

Up-to Date Review And Case Report

Closure of an oroantral fistula by bone autograft: a case report

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Abstract – Introduction: The management of the oroantral fistula is mainly focused on the closure of the mucosa. The surgical management restoring the underlying bone defect are seldom. Maintaining this defect may compromise implant rehabilitation in this sector. The purpose of this article was to show, through a clinical case, an alternative way to manage an oroantral fistula and the bone tissue defect in the same time. **Observation:** After a rigorous clinical and radiological observation of a 2-year oroantral fistula, an impacted autologous bone graft of the maxillary tuberosity followed by a water tight closure of the mucosa, were realized in a 50-year old patient. **Commentary:** Using this surgical technique was successful for the closure of the mucosa as for the bone defect reconstruction. A consolidation was noticed and an pre-implant management and a dental implant placement could be realized. **Conclusion:** The choice of this surgical technique for the management of an oroantral fistula had a direct influence on the future prosthetic rehabilitation. The surgical technique presented for this case could be an interesting approach because the fixed or removable prosthetic treatment will be more effective if the maxillary bone tissue is reconstructed.

Introduction

With the growth of bone augmentation procedures, implant-supported prosthetic rehabilitation becomes more and more possible. Therefore, one of the most challenging situations in bone augmentation is the management of oroantral fistula.

Oroantral fistula is most commonly caused by antral teeth extraction. That can lead to bacterial contamination of the maxillary sinus, causing a chronic sinusitis. One of the most common etiology is the extraction of the first and the second maxillary molars [1–3].

This complication can be diagnosed in its early stages by the Valsalva maneuver.

The pathological connection between oral and sinus cavities has several consequences on the maxillary sinus. Among them: chronic unilateral sinusitis with or without purulent discharge, discomfort during feeding or slurred speech [4,5].

According to various analysis [3–5], the frequency of oroantral fistulas can be up to 13% regarding antral tooth avulsions. Several factors must be taken into consideration:

anatomy of the maxillary sinus, periapical infections of the antral teeth, presence of cysts and tumors adjacent to the maxillary sinus, surgical avulsion technique of the tooth and last but not least the skill of the clinician [5,6].

According to Yalcın *et al.*, immediate surgical treatment by muco-gingival reconstruction is effective in 95% of the cases [7]. Delayed intervention is only effective in 64% [7]. The closure of an oroantral fistula must be carried out within 24 h following its occurrence. Exceeding this time frame, the management becomes more difficult due to an increasing inflammation. The latter is observed in half of the patients who end up with sinus cleansing in addition to closing the oroantral fistula [7].

Even after 24 h, the closure of the oroantral fistula can be effective if there is no active infection nor foreign body (endodontic filling material for example) [2].

When the oroantral fistula is less than 5 mm in diameter, a stable blood clot may be sufficient for a spontaneous closure. It is recommended to attempt a water tight mucosal closure, regardless of the fistula's diameter [2,4–6].

Before making any therapeutic decision, it is important to determine the clinical and the radiological size of the passage, the morphology of the underlying bone defect and the presence of any foreign body in the sinus [2,4,5].

