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## Clinical case

# Surgical treatment of oroantral post-extraction fistulas. Case presentation and review of the literature

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## ABSTRACT

**Introduction:** Oroantral fistulae are communications between the oral cavity and the maxillary sinus, primarily caused by tooth extractions. The majority of these communications close spontaneously due to their small size, but others form fistulae, perpetuating this pathological situation until proper treatment is provided, causing both local and general pathology.

**Case report:** We present the case of a 49-year-old male without previous medical history who was referred to the Oral Surgery Department at Hospital Virgen de La Paloma presenting with a three-week history of oroantral fistula with acute sinusitis of the left maxillary sinus. After evaluation of the various therapeutic options, Bichat's buccal fat pad pedicle flap was performed along with a vestibular advancement flap, in a double-layer closure technique.

**Conclusions:** There are multiple techniques described in the literature for correcting this pathological entity, each with their own advantages and disadvantages. It is necessary to know the details of each of them in order to establish the ideal treatment for each situation.

## KEYWORDS

Oroantral fistula; Oroantral communication; Surgical treatment.

## INTRODUCTION

An oroantral communication (OAC) is a pathological condition characterized by the presence of a continuity between the oral cavity and the maxillary sinus that affects both the sinus, the oral mucosae and the maxillary bone between them. The most common cause of OAC is simple or surgical tooth extraction of antral teeth; Franco et al.<sup>1</sup> state that this is the cause in 92.63% of cases of OAC. It can also be found in the field of implantology, either immediately at the time of surgery, or following the placement of implants. Other less frequent etiologies include the presence of cysts or tumors in the maxillary sinus (4.47%), trauma (1.3%), periodontal infections (0.93%), radiation to the head and neck, syphilis, tuberculosis and bisphosphonate-induced osteonecrosis<sup>2-6</sup>.

The clinical presentation of OAC is highly variable. It can be asymptomatic or present notable signs and symptoms such as functional changes in swallowing, respiration or phonation, pain around the cheek, infraorbital area and tissues surrounding the OAC, supuration from the communication itself or the ipsilateral nasal fossa, swelling of the area, generalized malaise or fever.

Treatment of this pathology is primarily surgical, with multiple techniques described for this purpose. The most commonly used techniques are trapezoidal vestibular advancement flap (TVAF), rotational palatal flap (RPF) and Bichat's buccal fat pad (BBFP).

TVAF is usually performed in small OACs since there is a risk of recurrence in larger communications. RPF is a full-thickness mucoperiosteic flap of the palatine fibromucosa that is rotated to cover the area of the OAC defect, leaving an exposed area of bone that heals secondarily in a period of 3-4 weeks. Bichat's buccal fat pad (BBFP) consists of traction of the flap through a 0.5 to 3 cm horizontal incision in the periosteum at the level of the zygomatic arch, suturing it to the palatine mucosa and replacing the vestibular flap over it; the exposed fat tissue will epithelialize within approximately 3 weeks; this flap provides a large amount of

vitalized tissue that is highly vascularized by the maxillary, superficial temporal and facial arteries, which allows to close large OACs with a low percentage of complications and a high rate of success.

## CASE REPORT

We present the case of a 49-year-old male without previous medical history who was referred by his dentist to the Oral Surgery Department at Hospital Virgen de La Paloma in Madrid. The patient presented with swelling and intense pain in the cheek with suppuration in the oral cavity and left nasal fossa three weeks after having undergone extractions in the left posterior maxillary sector. In addition to local symptoms, the patient referred malaise and high fever.

After clinical and radiological examination, it was concluded that the patient had post-extraction OAC, located approximately where the molar was removed. Acute sinusitis was also present (Figure 1).

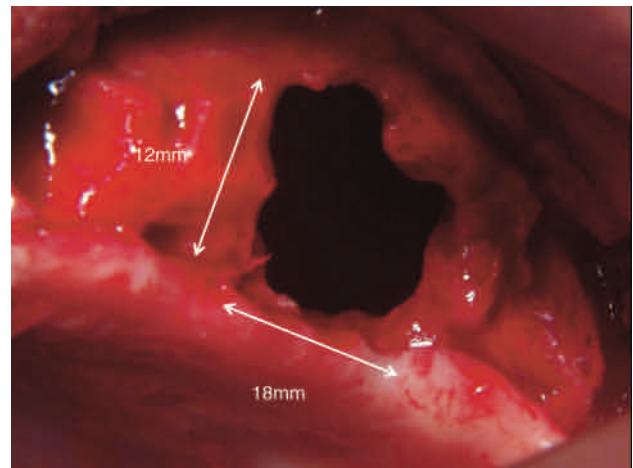


Figure 1. Dimensions of the underlying bone defect.

