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Folha laminada de titânio utilizada como barreira biológica na lesão provocada pelo procedimento cirúrgico

Titanium foil used as a biological barrier in injury caused by surgical procedure

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Resumo

A crescente utilização de implantes dentários levou a indústria a desenvolver desenhos de componentes específicos para melhoria na capacidade da osseointegração, mas também no desenvolvimento de uma vedação biológica; isto é, um selamento de tecido mole ao redor da parte transmucosa como também da crista óssea após extração dental. A folha laminada de titânio não absorvível indicada como auxiliar na neoformação óssea atua como barreira bioló-gica ou como lâmina totalmente impermeável, com propriedade em excluir a possibilidade de competição e invaginação dos tecidos moles sobre os enxertos e defeitos ósseos.

Descritores: Titânio, extração dental, materiais biocompatíveis, tecido ósseo.

Abstract

The increasing use of dental implants has led the industry to develop specific components designs to improve the osseointegration capacity, as well as the development of a biologi-cal seal (sealing of soft tissue around the transmucosal part and the bone crest after tooth extraction). The non-absorbable titanium foil is indicated as an aid for bone formation, acting as a biological barrier or as a totally impermeable membrane, that excludes the possibility of competition and invagination of the soft tissues over the graft and bone defects.

Descriptors: Titanium, tooth extraction, biocompatible materials, bone tissue.

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Introduction

The titanium (commercially pure) has low density, good mechanical resistance to traction, excellent resistance to corrosion and low thermal conductivity. It has high affinity to oxygen, with which it reacts under normal conditions of temperature and pressure to form a series of oxides with different stoichiometric compositions, although it is commonly found in the form of titanium oxide (TiO2). The use of titanium in the manufacture of dental implants has recently increased due to its excellent biocompatibility provided by the surface layer of thin oxide formed over the surface during manufacture2, better osteointegration and low risk of adverse reactions with the body. The clinical success of a dental implant requires not only an excellent osteointegration but also the development of a biological seal. Various strategies have been explored with the aim of improving the biological seal of dental implants, generally by chemical modifications of their surfaces. The surface texture is known for influencing epithelial cells and fibroblast fixation, although there is no complete agreement in literature regarding the exact effect3 Therefore, the cp titanium (ASTM F-67) can also be in nonabsorbable foil shape indicated as an aid for new bone formation, acting as a biological barrier or as a totally impermeable membrane that excludes the possibility of competition and invagination of the soft tissues over the grafts and bone defects.

Case report

The prosthetic rehabilitation is a huge challenge in Dentistry when esthetics with osseointegrated implants is involved. The loss of a dental element promotes physiological remodeling of the bone and gum tissues, which may complicate the surgical phase for installation of the implant, compromising the obtainment of a favorable final esthetic result1. The observation of the formation of gingival invaginations during the closing of the extraction space can generate difficulties in the completion and stabilization of the teeth adjacent to these spaces4. The alveolar repair process after dental extraction is a set of tissue reactions that begins immediately. Filling the post-extraction alveolus with a bone substitute directly after tooth extraction can preserve bone volume, and this increases the options for the success of a future treatment. To keep the alveolar bone crest and speed up the repair, frameworks can be used under normal conditions to act as barriers and stimulants to bone differentiation or mineralization.

The focus of this work was to present an alternative treatment by applying a titanium foil as biological barrier in injury caused by surgical procedure. The cares to take during the use of titanium foil should be:

1. Exceed 2 mm of the grafted area in its entire length;
2. Use aseptic surgical techniques applicable and prepare the receptor bed;
3. Cut the foil into the appropriate size for maximum adaptation to the area;
4. Adapt the foil to the site, leaving it flat and well adapted in its edges;
5. Reposition the flap over the foil and suture without involving the foil.

Patient EW, female, caucasian, 54 years old, attended the dental office with complaints of pain on percussion and instability of the prosthetic crown of element 45, desiring to perform a dental implant for rehabilitation of the case.

In anamnesis, the patient reported having been subjected to heart surgery for correction of ventricular flow, currently normotensive. No other deviation from basis was reported.

