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Case Report

Rehabilitation of a Severely Atrophic Mandible with Appositional Autogenous Graft and Immediate Implant Placement: A Case Report

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Abstract

Although several materials are used as bone substitutes, the gold standard is autogenous bone, especially in cases where implants are placed concomitantly at the moment of bone graft, whether bone blocks or particulate, as guided bone regeneration. This case report describes a mandibular fixed rehabilitation, based on the All-on-4 concept, where four implants were placed at the moment of the bone graft, which were harvested in high from the patient's mandible. All implants showed excellent initial stability (40 to 80 N/cm), nevertheless, we waited 3 months before starting the prosthetic steps to allow osseointegration and graft healing. At the moment of the reopening, the abutments were placed and the procedures for the fabrication of the fixed immediate load prosthesis were started, which was placed in 72 hours. Passed 3 months from the placement of the prosthesis, a tomography was taken to certify the good integration of the hard tissues and the implants. The technique of placing the implants at the moment of the autogenous block graft demonstrated to be reliable and easy to handle. This technique should be more used and studied, due to its advantages of a shorter treatment time and less surgical interventions, thus providing more comfort and better acceptation by patients.

Keywords: *Rehabilitation; Atrophic Mandible; Appositional Autogenous Graft*

Introduction

Regarding biomaterials for horizontal reconstruction of atrophic ridges, the autogenous bone is still the gold standard, once it provides better results in terms of quality and maintenance of the volume for subsequent placement of implants [1]. Though the high level of predictability of autogenous grafts, their biggest limitation is the diminished bone quantity of both the donor and receptor sites, thereby limiting the extension of the reconstruction and its revascularization level, respectively [2].

Factors like morbidity of the harvest, number of surgical procedures and time of treatment are barriers for the acceptance of autogenous reconstructions by patients. Thus, surgical alternatives seek for the placement of the implants and appositional grafts at the same surgical moment.

This case report describes a rehabilitation of a severely atrophied mandible, where an appositional autogenous graft was realized through reduction in high of the patient's interforaminal mandibular ridge, hence reaching proper thickness to place the implants at the same surgical moment, with further rehabilitation with a fixed implant-supported prosthesis.

Case Report

A male patient, 72 years old, wearing a maxillary denture and a mandibular removable partial prosthesis supported by extruded and periodontally compromised teeth, attended to the Brazilian Dentists Association-Florianopolis-searching for treatment with implants to

place fixed implant-supported restorations. At the moment of the CT examination, it was noticed that the patient did not have adequate bone thickness to place 4 implants and a fixed implant-supported restoration, however had excessive bone high in the mandible (Figure 1 and 2). The patient had a class III profile and a slight lip asymmetry while smiling.

