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Case Report

IMPLANT INSERTION, BONE REGENERATION AND PALATAL CONNECTIVE TISSUE GRAFTING IN MAXILLARY AESTHETIC AREA: A CASE REPORT

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ABSTRACT

The restoration of tooth loss in the frontal area is challenging. Patients demand immediate restoration for aesthetic reasons. In addition, tooth loss determines alveolar bone remodeling with consequent reduction in height and thickness of the alveolar bone. Several frontal area rehabilitation techniques exist, ranging from prosthetic solutions to immediately loaded implant solutions. In this case, there is often the need to do soft and hard tissue regeneration. These techniques can be performed at the same or different times of implant insertion. A single intervention to insert the implant, regenerate bone, and increase soft tissue in a single surgical session is more complex but highly appreciated by the patient. The present work describes a case report of a patient who benefited from implant placement, guided bone regeneration, and grafting of connective tissue collected from the palate to restore an upper central incisor.

KEYWORDS: *bone, regeneration, maxilla, jaw, crest, alveolus, graft, fixture*

INTRODUCTION

Immediate post-extractive rehabilitation of loss of frontal teeth is challenging due to soft and hard tissue loss and the request for a high aesthetic solution. The therapeutic choice is guided by several factors, such as the possibility of obtaining an implant's primary stability, gingival biotype, presence/absence of vestibular bone thickness/dehiscence, and marginal bone level.

Ridge bone reabsorption after tooth extraction in the frontal area is a common situation that can compromise a proper gingival tissue level around the implant emerging profile. From this point of view, the literature shows how vestibular bone is essential to maintain the vestibular soft tissue stability of the teeth to be treated (1). In addition, it has been identified that different gingival thicknesses are strictly related to the periodontal probing depth, gingival width, and type of teeth (2). Moreover, a correlation between gingival clinical thickness and alveolar bone thickness on the labial side has been demonstrated using CBCT measurements (3); both variables are essential for proper rehabilitation. Some

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surgical techniques can be used to maintain or restore alveolar bone ridges, such as socket preservation (4), guided bone regeneration, and the tent pole technique (5). Since patients ask for an urgent solution, combining some surgical procedures (i.e., implant insertion, bone regeneration, and soft tissue grafting) in a single surgical time is possible. In these cases, patient selection is paramount since the risk of failure is higher in cases where each surgical procedure is performed at different times.

Palatal tissue graft is the most used technique for soft tissue augmentation. The connective tissue graft procedure requires harvesting soft tissue from the palate (i.e., donor site), freeing the graft from the epithelium, and applying the connective tissue in a recipient site. The choice of the donor site is guided by the quantitative requirements of the site that received the graft (6). Indeed, connective tissue graft increases the width and thickness of keratinized tissue and improves the therapy's aesthetic results (7).

The present work reports a case treated with post-extractive implant insertion, guided bone regeneration using heterologous material, and palatal harvest connective tissue grafting treated by a single surgeon (Dr. Elias El Haddad). Furthermore, pertinent literature is discussed.

CASE REPORT

At the first visit, a 53-year-old man complained about a purulent swelling at the level of the left upper central incisor (Fig. 1).

Fig. 1. *Initial stage, frontal view*

A radiographic examination revealed the development of an apical lesion with probable apicectomy performed in the past (Fig. 2). Dental probing showed no periodontal lesions around the central incisor or adjacent teeth.

Fig. 2. *Radiographic examination with the development of an apical lesion*

The clinician explained different treatment options to the patient. The choice selected by the surgeon and the patient was to extract the tooth and immediately insert an implant 4.3 x 18 mm, replace tapered with a TiUnite surface, Nobel Biocare®, perform a bone regeneration using heterologous material, and graft connective tissue harvest from the palate. After taking a pre-extraction impression, the tooth element was provisionally restored with a temporary resin crown prepared in advance by the dental laboratory.

From a surgical point of view, after performing local anesthesia with adrenaline, the tooth was extracted, and a flap from the upper right central incisor to the upper left cuspid was lifted without a vertical incision. Then, a dehiscence in the vestibular bone plate was visible (Fig. 3).