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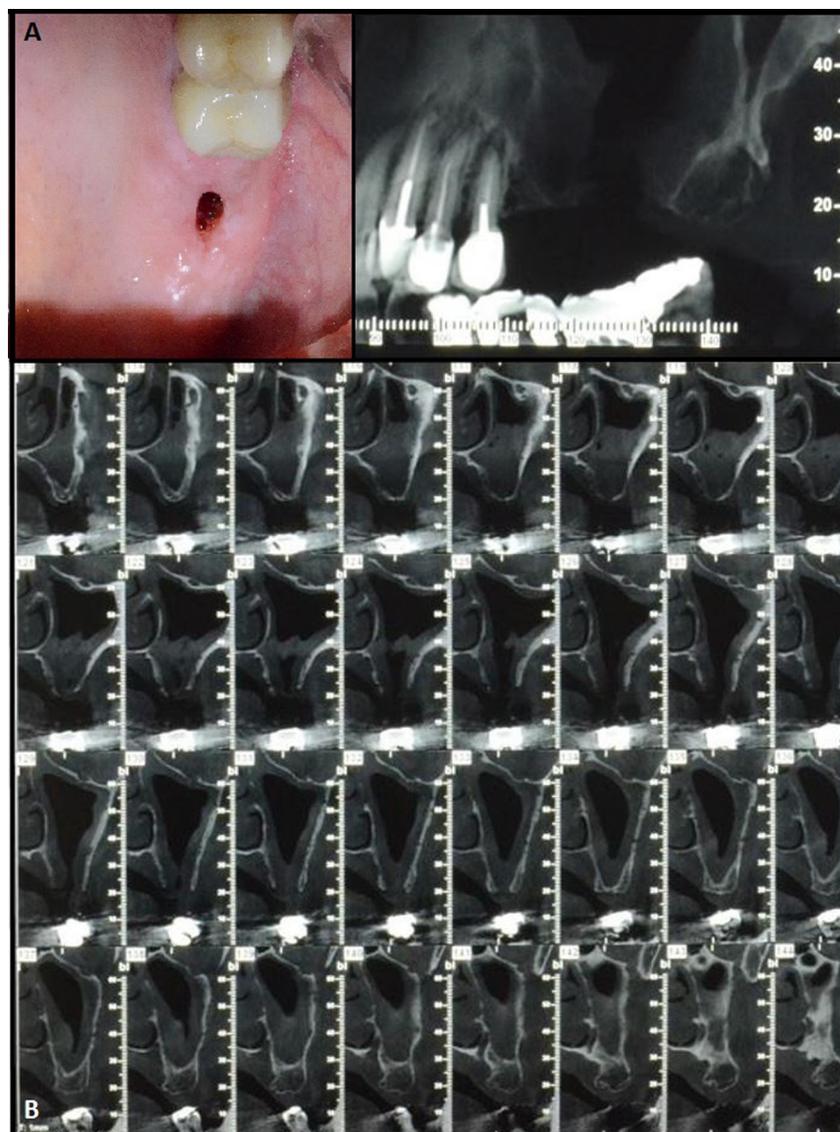


Fig. 1. (A) Clinical picture of the fistula. (B) CBCT performed after the first consultation.

Managing oroantral fistulas by pulling a vestibular flap (monolayer technique), described in 1939 by Wassmund [2,4], has some disadvantages. It causes a decreasing depth of the vestibule, which may compromise subsequent prosthetic rehabilitation. To overcome this problem, a palatal rotation flap can be used.

Bouazizet *al.* proposed closing the oroantral fistula by putting a dental implant. This was possible because of the reduced size of the fistula and presence of sufficient peri implant bone support. In fact, the goals of the surgical technique were to guarantee a tight closure and a good osteointegration of the implant. The results were satisfactory later than 20 months post-operatively [8].

For larger oroantral fistulas, the most predictable way to avoid recurrence is the traction flap using the Bichat's fat pad [9]. This technique can lead to a mucosal healing without correction of the bone defect [9]. This makes implant-supported prosthetic rehabilitation very difficult [1,7,9].

The purpose of this article is to show, through a clinical case, an alternative way to manage an oroantral fistula and the bone substance defect at the same time.

Observation

This case is about a 50-year-old, non-smoking patient with a history of Parkinson's disease. He complained of recurrent purulent discharge inside the oral cavity evolving in a non-constant way for over two years. The clinical examination found an oroantral fistula of 10×4 mm (Fig. 1A). It might have been caused during the extraction of teeth 26 and 27, 2 years ago. No treatment was proposed. Valsalva's maneuver was unequivocally positive, with an abundant discharge of pus through the opening.

On the day of the first consultation, cleaning and drainage of the sinus through the fistula was done.