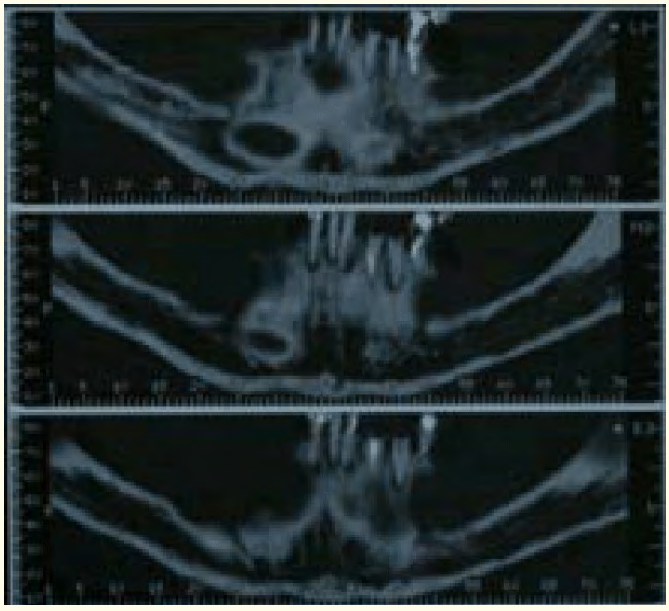

Figure 1: *Panoramic view of the tomography.*

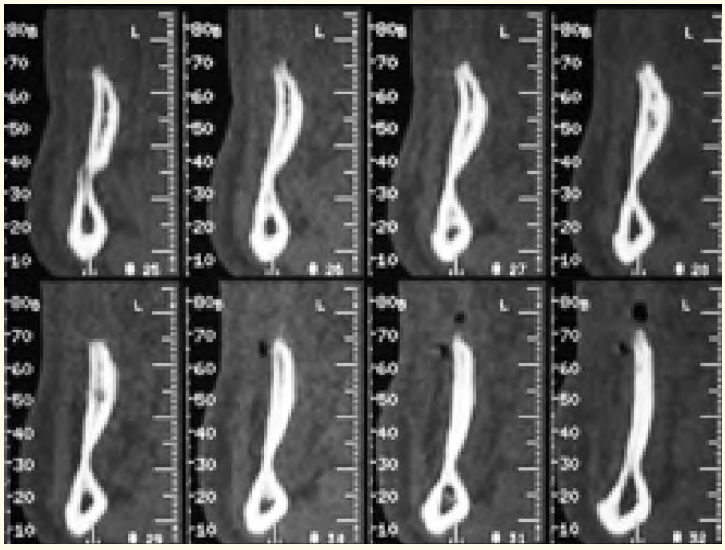

Figure 2: *Mandible sagittal sections.*

For this case, a reduction in high of the mandible was planned. The harvested block was fragmented for adaptation in the patient's interforaminal region for the placement of 4 implants at the same time, aiming for healing of the graft and osseointegration at once, decreasing the treatment time and number of surgical interventions. The next steps are the reopening and fabrication of the implant-supported restoration.

The patient was medicated with 2g of amoxicillin and 8 mg of dexamethasone, 1 hour before the surgery. Extra and intraoral asepsis were carried out with 0.2% and 0.12% chlorhexidine solution, respectively. To assure a more comfortable procedure for the patient, a physician performed intravenous sedation with midazolam and propofol. Local anesthesia was induced, blocking the inferior alveolar nerves bilaterally, and infiltrations in the mucosa and anterior region with 2% articaine. After extraction of the residual teeth, a supracrestral incision was made with a #15 scalpel blade from the left to the right retromolar region and a flap was developed to expose the mentonian foramen. In the region anterior to the foramens the bone was exposed to the base and with a diamond disc a side-to-side cut was performed, removing the exceeding bone above the foramens in a single piece (Figure 3).

Figure 3: *Bone block harvested from the mandible.*

The bone was then divided to form 2 blocks, one for each side of the mandible. They were prepared with perforations in the side that would be in contact with the receptor site, which was also perforated, and fixed with 2 fixation screws, accordingly to Raghoebar., *et al* [3]. After the stability of the blocks was verified, they were perforated to the placement of four 3.75 x 13 mm morse taped implants (AR-Morse, Conxexão Sistemas de Prótese, Arujá, SP, Brazil) (Figure 4), for better stress distribution [4]. The implants were at the bone level and their direction was guided by the maxillary rehabilitation plan, all with a torque between 40 and 80N/cm (Figure 5). The patient remained without the maxillary denture during all osseointegration period.

