



## **Anterior Maxilla Rehabilitation with Implants, Subepithelial Connective Tissue and Alloplastic Bone Grafts: A Case Report**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Authors AGP and CDP performed the prosthetic rehabilitation of this clinical case and wrote the first draft of the manuscript. Authors GMON and LABB performed the surgical procedures. Authors ACP and MAC managed the literature searches and wrote the final draft of the manuscript. All authors read and approved the final manuscript.*

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**Case Study**

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### **ABSTRACT**

The prosthetic rehabilitation of anterior teeth with osseointegrated implants is still a challenge in implantology. To avoid aesthetic complications in areas with bone or mucosal defects, it is often necessary to use bone and soft tissue grafts with the implants. This article describes the surgical and prosthodontic approach to such a patient where removal of the maxillary central incisors was

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performed and implants were immediately placed. To avoid the loss of bone and mucosal tissues, alloplastic bone graft and subepithelial connective tissue grafts were used. The prosthetic phase of treatment was performed after the period of osseointegration period, allowing for aesthetic harmony between the prosthesis and gingival tissue.

*Keywords: Dental implant; alloplastic bone graft; subepithelial connective tissue graft.*

## 1. INTRODUCTION

The prosthetic rehabilitation for the anterior jaw regions is still a challenge to implant placement [1]. Unfortunately, dental extractions in these areas result in significant resorption of the alveolar ridge [2,3]. The immediate placement of implants into the extraction sites is considered to be a viable approach to prevent or minimize the amount of bone resorption [2]. However, a space between the wall of the bony crest and the implant is quite commonly formed after the implant is placed [4]. In such situations, if the space is larger than 1.25 mm, the bony defect will not fill with bone unless bone regeneration techniques or bone grafts are placed [5].

Furthermore, any procedures performed in the aesthetic anterior regions should always minimize changes in the soft tissues [6]. The subepithelial connective tissue graft (SCTG) has been widely used with implant placement to enhance the aesthetic results. SCTG procedures are also used to enhance esthetics associated with defective alveolar ridges, to create alveolar ridge seal after immediate implant placement following tooth removal, to treat gingival recession, and for interdental papilla construction [6-8].

This article describes combining both alloplastic bone graft and SCTG in the surgical approach to the anterior maxilla and prosthodontic rehabilitation with implants inserted immediately after the teeth were removed.

## 2. CASE REPORT

The patient was a 58-year-old female who presented to the São Paulo State University (Unesp), School of Dentistry, Araraquara, SP, Brazil, complaining of cosmetic problems and mobility of her maxillary anterior teeth. On clinical and radiographic examination (Fig. 1 and Fig. 2) bone loss was noted in the region of teeth 7 to 10 and tooth 10 with a lateral root perforation by a metallic pin that was inappropriately placed. All teeth were moderately mobile with greater than 1

mm displacement. Impressions of the maxillary and mandibular arches were made to make study models and for a diagnostic wax-up of the case. Based on the diagnostic waxing, the removal of teeth 7, 8, 9, and 10 and the immediate insertion of two implants in the regions of teeth 8 and 9 followed by fabrication of a fixed prosthesis was planned.



**Fig. 1. Initial clinical aspect of patient**



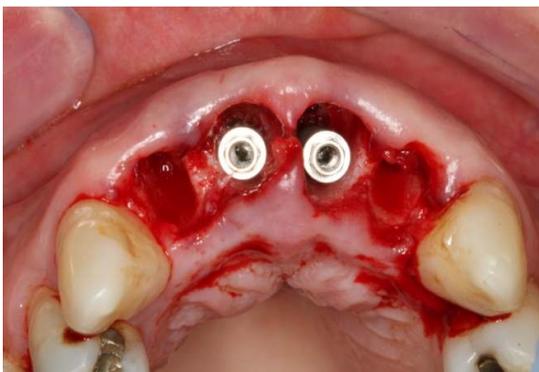
**Fig. 2. Initial radiographic aspect of patient**

The surgical procedure was performed under local anesthesia. After the extraction of teeth 7, 8, 9, and 10, a pre-made surgical guide was used to place the implants in proper alignment. (Fig. 3). Two implants (Conexão Sistema de Prótese Ltda, Arujá- SP, Brasil; diameter of 3.75 mm, length of 13 mm) were then inserted in the

region of the central incisors (Fig. 4). Due to the need of maintaining the volume of the alveolar ridge an alloplastic bone graft was placed to fill the gap between implant and bone (Bio-oss, Geistlich Pharma do Brasil, São Paulo – SP, Brazil) (Fig. 5) Next, using a surgical guide to establish proper tissue graft dimensions, an approximately 1.5 mm thickness SCTG matching the length and width of the recipient site was harvested from the palate by means of a single-incision technique in order to augment the keratinized gingiva [6,8] (Fig. 6). A full-thickness mucoperiosteal envelope flap was created between the labial bony plate and the gingiva over the extraction site to better expose the bone graft then the grafted soft tissue was placed to cover the grafted bone. The flap, itself, was then repositioned over the graft and secured with sutures.