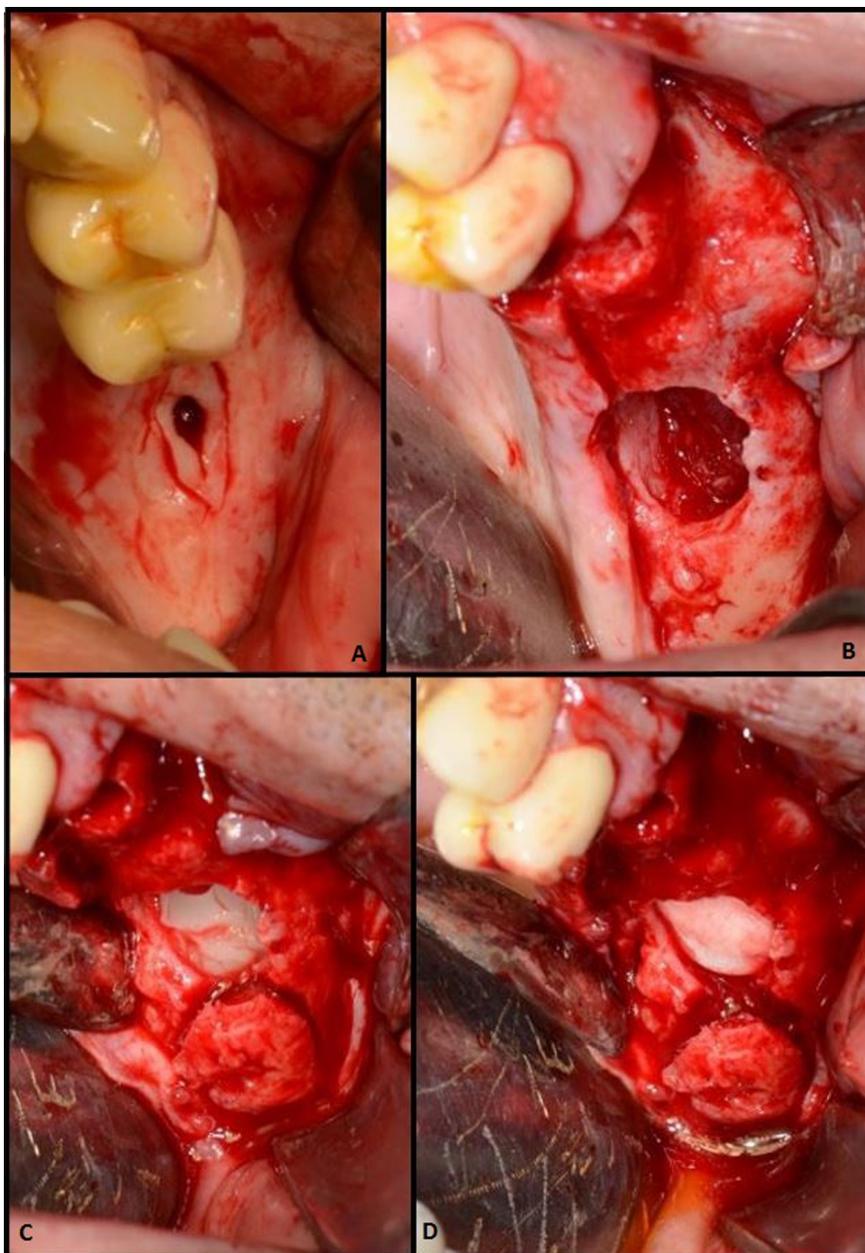


Fig. 2. (A) Incision line of the fistulectomy. (B) Mucosal detachments. (C) Graft modeling and Placement of PRF to seal the sinus mucosa. (D) Placement of the collagen membrane.

Cone beam computed tomography (CBCT) imaging revealed an oval bone defect of 13×10 mm in size, with a significant thickening of the sinus membrane (Fig. 1B). In addition, a large apical lesion was detected on tooth 25 indicating its avulsion.

The patient's immediate concern was to stop the pus discharge. In the long run, he aimed for a fixed prosthetic rehabilitation of his bilateral free-end edentulism. The only option which would fulfill these two objectives was a bone graft.

The treatment plan included bone autograft, followed by a bilateral sinus lift for implant-supported rehabilitation.

