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Oroantral Fistula Reconstruction by Pedicled Buccal Pad of Fat adjuvant with Advancement Flap (Clinical Study)

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ABSTRACT

Aim: *As well as highlighting the role of buccal fat of pad in closure large defects by evaluating healing process through pain, swelling and wound healing scores.*

Material and Method: *A prospective evaluation study was conducted among patients who underwent surgical closure to OAC in both Ear Nose and Throat Department with the Maxillofacial Department of Al-Salam Teaching Hospital in Mosul City of Nineveh Province. Data recorded includes demographical Information and clinical evaluations. Two operators measured the parameters. Pain and swelling assessment through the visual analogue scale (VAS) assess the level of pain on the third, seventh and day twenty following surgery. Wound Evaluation Scale used to evaluate closure of the oroantral communication without nasal regurgitation at 1st week (day 7) and 20th days post-surgery and measure the surgical success.*

Results: *The highest age group are between (20-29 years) with percent (56.5). male show high incidence (56.5%) more than female (43.47). In regard to cause extraction followed by tumors are the common cause for oroantral fistula (56.5%, 17.39).*

Day three and seven reflect different ranges of pain with highest percent for severe pain in day three (65.21%) and reduced to slight pain (82.60%) in day seven. In regard to swelling, in day three most of cases show very severe swelling (73.91%). In day seven the cases represent sever swelling (78.26%). Twenty-one patients from total 23 show incomplete healing at day seven while two patients have uncertain healing. In day 20 just one patient shows incomplete healing process.

Conclusion: *Buccal pad of fat can be used safely as adjuvant to buccal advancement flap for closure and is efficient in management of OAC to avoid diminished soft tissue in different size cases. Pain, swelling scales can be used as assessment for healing process added to them soft tissue wound healing scale.*

Keywords
Oroantral fistula, Buccal Pad of Fat, Buccal Advancement Flaps, Pain and Swelling Scale, Wound Healing Scale.

Introduction
Oroantral communication (OAC) is abnormal connection that develops from composite tissue loss affecting the maxillary sinus and oral cavity. The sinus lining, alveolar bone, and mouth mucosa are affected. It may occur following the extraction of the maxillary posterior teeth in close proximity to the sinus floor, the removal of a cyst or tumor from the posterior maxilla, or due to trauma or any other diseases. The magnitude of the defect primarily determines the various OAC management options [1].

The most common cause for OAC is maxillary posterior tooth extraction. This might be because thin sinus floors aggravate the roots' closeness to the maxillary sinus floor [2]. OACs can develop from enucleating tumors and cysts, orthognathic surgery (such as a LeFort osteotomy), trauma, pathological lesions, and implant surgery. If external sinus floor elevation and augmentation are unsuccessful, an OAC may also occur.

As principles surgical closure of OACs within 48 hours. If not treated, OAC can serve as a pathway for germs to enter the maxillary sinus, leading to infections, sinusitis, or slowed healing [3].

Most OACs with a diameter of 5 mm or less to close on their own without requiring surgery. Larger communications can frequently continue, necessitating surgically closing the defect [4].

The literature has proposed a variety of treatments for the closure of OAC, including simple primary closure, the use of buccal advancement flaps, palatal rotation flaps, split-thickness skin grafts, allogeneic grafts, regional flaps, bone grafts, or buccal fat pads [5].

The type and severity of the problem, along with the surgeon's decision, dictate the surgical approach. A single layer of tissue is usually used to treat OAC. This layer can be made of adipose tissue (buccal fat pad), muscle (tongue flap, temporalis flap), mucosa (palatal rotation flap, buccal advancement flap) [6]. One of most common complications in surgical treatment of OAC is failure to heal specifically in large defect closure more than 5mm [7].

The current study's goal was to assess the effectiveness of double layer closure in treating OAC by combining the buccal advancement flap and buccal fat pad.

Aim
The current study's goal was to assess the effectiveness of double layer closure in treating OAC by combining the buccal advancement flap and buccal fat pad. As well as highlighting the role of buccal fat of pad in closure large defects by evaluating healing process through pain, swelling and wound healing scores.