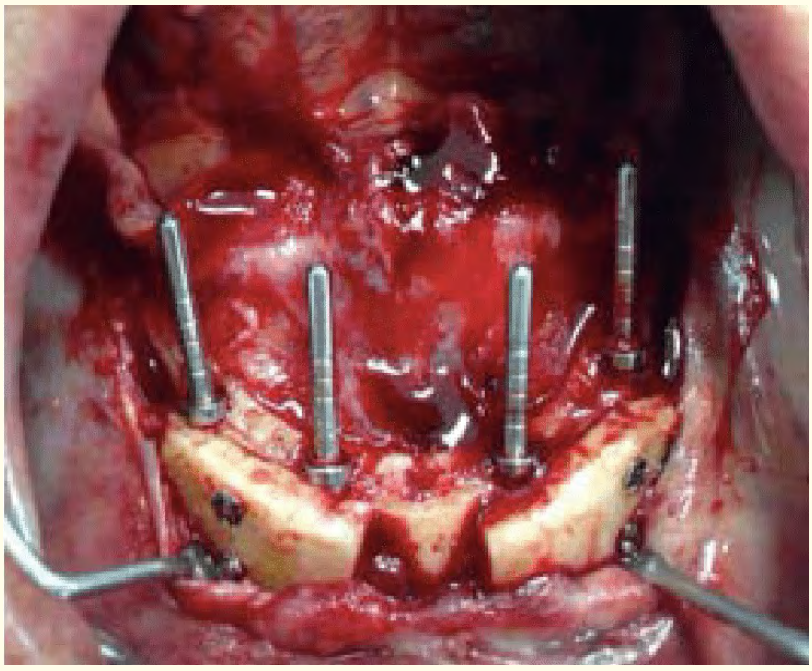

Figure 4: *Bone Blocks placed with guide pins in position.*

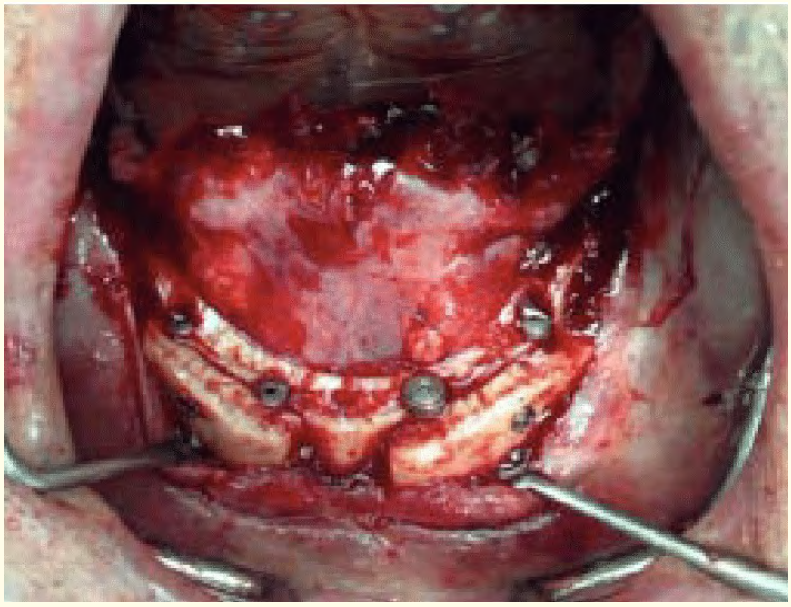

Figure 5: *Implants placed.*

After a 3-months healing period, the reopening surgery was conducted to assess the appositional grafts and implants osseointegration and the fabrication of the implant-supported restoration was started (Figure 6). Once clinical success was confirmed for implants and grafts, the blocks fixation screws were removed and the abutments were placed over the implants with a 20N load torque and suture with polyglactin 910 (Vicryl, Ethicon Inc., Cornelia, GA, USA) (Figure 7). Continuing, an impression of the abutments was taken with them splinted and with an open tray, to ensure more precision [5]. In the same day the metallic bar and the wax physiognomic reconstruction was tried. In the day after, the teeth wax try-in was performed and functional and esthetic adjustments were made. Finally, in the third day, the fixed implant-supported restoration was placed and the screws tightened with 10N/cm. The screws access holes were closed with polytetrafluorethylene tape and composite (Bioplic, Biodinâmica, Ibiporã, PR, Brazil). Finished the maxillary rehabilitation a maxilomandibular tomography was taken (Figure 8-10).

Figure 6: *Reopening of the implants.*

Figure 7: *Mini conical abutment protection cylinder.*

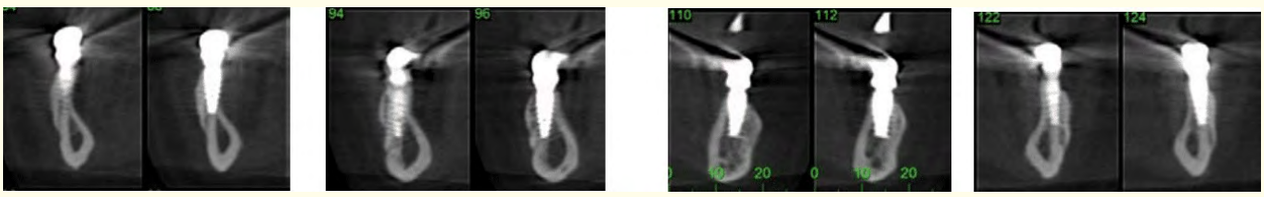

Figure 8: *Tomography sections 3 months after placement of the fixed restoration.*