A clinical and radiographic examination confirmed extensive caries infiltration and mobility of the prosthetic crown (Figure 1).

Complementary tests were requested and no change was observed. The initial computed tomography scans showed images of bone hypodensity and hypodense areas in dental root (Figure 2), suggesting external resorption.

A medical authorization was also requested with clearance of the procedure, and the patient was pre-medicated with 2g of Amoxicillin and 4mg of Dexamethasone 1 hour before the procedure.

The clinical planning with staged treatment and alveolar protection with Surgitime Seal titanium foil (Bionnovation Biomedical, Bauru/SP) was explained to the patient who, in agreement with the procedure, signed the informed consent form, thereby giving continuity to the proposed treatment.

Extra-oral antisepsis was performed with chlorhexidine 2% followed by anesthesia with mepivacaine 2% solution combined with corbadrine 1:20,000 (DFL – Rio de Janeiro/RJ), with local infiltrative injection at the bottom of vestibular groove and site on the tongue to promote operative silence.

Then an intrasulcular incision was made around the dental element and gingival divulsion. The prosthetic crown was detached by luxation movement (Figure 3). In sequence, the dental root and root fragmentation were luxated, moving to vestibular osteotomy for its removal (Figure 4).

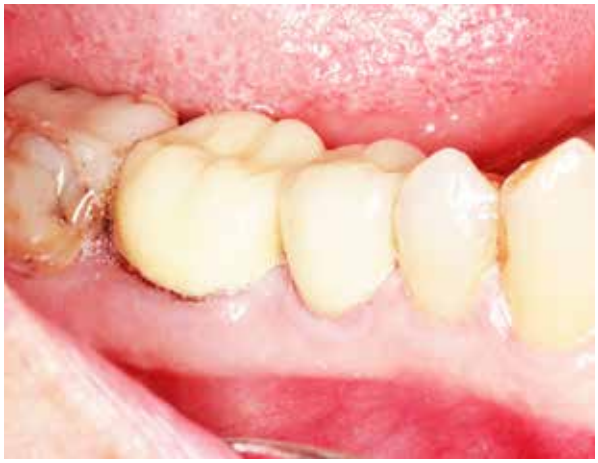

Figure 1 – Initial aspect.

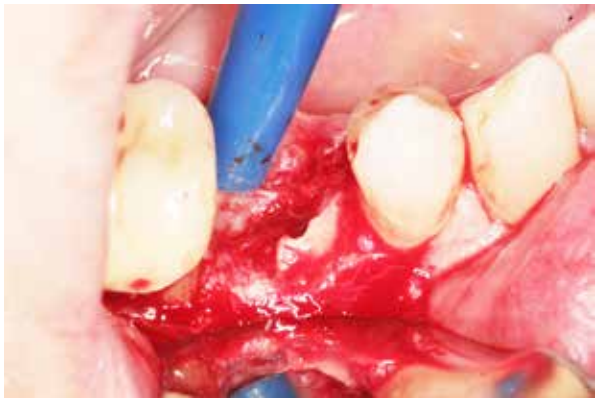

Figure 3 – Detachment of the dental prosthetic crown.

After removing the dental element (Figure 5), an alveolar protection template was made for the pre-modeling of the titanium foil Seal (Bionnovation Biomedical, Bauru, São Paulo) (Figure 6). The foil was then cut and positioned by adaptation with light pressure, without requiring fixation (Figures 7 and 8). Sutures were made for maximum coaptation of the edges (Figure 9).

At ten post-operative days (Figure 10), the sutures and titanium foil were removed (Figure 11) and the formation of organized tissue was observed (Figure 12). Biweekly follow-ups were made and after 70 days (Figure 13) a new CT scan was requested from the patient, observing a bone formation that enabled the installation of the implant (Figure 14).

The patient was then pre-medicated following the previous protocol. Instrumentation was performed on the dental alveolus suggested for the installation of the Biomorse XP 4.0X13 mm implant (Bionnovation Biomedical, Baurú, São Paulo) by using lance drill of 2.0 mm, helical drill of 2.4 mm, tapered drill of 2.8 mm, tapered drill of 3.2 mm and concluded with tapered drill of 3.6 mm.

