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Clinical case

GUIDED BONE REGENERATION USING BONE SUBSTITUTES AND TITANIUM MESH.

REGENERACIÓN ÓSEA GUIADA UTILIZANDO REEMPLAZOS ÓSEOS Y MALLA DE TITANIO.

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RESUMEN

El objetivo del presente trabajo es presentar un caso clínico de regeneración ósea guiada utilizando reemplazo óseo asociado a malla de titanio como elementos de distracción osteogénica y factor de exclusión celular. Se han utilizado maniobras clásicas de apertura de colgajo, perforación ósea para promover la nutrición tisular y fijación de la malla de titanio para el mantenimiento del injerto óseo evitando la competición tisular. Los resultados de la técnica de injerto óseo se pudieron observar en las comparaciones con los exámenes tomográficos previos al implante e injerto, y en la evaluación clínica al momento de la instalación de los implantes durante la segunda etapa quirúrgica. En conclusión, se observó una excelente formación ósea, capaz de ser sometida a la instrumentación y fresado además de anclar los implantes con torque adecuado para la oseointegración.

Palabras clave: Implante dental, regeneración ósea, biomateriales, malla de titanio.

ABSTRACT

The aim of this study was to present as clinical case of guided bone regeneration using bone substitutes asdsociateddd with titanium mesh as driving elements and osteogenic cell exclusion factor. Were used maneuvers classic opening flap, cortical perfurations to promote nutrition for bone tissue and titanium mesh fixation for graft bone tissue avoiding competition. The results of bone grafting technique could be observed in comparison with CT scans pre-implantation and pre grafting, and clinical assessment at the time of implant place-ment during the second surgical procedure. In conclusion, we ob-served an excellent bone formation, that could be subjected to drill-ing instrumentation in addition to anchoring implants with adequate torque for osseointegration.

Keywords: Dental implant, bone regeneration, biomaterials, titanium mesh.

INTRODUCTION

Alveolar bone defects after extraction are morphological alterations that affect all ridges, regardless of the surgical technique and trauma involved in the procedure[1,2]. The alveoli remodeling and scarring process necessarily cause a decreased alveolar volume, sometimes causing changes that can, to a certain extent, promote aesthetic and functional damage to dental rehabilitations[1,2,3,4].

In oral rehabilitations using dental implants, the soft tissues appearance and aesthetics are as important to the final results as the physical conditions of the own implant-supported restoration[5,6]. Therefore, the maintenance or recovery of hard and soft tissue peri-implant should be a constant concern[7,8].

One of the current goals to be achieved in the implants placement is, therefore, the prostheses production, which in addition to being biologically healthy should aesthetically satisfy the patient aspirations[7,8,9]. Therefore, the entire therapeutic process must be guided so that the future prosthesis can have a natural and harmonious condition with the teeth and its surrounding tissues[10].

Yet, the best material for the alveolar reconstruction is the autogenous bone, considered as the gold standard. Grafting lose a great part of its cell vitality, but are re-vascularized and

great part of its cell vitality, but are re-vascularized and incorporated into the receiver bed, what allows the implants osseointegration. The disadvantage is that its obtainment requires a second surgical site, which increases the procedure morbidity[10,11,12,13,14].
As that circumstance is a crucial factor in the technique choice, surgical alternatives are taken into consideration relying on various scientific studies on biomaterials biocompatibility, osteoconduction and biotolerance[11,12,13,14,15].

In particulate form or in blocks, biomaterials imitate a bone structure in such a way that osteoprogenitor cells can be fixed and differentiated multiplying on its structure, promoting the matrix and bone tissue formation[11,12,13,14,15,16].

In addition, its morphology does not ensure the volumetric structural condition, and needs an artifact that contains the material and avoids the fibroblastic tissue competition with the clot lodged between the grafting particles11,13. For that, barriers (membranes) are studied so that they provide a suitable environment for the bone regeneration guided by biomaterials. These barriers can be absorbable or non-absorbable, of collagen or polytetrafluoroethylene, with titanium or without it, respectively[12,14,15,16,17].
This case report describes a methodology for using biomaterials associated with the titanium mesh as a barrier for the bone regeneration, prior to the implant placement, in order to give back a better alveolar condition, leading to a better positioning of osteointegrating implants.

CLINICAL CASE REPORT

Patient F.C.J., with melanodermia, 48 years old, male, ASA I, was presented with several dental elements absence, however, with major complaint in the 23, 24, and 25 region. In the clinical examination a decreased alveolar volume was observed in the concerned region, showing an intermediate gingival biotype. In the CT scan, a bone amount is noticed where it is possible to place several implants, still in a palatinized condition regarding the neighboring elements (Figura1).