Material and Method
Study Design and Ethical Approval
A prospective evaluation study was conducted between January to April 2024 among patients who underwent surgical closure to OAC in both Ear Nose and Throat Department with the Maxillofacial Department of Al-Salam Teaching Hospital in Mosul City of Nineveh Province. The study follows the ethical principles of Declaration of Helsinki. Approval to conduct this study was obtained from the Institutional Review of the Authorised Scientific Committee in Nineveh Health Directorate with the numbered session 253 in 7/ 2 / 2024 with research number 2023021 (No. 5944, Date 8 / 2 / 2024).

The study purpose was explained to the participants with all details of the research. Consequently, willing to share or not were made according to wishes not obligatory. Written consent form was fabricated for this purpose.

Inclusion and Exclusion Criteria
Patients aged from 18- 50 underwent surgical management to OAC with more than 5 mm defect size are included in the study. Exclusion Criteria are patients need other types of surgery, patients unwilling to share and also incomplete patient's data. As well as any history of recurrent sinusitis or sinus surgery, medically compromised patients (diabetic) or drug use that can affect or alter healing process as steroids or radiation therapy. In case of resection followed by OAC.

Sample Size
The sample size was (23) participants.

Method
Patients Preparation
Patients examined clinically and radiographically to detect the defect size for cases exclusion of less than 5 mm defect size. All included patients prepared starting with history taking, clinical evaluation and radiographical assessment. All surgical steps are explained to patients in detail and informed consent signed.

Two days before surgery; the patient advised to start xylometazoline nasal spray as nasal decongestant, chlorhexidine mouth wash, and Augmentin tabs (1g BD) as antibiotic and continuing until the fifth day after. Choosing either local or general anesthesia depending on the circumstances and patient preference. In every instance, the operator and the first assistant remained unchanged.

During the operation, starting with fistula tract removal to prevent chronic leakage. Buccal mucoperiosteal flap of full thickness are reflected, ensuring it remained at least half a centimeter in front of the defect's anterior margin. Harvesting a sufficient amount of buccal fat pad at the operative site using blunt dissection. Three zero polyglactin suture to attach the retrieved fat to the palatal mucosa tightly forming the 1st layer closure.

Then second layer closure by advancing the buccal mucosal flap and suturing it over the palate mucosa using a 3-0 polyglactin suture. The immediate postoperative care of all patients remained unchanged. No heavy oral rinses or blowing of the nose should be done, and patients were instructed to eat a gentle diet. Administer diclofenec sodium tablets (75mg BD) as analgesic medication to the patients for a duration of 7 days. Patients followed for 1.5 months.

Demographical Information

Include age, gender, cause, number of days since the communication.

Clinical Parameters Evaluations

The evaluation of the parameters included both the primary outcome (the effective closure of the OAC) and the secondary outcomes (the postoperative pain and swelling). Two operators measured the parameters.

- Pain Visual Analogue Scale (PVAS). [8]: Pain assessment through the visual analogue scale (VAS) assess the level of pain on the third, seventh and day twenty following surgery. Authors verbally asked the patients to rate their level of discomfort on a scale from 0 (no pain) to 10 (total agony).

Criteria for post – operative follow up (PAIN) includes:

1. No pain – the patient feels well
2. Slight pain- if the patient is distracted, he or she does not feel the pain
3. Mild / Moderate pain- the patient feels the pain even if concentrating on some activity
4. Severe pain- the patient is very disturbed but nevertheless can continue with normal activities
5. Very severe pain- the patient is forced to abandon normal activities
6. Extremely severe pain – the patient must abandon every type of activity and feels the need to lie down

- Swelling Visual Analogue Scale (VAS) [8]: swelling assessment through the visual analogue scale (VAS) assess the level of swelling on the third, seventh and day twenty following surgery.

1. No swelling- patient does not detect the slightest swelling
2. Slight- patient detects a slight swelling but it is not very noticeable
3. Mild / Moderate swelling- the swelling is noticeable but does not interfere with normal mastication and swelling
4. Severe swelling- the swelling is evident and hinders normal mastication
5. Very severe swelling- the swelling is marked. Mastication is hindered but there is no reduction in the mouth opening
6. Extremely severe swelling- the swelling is very evident and mouth opening is reduced

- Wound Evaluation Scale [9]: Complete closure of the oroantral communication without nasal regurgitation at 1st week (day 7) and 20th days post-surgery to measure the surgical success.