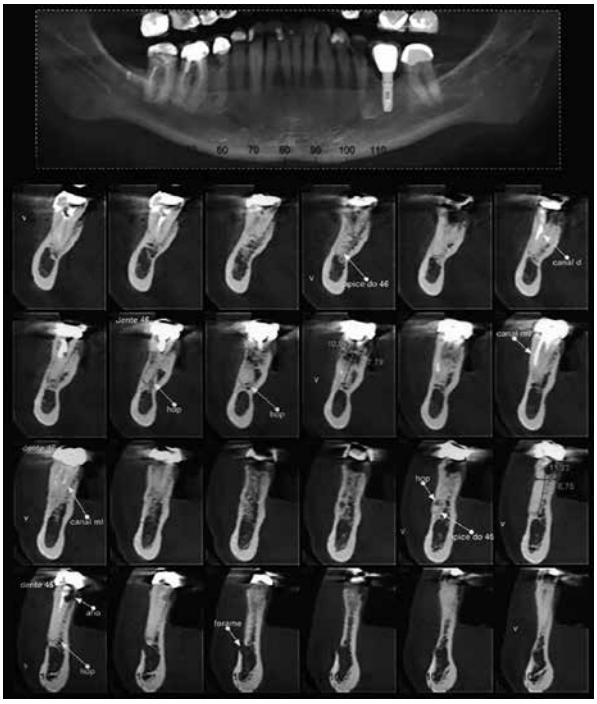

Figure 2 – Computed tomography. Areas of hypodensity compatible with external resorption of the root are observed.

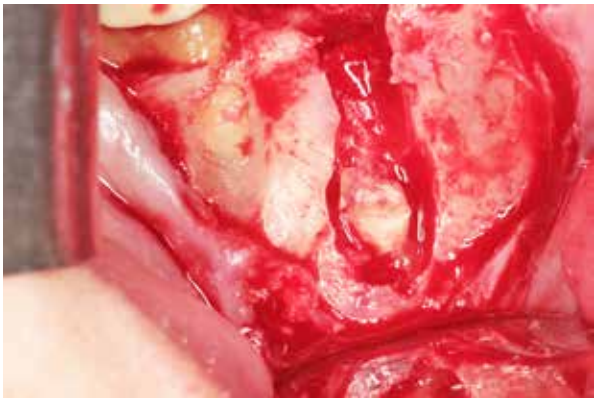

Figure 4 – Osteotomy for removal of residual root.

The implant was initially installed with counter angle (Figure 15), with torque of 45N placed below the 1 mm bone crest (Figure 16). The implant was then sealed with an implant cover and suture (Figure 17). Post-surgery follow-ups were made, initiating with the removal of the suture at 14 days (Figure 18).

After 30 post-operative days, it was shown to be satisfactory and the implanted site had a normal aspect, without evidences of inflammatory process or dehiscences.

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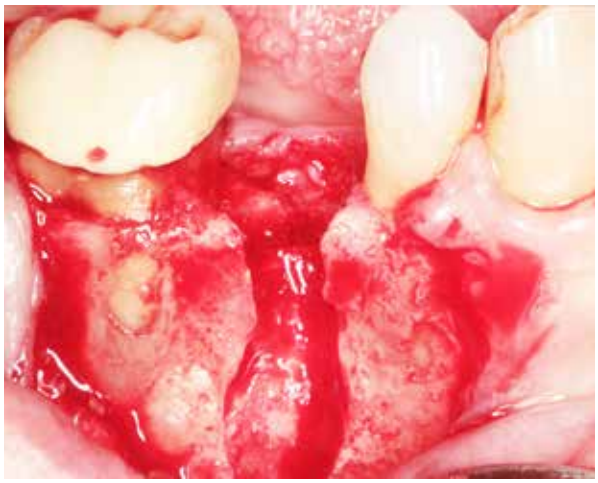

Figure 5 – Final post-extraction aspect.