The patient was premedicated with 2g of Amoxicillin one hour before the surgery, and 4 mg of Dexamethasone. The procedure was preceded by local asepsis with 0.20% chlorhexidine and infiltrating local anesthesia with articaine at 4%. An incision was performed in the bone ridge with relaxing mesial and distal incisions, and flap lift for the bone defect total view (Figure 2). An exodontia of element 26 and drillings in the vestibular cortical bone of 23, 24 and 25 regions were performed for the endo bone nutrition (Figure 3).

Then the titanium mesh prior fixing was made (Surgitime Titanium, Bionnovation, Bauru, SP), for the subsequent positioning of Bonefill biomaterial of medium granulation (Bionnovation, Bauru - SP) (Figures 4 and 5).

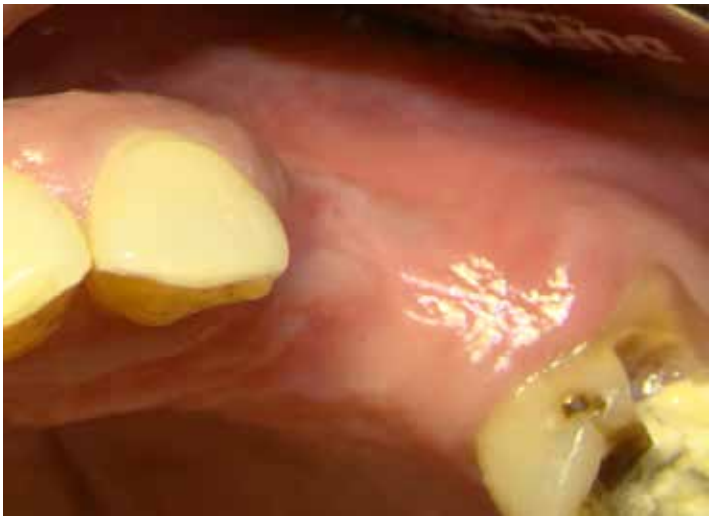

Figure 1- View of the defect.

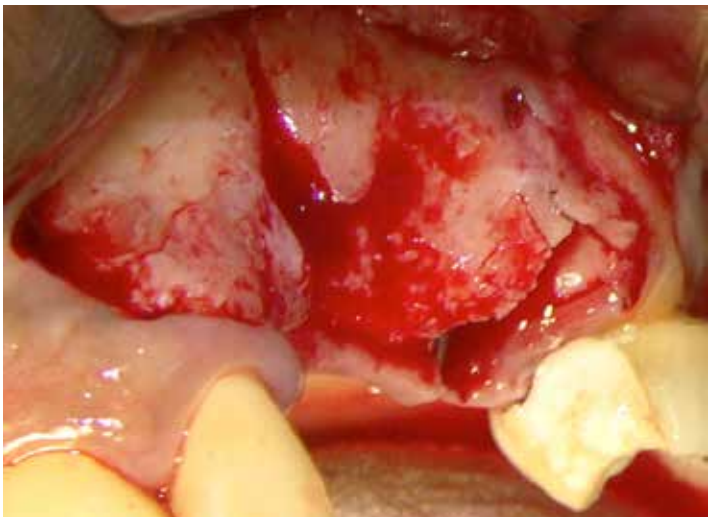

Figure 2 - Flap retraction and bone exposure.

Figure 3 - Drilling in the bone cortical to promote the tissue nutrition.

Figure 4 - Titanium mesh fixing – Titanium, Bionnovation - Bauru - São Paulo.

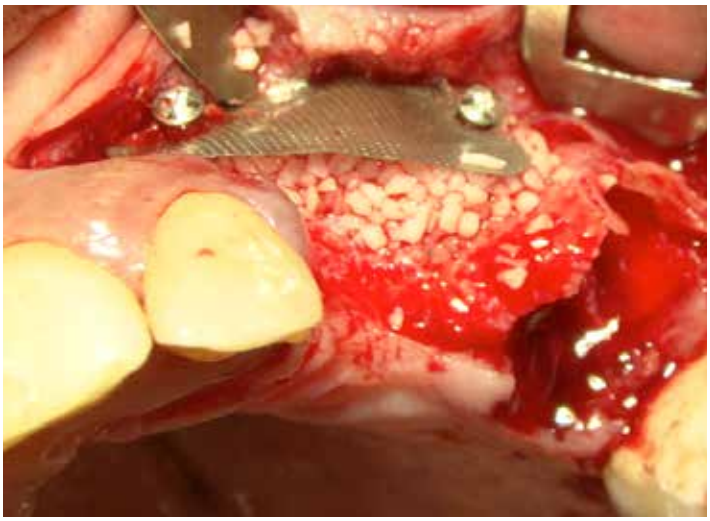

Figure 5 - Defect filling with medium-granulation Bonefill - Bionnovation - Bauru - São Paulo.