Wound Evaluation Scale include six points as follow:

1. Step off borders
2. Contour irregularity-puckering
3. Scar width-greater than 2 mm
4. Edge inversion-sinking, curling
5. Inflammation-redness, discharge
6. Overall cosmoses

*6/6 = optimal wound healing.

The healing process distributed into three levels level one (complete healing or closure), level two (incomplete healing) and level three (uncertain or unhealed wound)

Statistical Analysis

The data are collected and analyzed through SPSS package (20).

Results

Table one show the descriptive analysis for the patients. The highest age group are between (20-29 years) with percent (56.5). male show high incidence (56.5%) more than female (43.47). In regard to cause extraction followed by tumors are the common cause for oroantral fistula (56.5%, 17.39).

Table 1: Descriptive Analysis for the Demographic Informations (Age, Gender and Cause).

Variables		No. of Patients	%	Total
Age	20-29	13	56.5	**23**
	30-39	6	26.08	
	40-49	4	17.39	
Gender	Male	13	56.5	**23**
	Female	10	43.47	
Cause	*Extraction*	13	56.5	**23**
	Cysts	2	8.69	
	Tumor	4	17.39	
	Orthognathic Surgery	1	4.34	
	Trauma	2	8.69	
	Implant Surgery	1	4.34	

Clinical Parameters Assessments

Table 2, emphasize the clinical parameters percent for both pain and swelling in relation to severity and days distribution.

Pain Visual Analogue Scale: All patients assessed for pain; as base line before surgery Fifteen patients (65.21%) show no pain at day zero before surgical intervention while the rest of cases show mild to moderate pain (34.78%). In day twenty all cases show no pain at all. Day three and seven reflect different ranges of pain with highest percent for severe pain in day three (65.21%) and reduced to slight pain (82.60%) in day seven (Figure 1).

Swelling Visual Analogue Scale (VAS): (Table 2, Figure 2)

In regard to swelling, all patients have no swelling before surgery and also at day twenty after surgery. In day three most of cases show very severe swelling (73.91%). In day seven the cases represent sever swelling (78.26%).

Table 2: Descriptive Analysis for the Clinical Parameters in Days.

Clinical Parameters with Days		Day 0 (Base Line) Pt. No. %		Day 3 Pt. No. %		Day 7 Pt. No. %		Day 20 Pt. No. %	
Pain Scale	No Pain	15	65.21%					23	100
	Slight Pain			1	4.34	19	82.60		
	Mild / Moderate Pain	8	34.78	4	17.39	2	8.69		
	Severe Pain			15	65.21	2	8.69		
	Very Severe Pain			3	13.04				
	Extremely Severe Pain								
Swelling Scale	No Swelling	23	100					23	100
	Slight Swelling					1	4.34		
	Mild / Moderate Swelling			2	8.69	4	17.39		
	Severe Swelling			2	8.69	18	78.26		
	Very Severe Swelling			17	73.91				
	Extremely Severe Swelling			2	8.69				

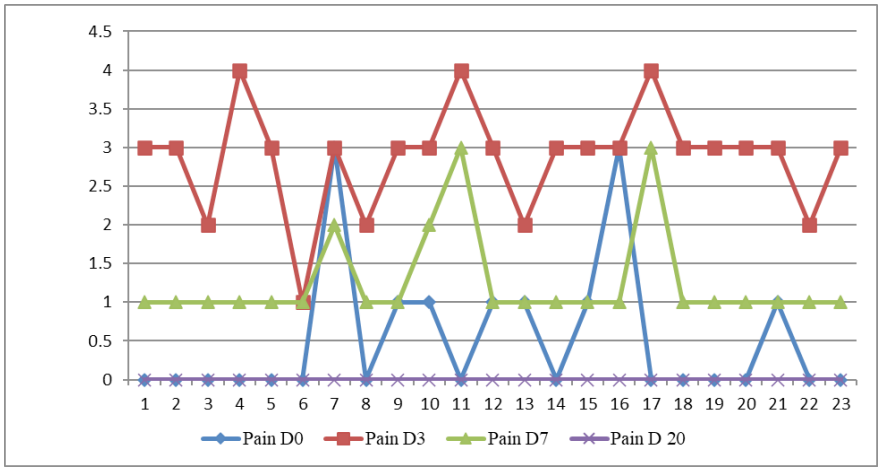

Figure 1: Clinical Assessment for Pain Visual Analogue Scale According to Days.
0 = No pain, 1= Slight pain, 2= Mild / Moderate pain, 3= Sever pain, 4= Very Severe pain, 5= Extremely Severe pain
Pain D0 = Base Line Pain, Pain D3 = Third Day Pain, Pain D7 = Seventh Day Pain, Pain D20 = Twenty Day Pain.