Figure 9: *3 months after treatment finished.*

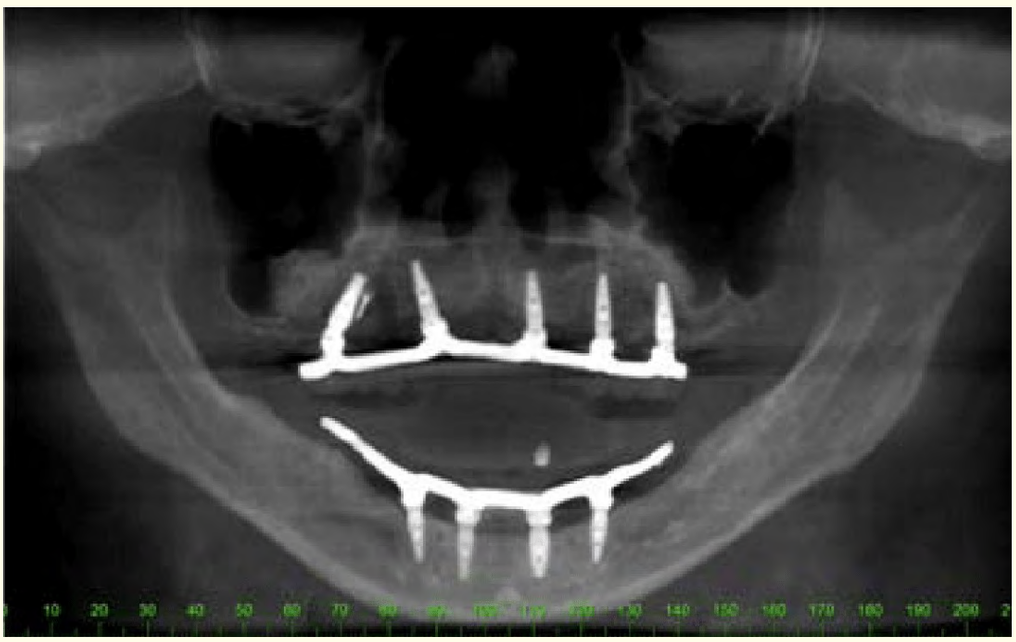

Figure 10: *Panoramic view 3 months after treatment finished.*

Discussion

The rehabilitation of edentulous arches was overcome a long time ago. With the advent of osseointegration and its advances, the challenge now is to rehab cases of severe atrophy, whether vertical or in thickness, with a shorter treatment time, simplified techniques and

less surgical interventions, which may expose patients to infections and failures. The best material to reconstruct intraoral bone defects is, without doubt, the patient's own bone, and always when possible from the oral cavity, thereby avoiding hospitalizations, extra costs and possible sequels caused by bone removal from extra oral regions like the iliac crest or skullcap. The mandible, when possible, is always our best donor site [1] due to the easy access and quantity of bone whether to blocks or particles [6]. The use of 4 just implants to rehab an arch also was studied and well documented either for immediate load cases [7,8] and late load [9,10]. In this case the 4 implants were placed in parallel because after the mandibular reduction, the mentonian foramen was placed too close from the bone crest, not allowing the placement of the inclined distal implants. In cases where it is possible, we can opt for inclining the distal implants, reducing the lever arm behind the last implant, without biomechanical damage [11,12].

Nevertheless, in this case, the most interesting fact was the placement of the implants at the same time of the bone graft, reducing the treatment time and surgical interventions. This technique was already successfully documented in partial cases [13-15], but we cannot found casuistic for total mandibular rehabilitations like this situation. Isaksson and Alberius in 1992 [16] related an 83% success in cases of simultaneous placement of implants in maxilla, but with grafts from the iliac crest. Nystrom., *et al*. in 2004 [17] found the same percentage with the same technique in maxilla. In mandibles, Van der Meij., *et al.* in 2005 [2], reached 88% of success in an average period of 4.3 years, with iliac crest blocks grafts in mandibles with simultaneous placement of 2 implants for further fabrication of overdentures. In a systematic review from 2011, Clementini., *et al*. [18] concluded that the percentage of success of implants placed in grafted areas with autogenous bone is similar to those placed in native bone, then, onlay grafts are predictable to enable placement of implants in atrophic areas. However, they warn that there are no many studies with adequate methodology to compare the success of the simultaneous technique and control groups and tested, standardized criteria to assess the success of the treatment, fact that we observed.

Rammelsberg., *et al*. in 2012 [19] found the same percentage of success in treatments with and without simultaneous placement of implants to some type of ridge augmentation with autogenous bone. However, Lundgreon., *et al*. in 1999 [20], concluded that implants placed non-simultaneously with the graft had more contact with the bone than the ones which were placed simultaneously, although the research was made with short dimension implants (2 x 5 mm). Rasmusson., *et al*. in 1999 [21] also found higher stability in implants placed non-simultaneously with the graft, despite finding the same bone-implant contact level and same removal torque of the simultaneously placed.

Once there are basically no statistical differences between success in treatments with and without immediate load in the implants, and is acknowledged that with a minimum of 30 N we may use immediate load in total rehabilitations [5]. Even overtaking placement torques higher than the minimum recommended by the literature, we found to be safer to wait the integration of the bone tissue and the implants before rehabilitating the patient. During the reopening we noticed that in some implants a small bone loss occurred, without compromising the stability or the esthetic, as reported by Peñarrocha-Diago., *et al*. in 2013 [15]. Van der Meij., *et al*. in 2005 [2] also found a mean reabsorption of 15% in block grafts.

In a study based on quantitative radiology from 2000, Verhoeven., *et al.* [22] concluded that in the first 6 months of simultaneous placement of implants in block grafts in mandible, the graft loses cortical thickness, and in the following 6 months it increases its cortical and medullar density. Our case had similar behavior.

Conclusion

Based on the literature, the placement of implants at the same time of the autogenous appositional bone graft is an easy to manage alternative, with verified success. This approach reduces the number of interventions and the time of the treatment, favoring the acceptance of patient's who require bone thickness augmentation prior to implants placement. We recommend more studies of total rehabilitation cases like this to better verify the long-term success of the technique.

Conflict of Interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

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