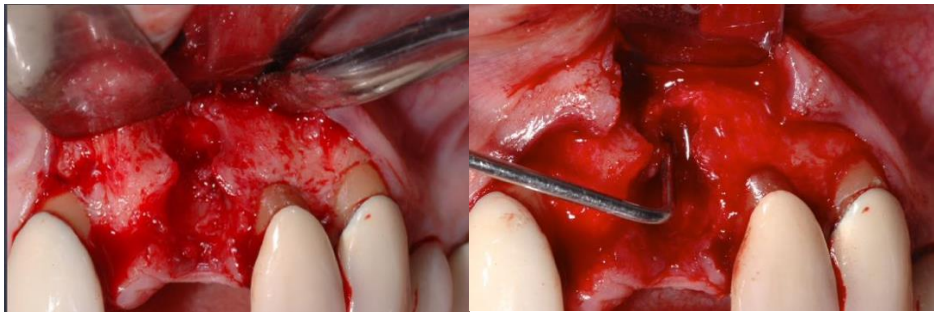

Fig. 3. *In the first photo, we can see the flap's realization and the vestibular bone's dehiscence in the following photo.*

The alveolus was cleaned by granulation tissue, and the implant was inserted. The implant surface was out of bone in the vestibular area for about 8 mm (Fig. 4).

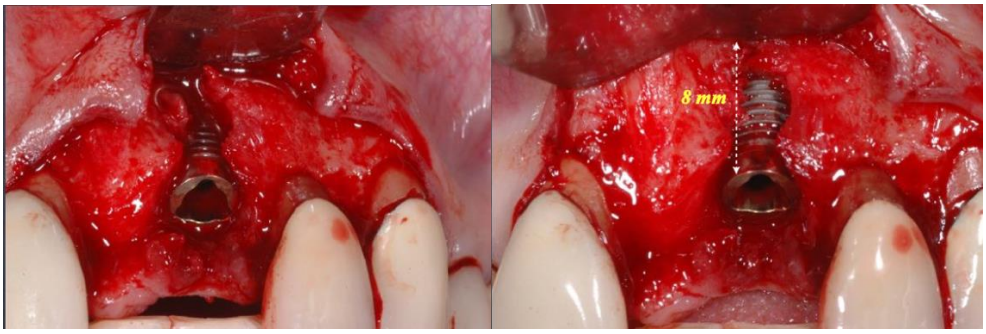

Fig. 4. *Implant positioning and vestibular dehiscence.*

Notably, the implant's surface was under the vestibular bone profile, a condition that makes bone regeneration ideal. A temporary crown was placed before proceeding with the reconstruction of hard and soft tissues. A cemented temporary crown was chosen to manage the restoration's aesthetics better.

A standard abutment was connected to the implant, leaving a space of 2 mm between it and the lower teeth to have the space for to create a correct occlusal crown. Afterward, our temporary crown was checked for occlusion in a nonfunctional way and finished to prevent over-contours and excess resin. It was polished and then cemented with a layer of temporary cement (Fig. 5).

Fig. 5. *Placement of a cemented temporary crown on the implant.*

Once this phase was completed and the excellent stability of our implant was verified (by tightening and loosening the abutment screw), the surgeon proceeded with the reconstruction of hard and soft tissues. A connective tissue

graft was taken from the palate side of the same surgical field. It was unnecessary to reach the molar area to collect the palatine connective tissue, which was preserved in physiological saline solution (Fig. 6).

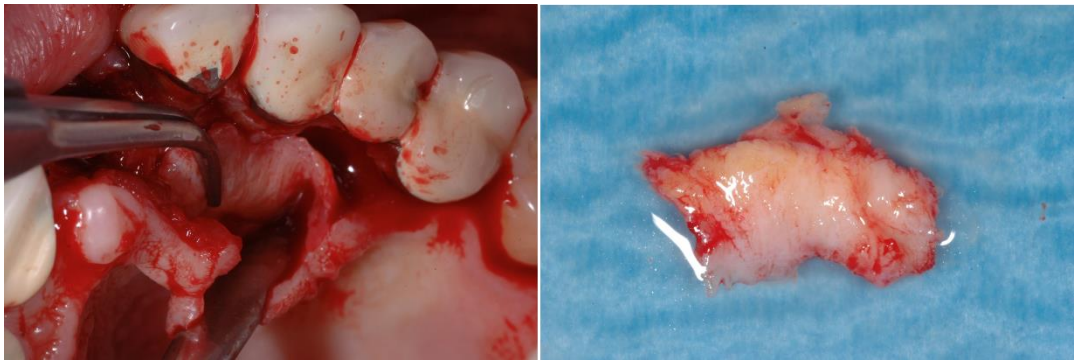

Fig. 6. *Connective tissue graft taken from the palate*

The vestibular bone defect was filled with a granular graft material of bovine origin, which was then covered with platelet-derived membranes (Fig. 7).