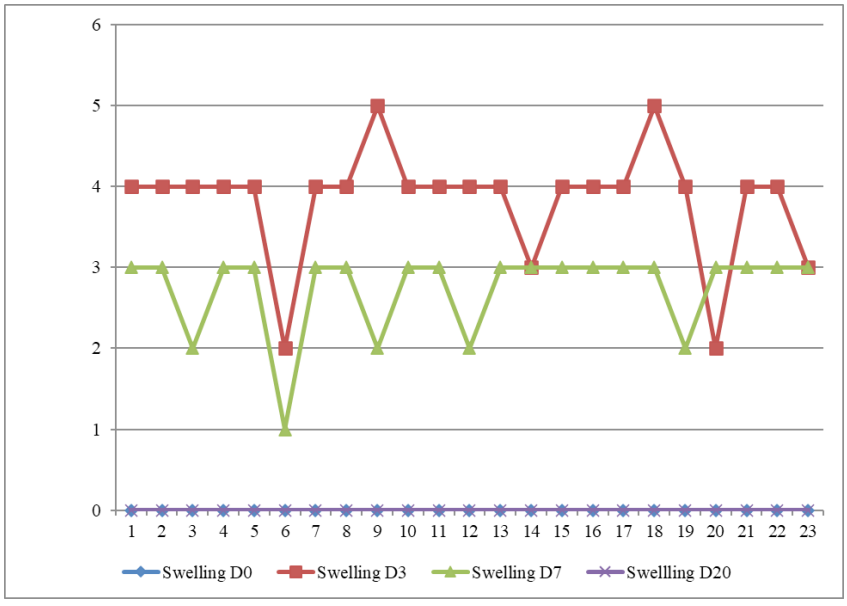

Figure 2: Clinical Assessment for swelling Visual Analogue Scale According to Days.
0 = No Swelling, 1= Slight Swelling, 2= Mild / Moderate Swelling, 3= Sever Swelling, 4= Very Severe Swelling, 5= Extremely Severe Swelling.
Swelling D0 = Base Line Swelling, Swelling D3= Third Day Swelling, Swelling D7 = Seventh Day Swelling, Swelling D20 = Twenty Day Swelling

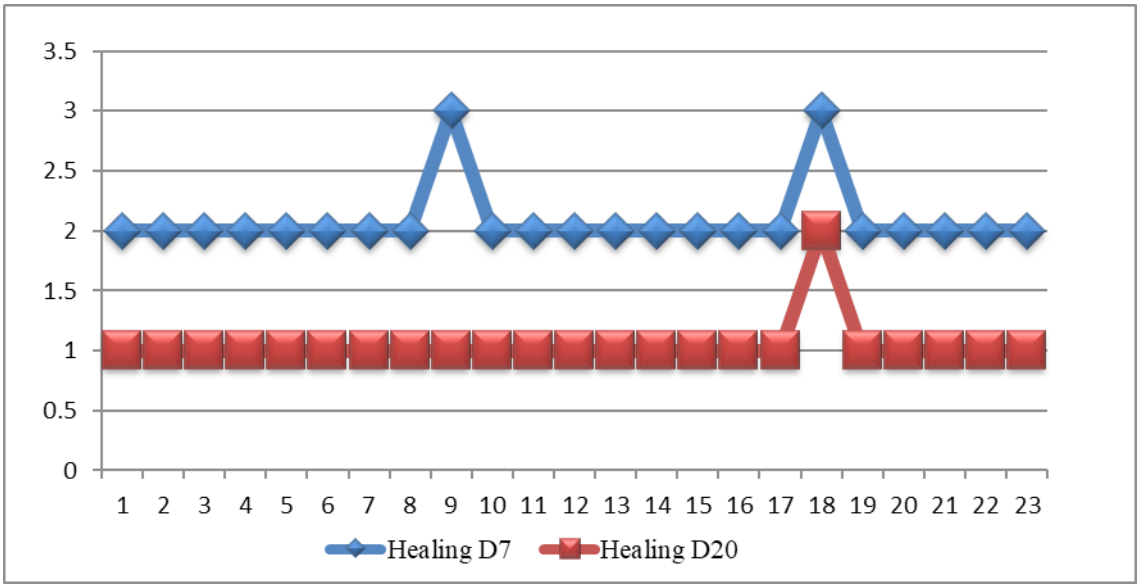

Figure 3: Wound Healing Evaluation Scale.