Figure 6 - Suture.

Figure 7 - Postoperative 2 months.

After the grafting placement, the tissue relief was made for the suture procedure without tension (Figure 6). Postoperative follow-up was made to prevent the titanium mesh premature exposure (Figure 7).

After 9 months of waiting for a good healing, a new CT scan was requested to plan the implants placement (Figure 8), molding and model obtainment for the surgical guide (Figure 9).
The patient was premedicated with the same previous protocol, and the same anesthesia methodology was followed (Figure 10), taking into account the titanium mesh and the newly-formed tissue.

SThe titanium mesh removal was made and bone tissue was exposed to continue with the drillings for the implants placement following the surgical guide (Figures 11, 12 and 13).

Subsequently the alveoli instrumentation was made and the implants selection was based on the unitary prosthesis planning, choosing morse-cone type implants (Biomorse XP, EZ and Conic - Bionnovation - Bauru - SP) (Figures 14 and 15).

All implants showed a performance with high insertion torque despite being placed in a grafted bone (Figures 16 and 17).

After the implants placement, their protection was made with the implant cover screw and suture (Figure 18).

Discussion

The bone resorptions can be treated in various manners, the best predictability condition should be followed1, 2. Grafts can be autogenous, halogenous, xenogeous or alloplastic, in block or particulated[3,6,7,10].

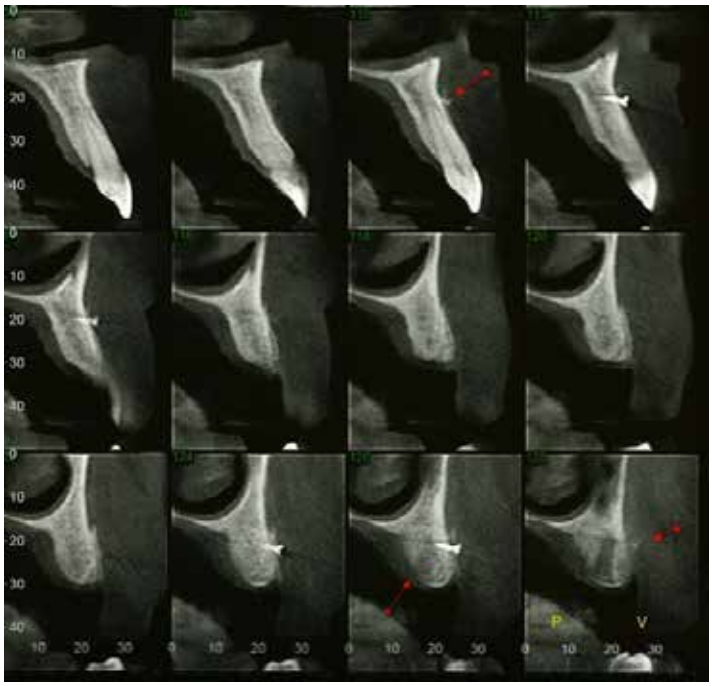

Figure 8 - Cone-beam CT scan.

Figure 9 - Surgical Guide.

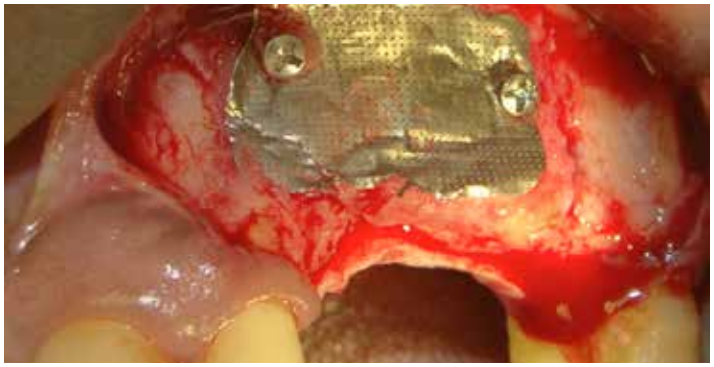

Figure 10 - Careful detaching to expose the titanium mesh.