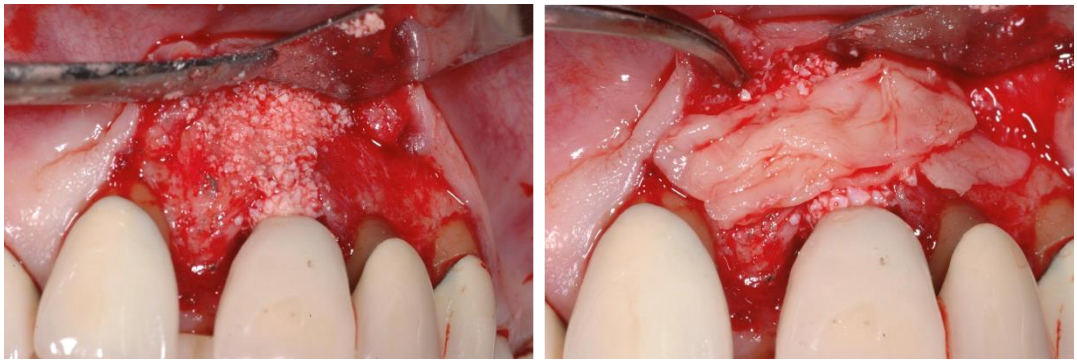

Fig. 7. *Granular graft material of bovine origin and platelet-derived membranes*

Above the bovine-derived granular graft material, the connective graft was positioned and sutured with the primary flap (Fig. 8).

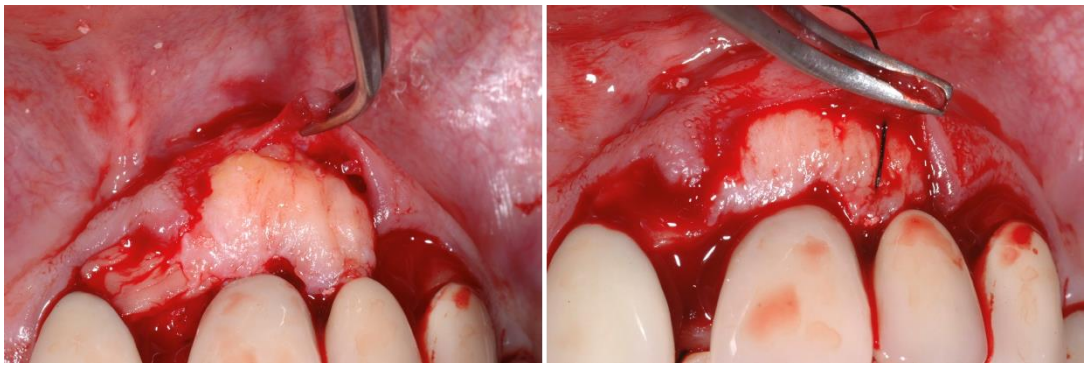

Fig. 8. *Positioning of the connective graft and suture with primary flap.*

An X-ray was performed to check implant positioning and prosthetic rehabilitation, and the patient was discharged with antibiotic therapy (i.e., amoxicillin and clavulanic acid), a chlorhexidine-based mouthwash, and a pain reliever (Fig. 9). One week later, the sutures were removed (Fig. 10).

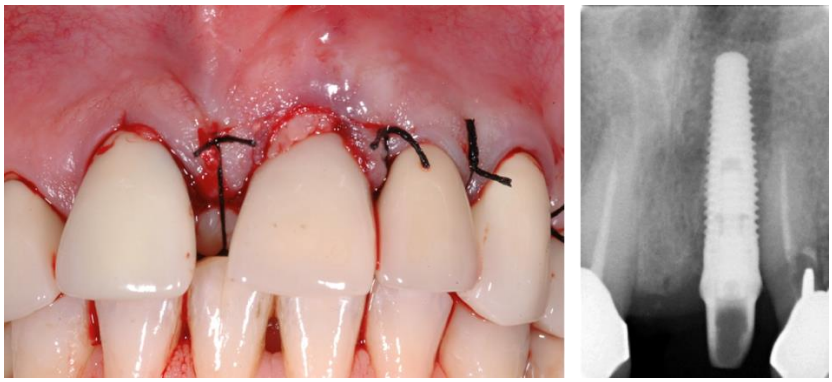

Fig. 9. Clinical and *X-ray control*

Fig. 10. *Suture removal after one week.*

After three months, the provisional restoration was finalized with a ceramic crown (Fig.11). Fig. 12 shows the clinical and radiological checks before and after the treatment.