D7= Day Seven, D20= Day Twenty

Wound Evaluation Scale: Figure 3

Wound healing also evaluated in relation to days (7th and 20th). Twenty-one patients from total 23 show incomplete healing at day seven while two patients have uncertain healing. In day 20 just one patient shows incomplete healing process Figure 3.

Discussion

This research aimed to assess the effectiveness of a two-layer approach, utilizing both buccal mucosa and fat, in closing composite OAC defects. Historically, the success rate of closing OAC has been variable when using either the buccal fat pad or the buccal advancement flap individually.

From an anatomical perspective, the buccal fat pad is a narrow capsule that contains a concentrated quantity of fat. It helps shape the face and is located in the masticatory spaces of the orofacial region. The "branches of the facial artery, transverse facial branches of the superficial temporal artery, and the vestibular branches of the maxillary artery" all contribute to the fat mass's blood supply. The fat's abundant blood supply and availability near the OAC defect explain its usefulness in OAC control. Kumar suggested using a skin graft to line the buccal fat pad so that the flap could be fully epithelized [10]. However, extensive studies have demonstrated that a fat graft, when administered alone, successfully epithelizes after three to four weeks of implantation [6].

The literature on double-layered closure using flap combinations for OAC closure is limited. Because the buccal fat pad can become overly stretched or perforated when closing a large defect, it appears that integrating it with the buccal mucosa has an advantage in this situation [11].

When dealing with defects bigger than 50 mm, Candamourty R et al. recommended using a buccal advancement flap in conjunction with a buccal fat pad instead of just the fat pad [12]. Not having enough fat graft volume to harvest is another reason to employ a combined flap. The buccal fat pad has a volume of 10 mL and weighs approximately 9.3 grams. Once properly separated and moved, it has the potential to yield 70×40×30 mm of pedicled graft [13,14]. Size might also differ from person to person. In certain instances, the buccal fat pad volume may not be sufficient to close a significant defect, necessitating the use of a combined flap. The buccal fat pad is simple to harvest and insert.

A careful, rough dissection is required to harvest the flap without damaging its delicate capsule. As well as suture the flap without straining it. Although the procedure is generally well-tolerated, there have been a few small complications reported with buccal fat pad harvesting. These include pain, swelling, bleeding, scarring, infection, and injury to facial nerves. Pain and swelling considered as subjective factors with wide range depending on patients perception in deed [15].

The peak of these two factors were in day three post-surgery and gradually reduced in day 7th with no serious complications recorded. In this present study only one patient were has complicated healing process need more follow up period and care. The rest of cases show good healing process within the documented follow up period.

Its well-known that edoema can happen with any kind of surgery. Surgeons must handle and transfer the buccal fat pad with extreme care to maintain its blood supply, prevent bleeding, and minimise edoema [16,17].

According to Nezafati et al., edoema typically appears the day following surgery, gets worse for a couple of days, and then progressively goes away after seven days. These study's result findings corroborate their research [16]. After a surgical operation,

patients may have mild to moderate discomfort. The increased risk of tissue damage during buccal fat pad collection could be a contributing factor to increase pain.

Because no patient complained of severe pain or discomfort on the twentieth day of follow-up, authors can safely assume that the majority of patients experience mild to moderate throughout these treatments. The results are consistent with those of other studies, including Nezafati's. However, the results of our investigation contradict Hariram's clinical evaluation [18].

Conclusion

Buccal pad of fat can be used safely as adjuvant to buccal advancement flap for closure and is efficient in management of OAC to avoid diminished soft tissue in different size cases. Pain, swelling scales can be used as assessment for healing process added to them soft tissue wound healing scale.

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