Given the patient's pathology, pharmacological treatment was initially administered (amoxicillin/clavulanic acid 875/125 mg every 8 hours for 1 week).

After this period, surgical closure of the OAC was performed via a BBFP. First, a supracrestal incision was made with mesial and distal openings to expose the bone defect (Figure 2), through which we proceeded

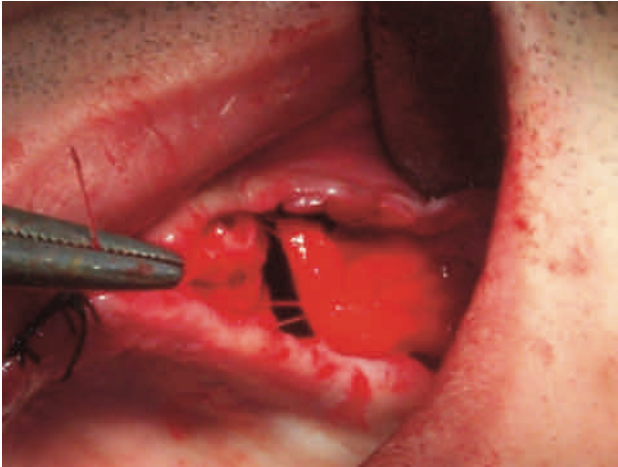


Figure 2. Traction of the Bichat's pad of fat.



Figure 5. Appearance at one year.



Figure 3. Suturing of the surgical wound.



Figure 4. Appearance at 6 weeks.

to clean the sinus using 0.12% chlorhexidine lavages and careful curettage. Once clean, a horizontal incision was made in the periosteum at the level of the vestibular fundus of the second and third molar in order to access Bichat's buccal fat pad. Once exposed, it is dissected and progressively pulled until the entire bone defect is covered with no tension on the flap (Figure 3) and the palatine mucosa is sutured. In this case, given the large bone defect, the adipose tissue was covered with a TVAF in order to provide more stability and to avoid possible complications derived from scarring of the adipose tissue that was directly exposed in the oral cavity.

The patient was followed and evaluated at days 3<sup>rd</sup>, 7<sup>th</sup>, at the 3<sup>rd</sup> and 6<sup>th</sup> weeks (Figure 4) and at one year (Figure 5) postoperatively. No complications occurred and complete resolution of the sinus pathology and the oroantral fistula was achieved.

## DISCUSSION

There are multiple surgical techniques and protocols for the treatment of OAC with no clearly established and unanimously accepted action criteria.

The majority of authors state that small OACs close spontaneously without the need for surgical treatment within a period of 2 days to 2 weeks in the absence of

sinus pathology<sup>7</sup>. Some authors claim that the maximum width for spontaneous closure be 2 mm<sup>7,8</sup> or up to 5 mm as referred by others<sup>9,10</sup>.

Prior to surgical closure of the communication, evaluation of the state of the maxillary sinuses is required; if they are involved or there was sinus pathology prior to tooth extraction, intraoral treatment of the sinuses using a Cadwell-Luc approach or endoscopic treatment via the nasal fossae would be required<sup>7,11</sup>.

There is a high level of variability on the usage criteria, limitations, complications, etc. among the most commonly used techniques.

According to most authors, TVAF is the technique presenting the fewest postoperative complications, but it has the greatest risk of recurrence of the oroantral fistula. Some authors found recurrence only in patients treated with TVAF but not with other techniques<sup>7,9</sup>. However, Franco et al.<sup>1</sup> reported a failure rate of 10.39%, which is even lower than RPF, with a failure rate of 11.68%, although this is due to the fact that their meta-analysis included authors who used RPF to treat OACs caused by extraction of superior third molars, a technique not indicated for this type of defect unless the anterior palatine orifice is extended<sup>12</sup>. Batra et al.<sup>7</sup> consider this technique to be contraindicated when there are large bone defects, sinus involvement, reinterventions or when the OAC is very posterior or very palatinized, given that in these cases, the tension on the flap is much greater, which increases the risk of failure. They also consider it contraindicated when the patient is going to receive rehabilitation with any type of removable prosthesis due to the decrease in the width of permanent vestibular fundus that is present in 40% of patients<sup>7,9</sup>. TVAF has also been used as a complement to the BBFP technique, as in the case presented, in order to provide greater safety to the intervention and to avoid the risk of healing-related complications associated to this technique such as herniation of the flap, partial necrosis and in particular excessive granulation tissue formation during healing<sup>1</sup>; however, other authors state that it does not provide any significant

advantage over the conventional BBFP technique and only recommend its use when the Bichat's pad has been perforated or excessively stretched under traction, a situation that can be solved with the use of lyophilized porcine dermal membranes, without losing vestibular depth<sup>5,7</sup>.