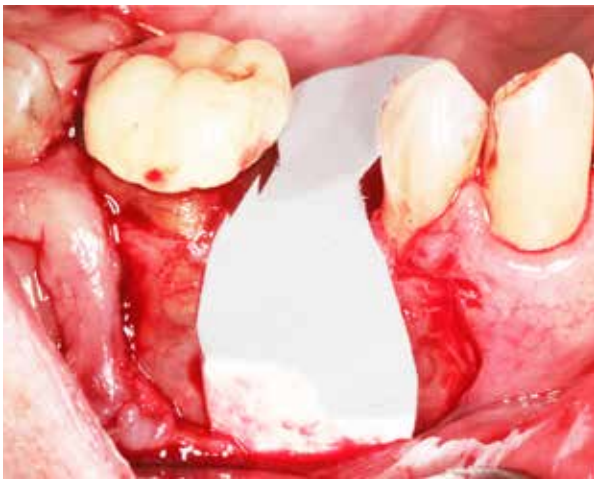

Figure 6 – Making of pre-modeling template.

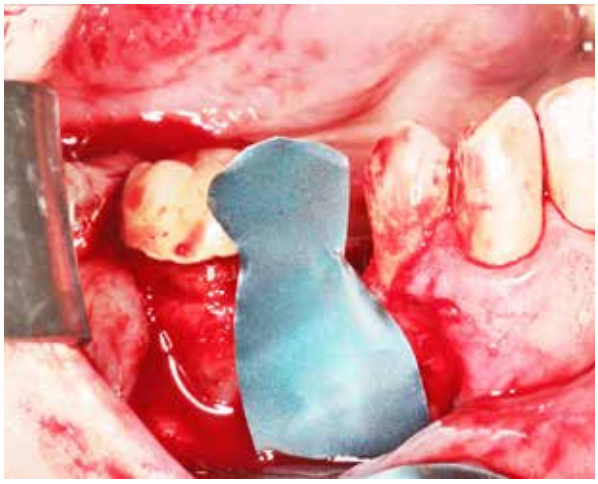

Figure 7 – Installation of Titanium Seal foil.

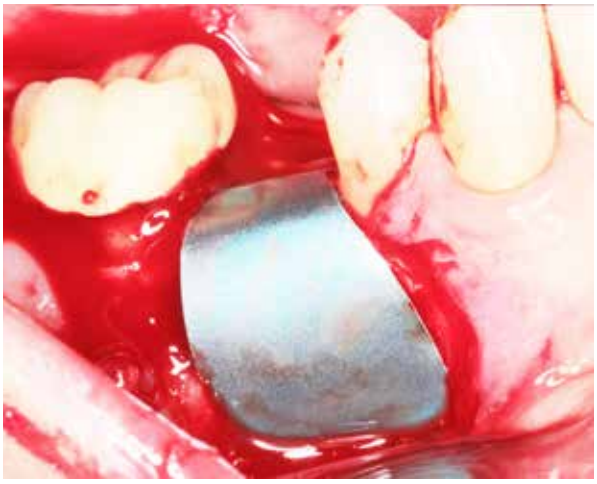

Figure 8 – Final adaptation of the Titanium Seal foil.

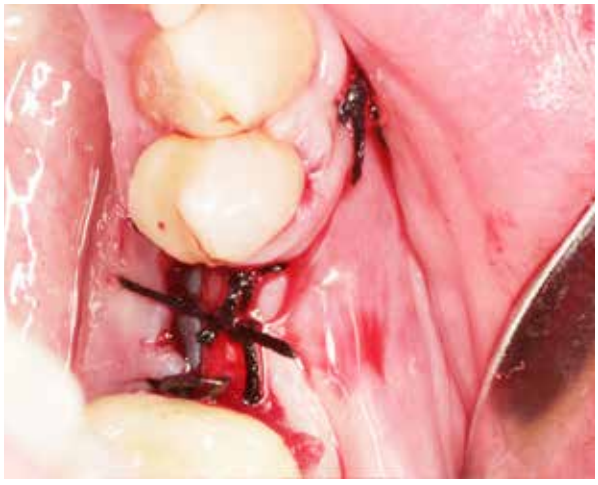

Figure 9 – Suture.