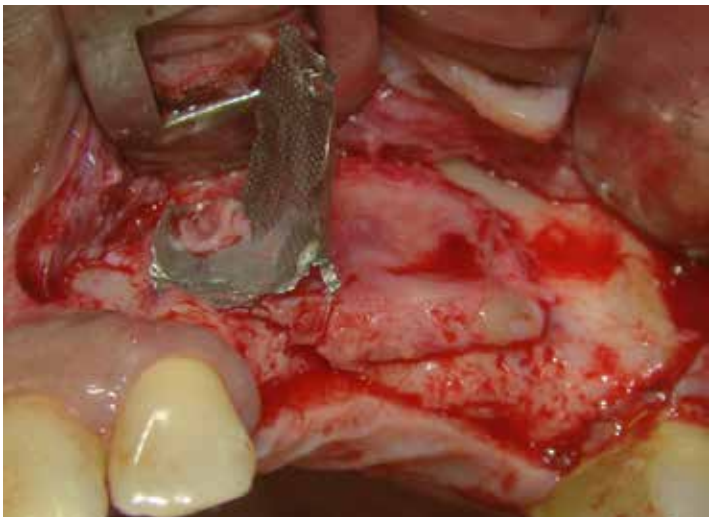

Figure 11- Titanium Mesh Removal.

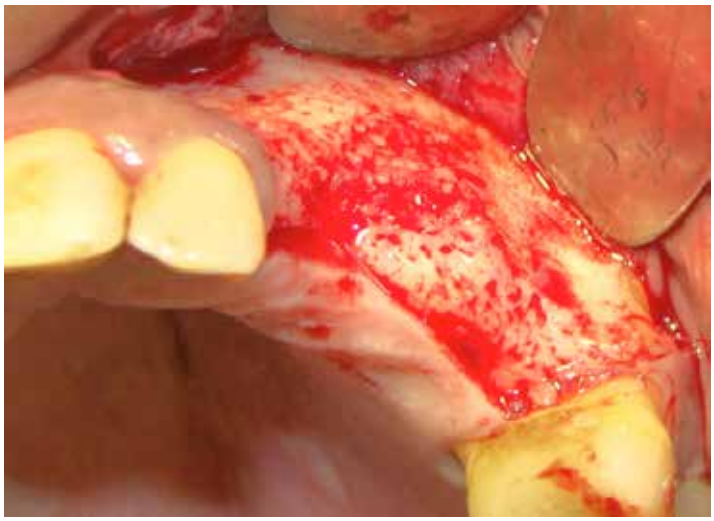

Figure 12 - Bone exposure – evidencing the bone formation quality.

Figure 13 - Surgical guide position and start of instrumentation.

A condition for the alloplastic materials use, regardless of its origin, is the use of membranes or barriers aiming the cell exclusion and avoiding the clot competition with soft tissues[14,15,16,17], in addition to the volumetric structural maintenance, in this case, different when grafts are used in block.

Autogenous grafts are considered the gold standard when it comes to bone formation, compatibility, immunogenicity and vascularization 4,5,8,9, in addition to producing a postoperative with morbidity[3,6,7,10].Bone substitutes on the other hand, produce less invasive surgeries; however, the new bone formation process occurs more slowly, and scar waiting must take into account the material type, granulation size, microporosity and crystallinity[11,12,13]. Depending on the biomaterial, it is expected that not all its structure is reabsorbed and remodeled, and therefore, causing a reduction in the implant bone contact area 4,8, however, it is sufficient to produce an initial mechanical stability so that the newly-formed bone can be osteointegrated with the dental implant.

CONCLUSION

Through this case report, it can be stated that bone regenerations promoted with biomaterials for the bone substitution associated with titanium mesh can produce a bone condition favorable for promoting a better implant positioning, with biological and mechanical stability favorable to osteointegration.

Figure 15 - Placement of Biomorse EZ implant (Bionnovation - Bauru - São Paulo).

Figure 17 - View of the implant proper positioning.

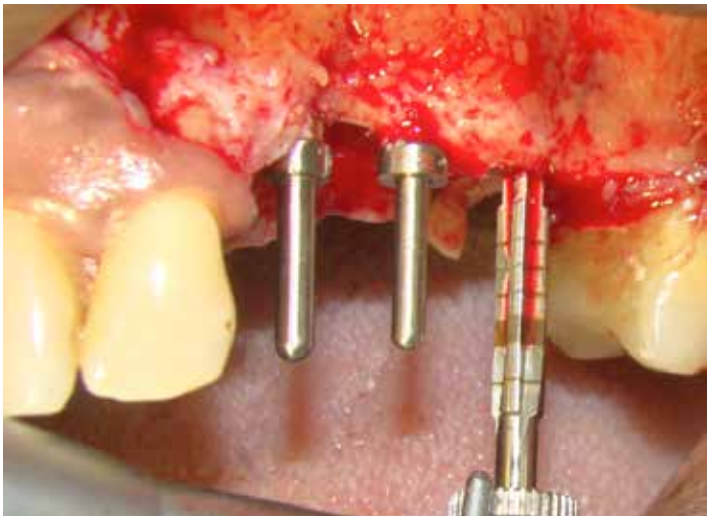

Figure 14 - Parallelism bolts position and milling with conical drill.

Figure 16 - Implant torque.

Figure 18 - Suture.

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