The donor site was the maxillary tuberosity ipsilateral to the fistula. Indeed, the CBCT confirmed the presence of enough

bone tissue posterior to the fistula (Fig. 1B). This avoided the use of a secondary donor site.

The operation started with fistulectomy and excision of inflammatory tissues (Fig. 2A), followed by full-thickness vestibular flap detachment. Then, a dissection of the Schneider's membrane from the sinus floor was performed (Fig. 2B).

Afterwards, the graft was shaped similarly to the defect but with a superior diameter. Then platelet rich fibrin (PRF) membranes were put into place in order to seal the defect in the Schneider's membrane (Fig. 2C). Resorbable collagen membrane was introduced to reinforce the all (Fig. 2D). The graft was harvested and impacted into the bone defect (Fig. 3A). A second resorbable collagen membrane was then fixed on it

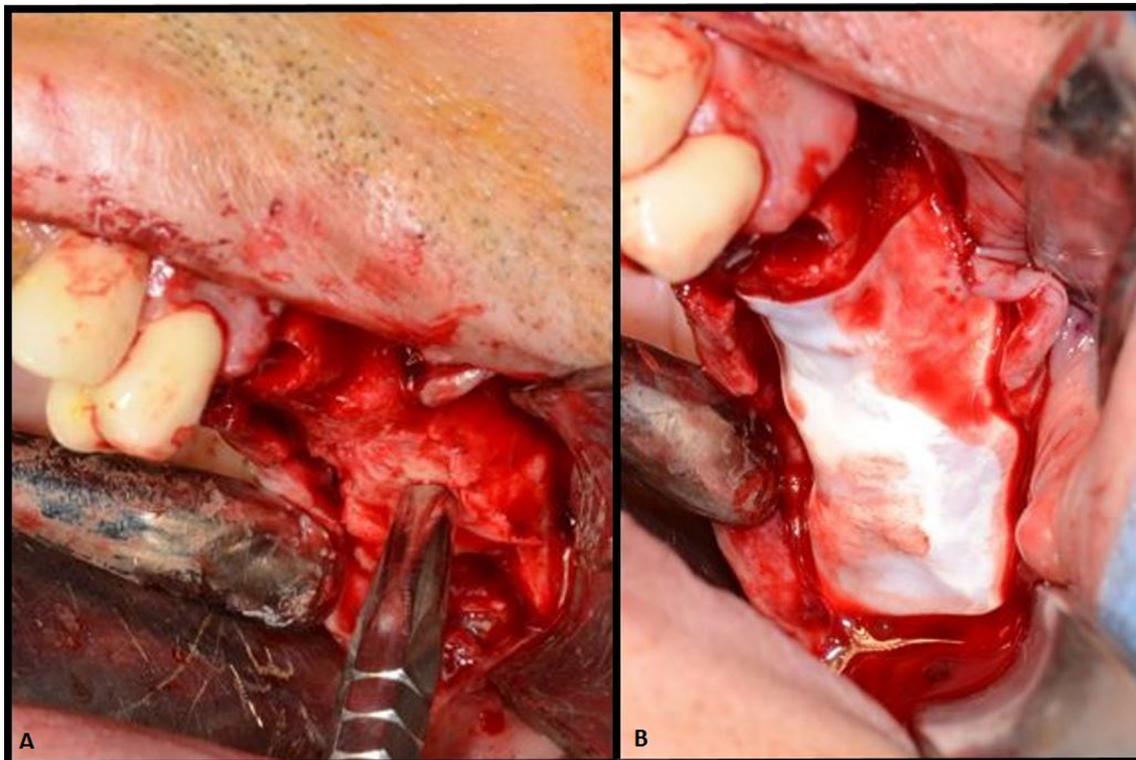


Fig. 3. (A) Graft impaction. (B) Placement of a collagen membrane over the graft and donor site.

(Fig 3B). Finally, the procedure ended with a sealed closure of the site with separate 3-0 and 4-0 resorbable sutures.