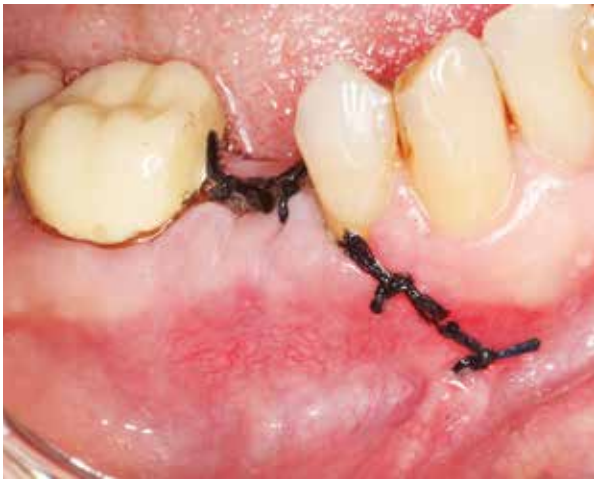

Figure 10 – 10 days post-operation.

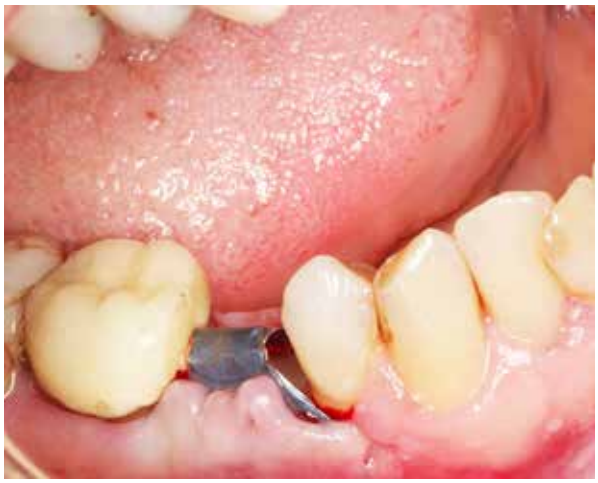

Figure 11 – Removal of the titanium foil.

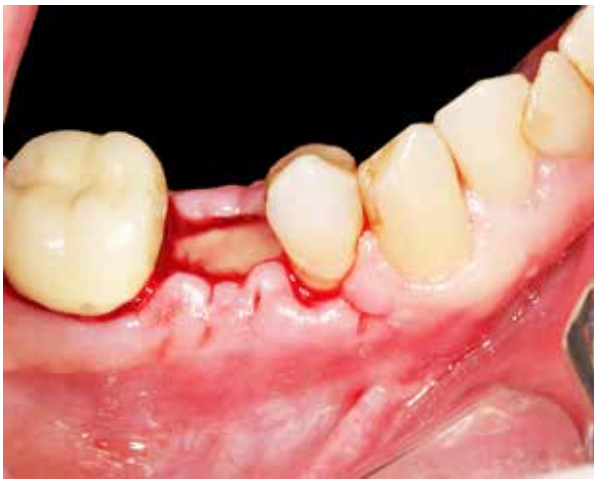

Figure 12 – Observation of the initial healing and formation of well organized tissue.

Figure 13 – 70 days post-operation.

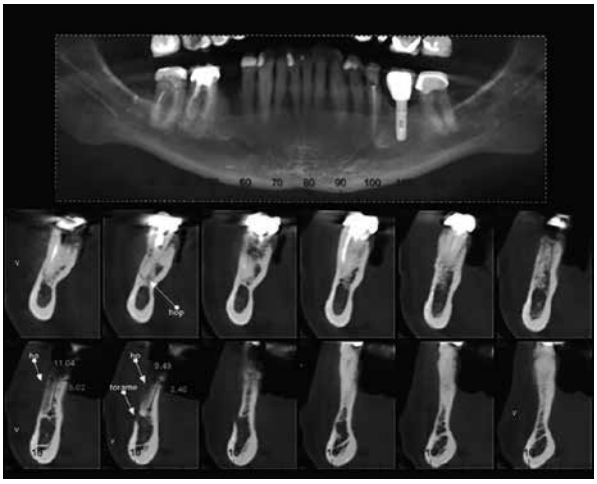

Figure 14 – 70 days post-operation computed tomography.