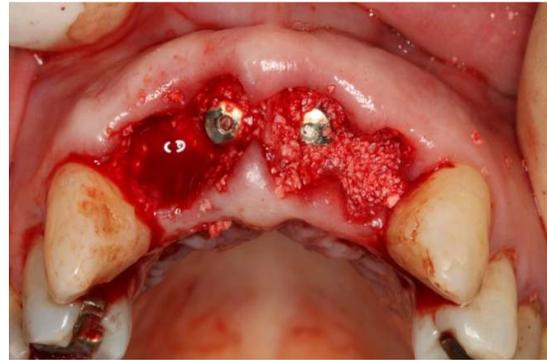


**Fig. 3. Surgical guide**

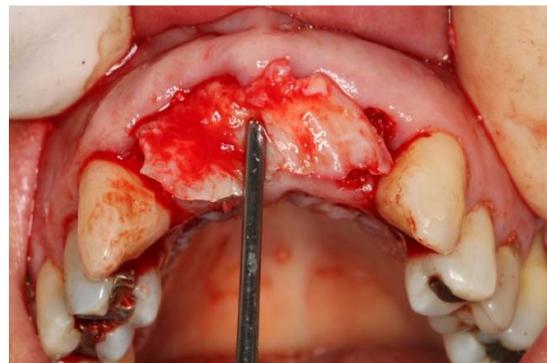


**Fig. 4. Installed implants - occlusal view**

A previously prepared provisional prosthesis was cemented to teeth 6 and 11 (Fig. 7). Postoperative medications included oral analgesics, antibiotics, and a daily mouth rinse with 2% chlorhexidine.



**Fig. 5. Inorganic bone grafts**



**Fig. 6. Subepithelial connective tissue removed from the palate**



**Fig. 7. Provisional crowns immediately after the surgery**

At the six months, postoperative examination it was found that the temporary crowns were being well-tolerated by the soft tissues in the anterior surgical site (Fig. 8). Healing abutments were placed and after seven days impressions were made. A new temporary prosthesis was fabricated and cemented to two provisional customized abutments. Three months later, impressions were made to obtain a working

cast. New metallic abutments were customized and a metallic framework made for the four planned crowns. After the abutments were installed a framework try-in was made and the porcelain crowns built on the framework. After the metal-ceramic try-in and with the approval of the patient, final cementation of the fixed prosthesis was made (Fig. 9). Fig. 10 is a radiograph made at two years after completion of this case.



**Fig. 8. Provisional crowns 6 months after the surgery**



**Fig. 9. Final appearance of the prosthesis after cementation**



**Fig. 10. Radiographic aspect 2 years after the treatment**

### 3. DISCUSSION

For many years, the success of dental implant treatment was based solely on the predictability of the osseointegration and the functional rehabilitation of mastication. However, the concern of the majority of, if not all, patients is now more directly related to aesthetics, bringing a new challenge for the profession.

A minimum amount of bone width and height is an essential prerequisite for the longevity and success of implant treatment [9-11]. Aesthetic restorations supported by implants in the anterior jaw pose several clinical challenges, among them the need to preserve or restore the peri-implant architecture of the soft and hard tissues around the implant site [12].

In our clinical case, a circumferential gap defect larger than 1.25 mm was observed between the wall of the bony crest and the implants (Fig. 4). The defect made it necessary to perform an allogenic bone graft to fill the defect in order to ensure implant osseointegration followed by a SCTG harvested from the palate region to maintain tissue contours around the implants [3,5,6,8].

Another treatment alternative would be the addition of platelet-rich plasma (PRP) to the bone graft. High concentrations of platelets in a bony wound increase the local concentration of secreted growth factors and also increase the initial bone-healing response. The direct influence of PRP will diminish with time but the physiological mechanisms of bone repair will continue to work at an accelerated level [13]. However, this additional step was not considered to be necessary for success of this case.

SCTG for immediate implant placement and provisionalization procedures has been effectively documented. Chung et al. [8] evaluated clinically and radiographically facial gingival stability following single immediate tooth replacement in conjunction with SCTG in ten patients. At 1 year, 9 of 10 implants remained osseointegrated with the overall mean marginal bone change of -0.31 mm and a mean facial gingival level change of -0.05 mm. The papillary index score indicated that at 12 months after surgery more than 50% of papillary fill was observed in 89% of all sites. Kan et al. [6] reported that SCTG simultaneously grafted with immediate implant placement is able to maintain existing bone levels as well as improve gingival

architecture, gingival quality, and quantity. Tsuda et al. [7] also evaluated the peri-implant tissue response following extraction and immediate implant placement and restoration in conjunction with a SCTG and bone grafting. After one year, it was observed that all implants were osseointegrated, with a mean marginal bone change of +0.1 mm and a mean facial gingival level change of -0.05mm. Leziy et al. [14]. reported successful tissue enhancement when connective tissue graft was performed at the time of implant placement or abutment connection.

In this clinical case, the aesthetic and functional results of the SCTG were satisfactory because we were able to maintain the biological advantages of the technique such as a good nutritional blood supply to the graft and providing a satisfactory level of keratinized gingival thickness. A disadvantage of SCTG is the need for a second surgical site. However, leaving palatal donor epithelium with a base of connective tissue will allow the site to heal more quickly by primary intention thereby minimizing post-surgical complications [15,16].

Various techniques and materials are recommended to augment soft tissue volume prior to or simultaneous with implant placement, during the healing stage of the implant, at the time of abutment connection, or after the insertion of the prosthesis [17]. Considering the variety of materials used for augmenting soft tissue volume, the SCTG is still considered to be the gold standard and contributed to the successful outcome of our case [18].

#### 4. CONCLUSION

The SCTG combined with a bone graft can help contribute to long-term implant survival. This technique allows for maintaining the gingival tissue architecture and providing for the rehabilitation of occlusal and aesthetic functions.

#### CONSENT

All authors declare that written informed consent was obtained from the patient for publication of this paper and accompanying images.

#### ETHICAL APPROVAL

It is not applicable.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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