Antibiotic therapy with Amoxicillin/Clavulanic Acid (1g/125 mg) was introduced 1 week preoperatively, 3 times a day and was continued for 10 days postoperatively.

Prednisolone corticosteroid (1 mg/kg), Class 2 opioids, Chlorhexidine mouthwashes and passive washes of the nose with saline solution associated with a vasoconstrictor spray to limit local inflammation of the mucous membranes were prescribed.

Clinical follow-up was performed at first, second, fourth and twelfth weeks post-operatively.

At week twelve, the presence of an attached crestal gingiva was noted. No signs of oroantral fistula were observed (Fig. 4). CBCT showed no signs of resorption of grafted bone nor loss of bone continuity (Fig. 5).

Commentary

The literature offers many techniques for closing oronasal and oroantral fistulas. The reference remains the technique described by Rehrmann *et al.* [9], consisting of a trapezoidal vestibular flap drawn to cover the oroantral fistula. This is the way to achieve first attempt closure within 24–48 h after its occurrence. Merlini *et al.* also demonstrated the efficiency of a double flap (palatal flap covered by a semi-thick vestibular flap), among 25 patients, some of whom were followed for 10 years [10].

Noel *et al.* have even described an endoscopically pedicled nasoseptal flap for mucosal closure of oroantral fistulas [11].

When an oroantral fistula occurred more than 48 h ago, the most predictable closure technique with a complication rate of



Fig. 4. Clinical picture 12 weeks postoperatively.

16.88% [9], is the one associating a closure of the fistula by the Bichat's fat pad with a vestibular flap [9].

Many factors have to be considered when choosing the treatment: the size and location of the fistula, the prosthetic project or the general conditions of the patient. There are two ways to perform the reconstruction. On one hand, there are the techniques allowing mucosal closure of the fistula such as