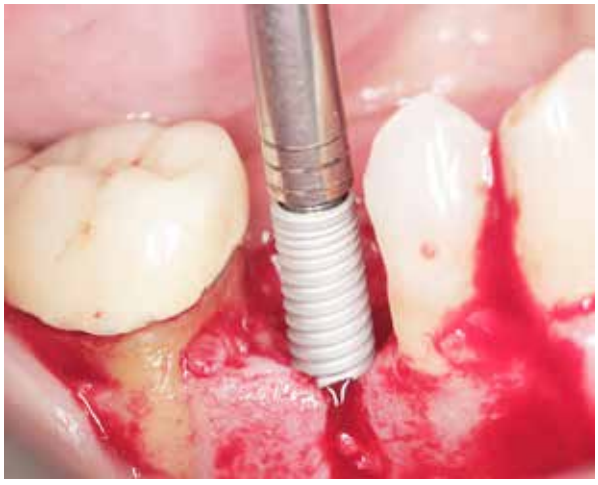

Figure 15 – Implant installation.

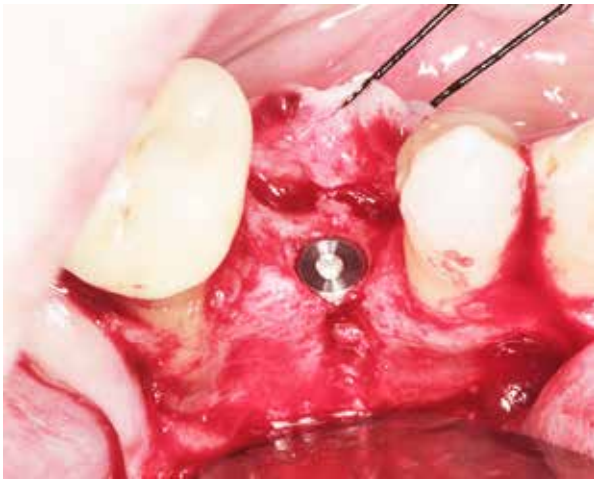

Figure 16 – Installed implant.

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Figure 17 – Suture.

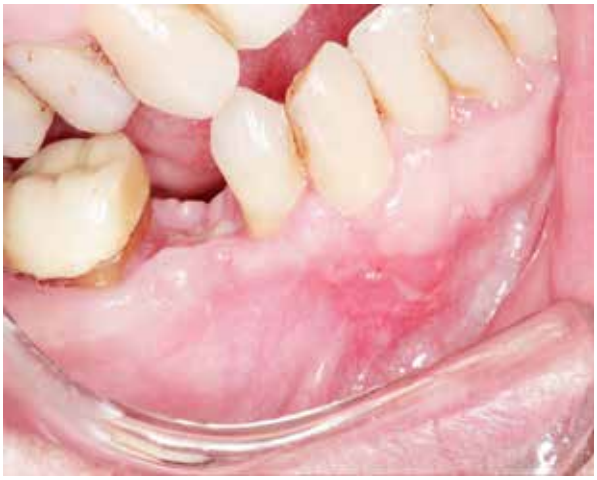

Figure 18 – Post-operation.

Final considerations

The titanium foil is a malleable foil that is easy to manipulate and adapt, with the function of protecting blood clot from the invasion of non-osteogenic structures and direct them to prevent their distortion by the pressure of adjacent tissues. It has a very thin thickness varying from 0.01 mm to 1.5 mm and length x width varying from 34.0 mm x 25.0 mm to 200.0 mm x 200.0 mm. Regarding the Surgitime Titanium Seal model, it is primarily indicated for alveolar sealing, protecting the surgical injury from the invagination of soft tissues, promoting a resorption of the absorption process. Due to its impermeability, the foil continues to protect the bone graft material.

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