Another possible combination described in the TVAF literature is using small-sized RPF that, although it slightly decreases the possible tension on the suture, it adds some loss of the vestibular fundus that results from TVAF to the morbidity of RPF.

RPF has been used to close both small and very extensive OAC. It has been reported to successfully close a 2 x 4 cm OAC<sup>8</sup>. The main disadvantage of this technique reported by the majority of authors is postoperative complications and the high number of complications that can occur (persistence of the passage of air and liquids between the nose and oral cavity below the flap until healing has concluded, flap necrosis, postoperative bleeding, excessive granulation of the scar, etc.)<sup>1,7</sup>. Batra et al.<sup>7</sup> state that the remaining techniques available are less aggressive and equally successful. Therefore, they recommend avoiding its use except in very specific situations, although other authors claim these problems are minimal and they indicate its use for closure of large or long-duration OACs prior to TVAF and BBFP<sup>8,13,14</sup>. However, all authors concur in that OACs in a very posterior or very vestibularized location are best treated with a technique other than RPF.

The majority of authors consider BBFP to have the lowest risk of recurrence. Franco et al.<sup>1</sup> report a 1.30%, much lower than other techniques. According to the literature, the use of this technique is indicated in defects up to 7 x 5 cm, but the majority of authors recommend limiting this technique to defects smaller than 5 x 4 cm<sup>15</sup>. The reasons for the high success rate of this technique appear to be related to the large mass of vitalized tissue that is highly vascularized by the maxillary, facial and superficial temporal arteries. This promotes rapid epithelialization once exposed to the oral cavity within 3-4 weeks<sup>15</sup>. In addition to

the high level of success, BBFP is increasingly becoming the technique of choice for post-extraction OACs due to its ease of extraction with minimal dissection, the low rate of complications, low morbidity in the donor zone and because this technique can be performed under local anesthesia in the dental office. Although less frequent than RPF, BBFP is also not exempt from complications, some of which are more significant than those produced by other techniques. These include partial necrosis of the flap, fibrosis, trismus, marked inflammation, excessive formation of granulation tissue and complications derived from deficient surgical technique such as hemorrhage and damage to the facial nerve<sup>8,9</sup>.

This technique was used in the case presented in order to achieve maximum predictability in the closure of such a large OAC. RPF was discarded despite a larger vestibular fundus being preferable in light of future prosthetic rehabilitation because it was not a sound reason because of the complications that could arise, such as a worse surgical field for cleaning the sinus or greater postoperative damage, in a patient who had just had all of the maxillary teeth extracted. Although the patient initially lost length of the vestibular fundus, he recovered the original dimensions over time, with complete symmetry at the one-year follow-up visit.

There are also other techniques based on mobilization of the soft tissues such as the lingual flap, the buccal mucosal flap from the genial region or the temporal muscle flap. These are currently used much less frequently due to their high morbidity, and practically abandoned for closure of post-extraction OAC<sup>7</sup>.

We can also find techniques that are not only based on mobilization of soft tissues for closure of OAC such as the use of alloplastic materials including gold or polymethacrylate sheets, but these can result in complications such as extrusion, migration or infection<sup>16</sup>; or autologous transplant and subsequent endodontics of the third superior molar to the bed where the defect is located<sup>17</sup>.

In patients needing prosthetic rehabilitation with the use of osseointegrated implants, closure of the OAC by surgical techniques that only involve mobilization of different soft tissues, the sinus mucosa and the oral mucosa will be in contact without a barrier between them, which significantly complicates future surgery to elevate the sinus for the placement of implants. In order to avoid this problem, en block bone grafts from different donor areas can be used, whether they are intra-oral or extra-oral<sup>18-21</sup>, or autologous cartilage implants, be they auricular or from the nasal septum; these types of grafts have the advantage of being more resistant to infection than osseous tissue and they do not require vascularization for integration, which considerably reduces the risk of failure in addition to lower morbidity of the donor zone<sup>22</sup>. Within this field, there are also authors who propose the use of bone morphogenic protein 2 (BMP2), claiming that there is a lower risk of infection compared to conventional bone grafts, when the previous chronic infection of the target area is eliminated<sup>23</sup>.

## CONCLUSIONS

There is no single solution for the treatment of this pathology, nor are there unanimous criteria on when one technique or another is indicated. For this reason, it is very important to understand the limitations and disadvantages of each technique and to integrate aspects such as location, time of disease progression, size of the OAC and type of prosthetic rehabilitation that the patient will use in the future. The therapeutic approach that best suits the individual patient's situation should be chosen.



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