Fig. 11. *Ceramic prosthesis.*

Fig. 12. *Clinical and radiological check before and after the treatment.*

A 9-year follow-up CBCT control was performed to better evaluate the vestibular bone regeneration outcome (Fig. 13).

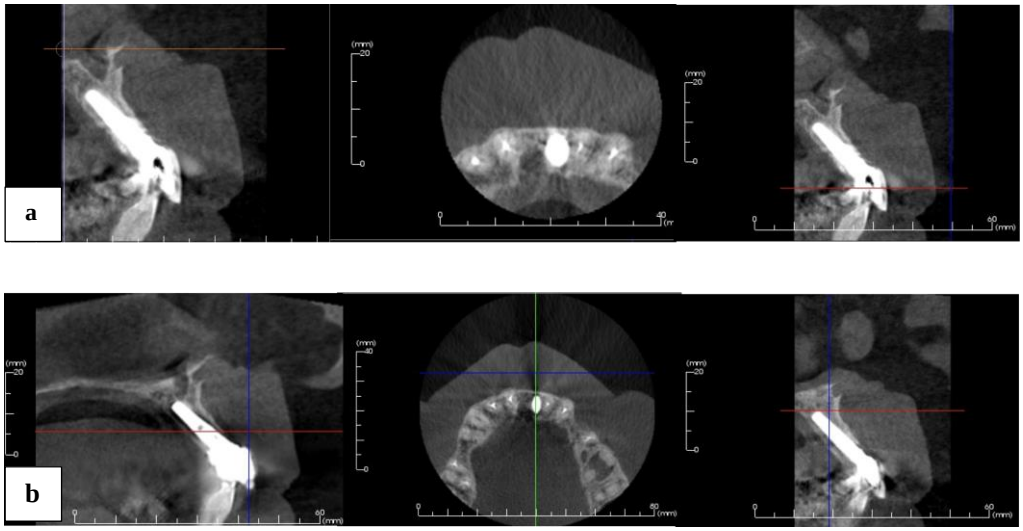

Fig.13. *9-year follow-up with CBCT investigation. A): Immediately after surgery; B): Nine years after surgery.*

DISCUSSION

For a long time, research in the implant field focused on peri-implant bone, as it claimed that quality and quantity of hard tissue were the main criteria for success (8). Therefore, before placing an implant, it was essential to have adequate bone volume, and this could be achieved through various conservation and ridge augmentation procedures (9).

The critical factors for implant success have always been crestal bone loss (10) and primary implant stability (11), while the importance of peri-implant soft tissue has often been overlooked. Recently, scientific evidence has shown that peri-implant soft tissue is critical to maintaining peri-implant health (12). Several publications evaluated the importance of soft tissues at dental implant sites from both a biological (13-15) and esthetic perspective (16, 17).

The anatomy of peri-implant mucosa and gingiva are different according to several factors. First, there is a difference in the connective tissue fibers that do not attach to the implant (18). In addition, the implant site has reduced vascular supply (19), and the junctional epithelium around implants is more permeable (20). Maintaining an adequate quantity and quality of mucosa around peri-implant bone is essential to promote peri-implant health (21).

Connective tissue grafts have become an essential part of periodontal reconstructive surgery, and several techniques are available to harvest a suitable connective tissue graft (22). For immediately loaded implants, strong evidence suggests that their placement and simultaneous bone grafting should be combined with soft tissue grafting to

counteract postoperative remodeling processes. Adding a connective tissue graft has been shown to improve aesthetics and reduce the formation of peri-implant soft tissue recessions (23-25).

The reported case with a 9-year follow-up strengthens the importance of connective grafting in conjunction with bone regeneration at the time of implant insertion.

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