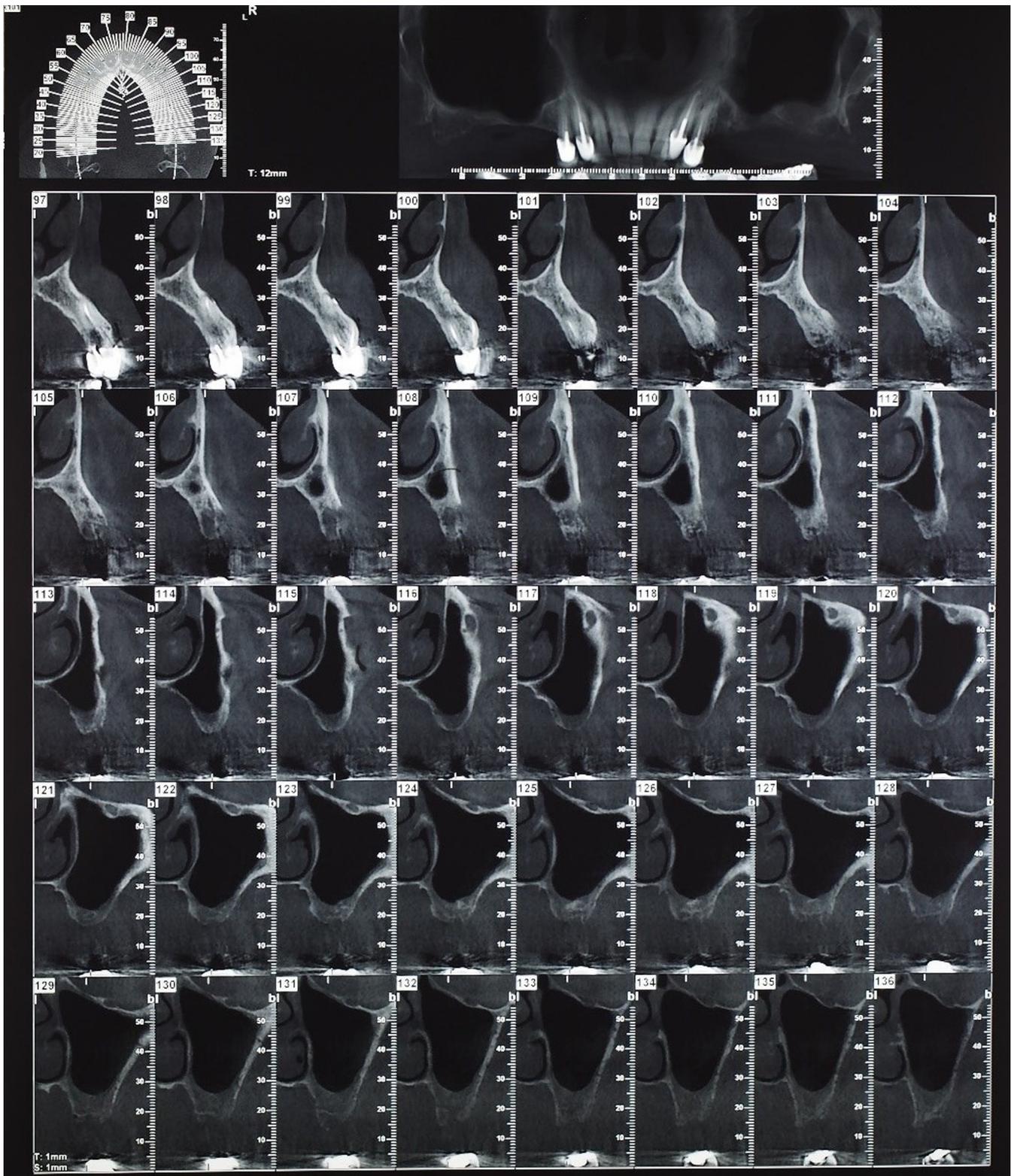


Fig. 5. CBCT at 12 weeks postoperatively.

Bichat’s fat pad, vestibular flaps, palatal flaps, mixed flaps (associated vestibular and palatal), pedicled tongue flap, all with or without PRF. On the other hand, we have surgeries for the bone defect reconstruction such as bone grafts (autograft, allograft, xenograft) associated or not with membranes.

When the patient is requesting a fixed prosthetic restoration and the dental abutments are not satisfying and/or sufficient to perform a bridge, it becomes necessary to restore the maxillary bone loss that caused the oroantral fistula.

Too large bone defects (more than 2 cm long axis) could be a problem for the viability of the graft, due to its vascularization being mainly provided by the periosteum of the vestibular flap [12].

Haas *et al.* described a case of bone reconstruction using autogenous impaction grafting. The grafts were harvested at the level of the mandibular symphysis. This allowed them to perform a sinus lift 3 months later as a part of an implant-supported rehabilitation [13,14].

Cortes *et al.* have described a case of osteosynthesis of autologous bone graft associated with a sinus lift by xenograft. Performing those procedures at the same time may seem risky, but the final consolidation has occurred properly. This has allowed them to put implants at different time frames. We need more similar successful cases in order for this technique to become a reference [15].

In the present case, more time seems necessary to ensure an optimal bone consolidation. Indeed, it's only during the sinus lift surgery that bone healing or not can really be appreciated.

According to Pripatanont *et al.*, the addition of PRF to autogenous bone grafts may enhance new bone formation. In this case, it was used for, at least, help mucosal closure of the sinus floor [16].

Many cases of mucosal flap failures, whether palatal or vestibular, can be explained by the absence of supportive bone tissue. Indeed, although the mucosal opening may appear small, the bone defect behind is always more important.

Conclusion

Reconstruction of bone loss in oroantral fistula is not always achievable. Beyond the risk of failure, it is technically more demanding. In addition, mucosal closure techniques do not always facilitate prosthetic rehabilitation. They result in a reduction of the vestibular depth with a decrease of the height of keratinized tissue. Whether fixed or removable, prosthetic restoration will always give better results in the presence of attached gingiva on sufficient bone support. In this context, reconstructing the bone loss is much more interesting.

Conflicts of interest: The authors declare that they have no conflict of interest in relation to the publication of this article.

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