long-term effectiveness of the pedicled buccal fat pad in the closure of a large oroantral fistula. *J Oral Maxillofac Surg*. 2016;74:1718-1722.
8. Abuabara A, Cortez A, Passeri L, de Moraes M, Moreira R. Evaluation of different treatments for oroantral/oronasal communications: experience of 112 cases. *Int J Oral Maxillofac Surg*. 2006;35:155-158.
9. Mårtensson G. Operative method in fistulas to the maxillary sinus. *Acta Otolaryngol*. 1957;48:253-254.
10. Shukla B, Singh G, Mishra M, Das G, Singh A. Closure of oroantral fistula: comparison between buccal fat pad and buccal advancement flap: a clinical study. *Natl J Maxillofac Surg*. 2021;12:404-409.
11. Park J, Chun BD, Kim UK, Choi NR, Choi HS, Hwang DS. Versatility of the pedicled buccal fat pad flap for the management of oroantral fistula: a retrospective study of 25 cases. *Maxillofac Plast Reconstr Surg*. 2019;41:1-6.
12. Er N, Tuncer HY, Karaca Ç, Çopuroğlu S. Treatment of oroantral fistulas using bony press-fit technique. *J Oral Maxillofac Surg*. 2013;71:659-666.
13. Ram H, Makadia H, Mehta G, et al. Use of auricular cartilage for closure of oroantral fistula: a prospective clinical study. *J Maxillofac Oral Surg*. 2016;15:293-299.
14. Yalçın S, Öncü B, Emes Y, Atalay B, Aktaş İ. Surgical treatment of oroantral fistulas: a clinical study of 23 cases. *J Oral Maxillofac Surg*. 2011;69:333-339.
15. Hernando J, Gallego L, Junquera LM, Villareal Renedo P. Oroantral communications: a retrospective analysis. 2010.
16. Visscher SH, van Minnen B, Bos RR. Closure of oroantral communications: a review of the literature. *J Oral Maxillofac Surg*. 2010;68:1384-1391.
17. Bell G, Howard L, Lamont T. Clinical and radiographic assessment and restoration of maxillary sinus function in relation to oroantral fistula closure: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2022;134(4):432-441.
18. Ahmed MS, Askar NA. Combined bony closure of oroantral fistula and sinus lift with mandibular bone grafts for subsequent dental implant placement. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2011;111:e8-e14.
19. Watzak G, Tepper G, Zechner W, Monov G, Busenlechner D, Watzek G. Bony press-fit closure of oroantral fistulas: a technique for pre-sinus lift repair and secondary closure. *J Oral Maxillofac Surg*. 2005;63:1288-1294.
20. Jain M, Ramesh C, Sankar K, Babu KL. Pedicled buccal fat pad in the management of oroantral fistula: a clinical study of 15 cases. *Int J Oral Maxillofac Surg*. 2012;41:1025-1029.
21. Abdel-Aziz M, Fawaz M, Kamel M, Kamel A, Aljeraisi T. Closure of oroantral fistula with buccal fat pad flap and endoscopic drainage of the maxillary sinus. *J Craniofac Surg*. 2018;29:2153-2155.
22. Pool C, Goyal N, Lighthall JG. Novel use of the buccal fat pad for sinocutaneous fistulae closure and a review of reconstructive options. *Ann Otol Rhinol Laryngol*. 2022;131:295-302.
23. Nezafati S, Vafaii A, Ghojazadeh M. Comparison of pedicled buccal fat pad flap with buccal flap for closure of oroantral communication. *Int J Oral Maxillofac Surg*. 2012;41:624-628.
24. Pal U, Mohammad S, Singh R, Singh G, Malkunje LR. Buccal fat pad versus sandwich graft for treatment of oroantral defects: a comparison. *Natl J Maxillofac Surg*. 2010;1:6-10.