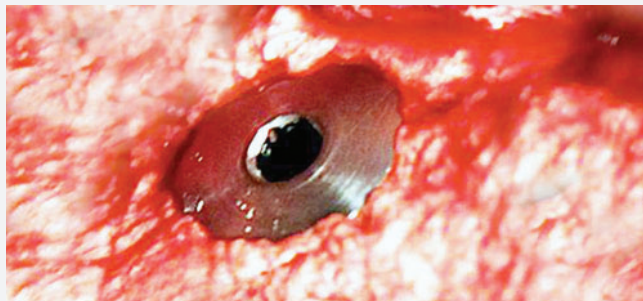


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News No. 27 July 2011

Bone Regeneration With
Calcium Sulfate, Platelet
Rich Plasma & Immediate
Implant Placement In
Lower Jaw



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Bone Regeneration With Calcium Sulfate, Platelet Rich Plasma & Immediate Implant Placement In Lower Jaw

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Abstract

Osseointegrated implants are the best alternative for the restoration of partially or totally edentulous jaws, but in many cases there is not enough bone to place implants, that is why bone substitutes are required to regenerate this tissue. Now a days there are different kinds of regeneration materials such as: calcium sulfate (biomaterial that has been used for many years), and the platelet-rich plasma (used to potentiate the healing).

This article presents a case report, where bone regeneration is performed in an area of bone loss caused by a mandibular implant blade, using biphasic calcium sulfate, platelet-rich plasma and immediate implant placement.

Introduction

Calcium sulfate is an important material used to achieve bone regeneration, its excellent biocompatibility allows it to be an optimal biomaterial for this purpose, it can be applied alone or combined with other bone substitutes. Calcium sulfate comes in several formulas, the two main forms are hemihydrate and dihydrate, when they are put together in a single compound, they produce a synergistic effect, increasing the main advantages of both. The platelet-rich plasma is a rich source of growth factors with angiogenic and mitogenic properties that accelerates healing of soft and hard tissues.

Case Report

59 year old female patient with no systemic commitment who referred pain and swelling in right jaw area; approximately 20 years ago, blade implants were placed in this area. She referred mobility and discomfort of the prosthetic structure when chewing. Radiographic examination showed a fixed

prosthesis supported on tooth 43 (misfit and periapical lesion), pontics 44 - 45 and support on implant 46 and 47. On the left side the patient has an asymptomatic blade implant, that has been covered with soft tissue for a long period of time, (Figure 1). The patient is ordered antibiotic therapy etidoxina[®] Euroetika - Colombia every 24 hours for 10 days.

Surgical Procedure

After nerve block anesthesia, the fixed prosthesis was removed showing corrosion as well as the blade implants (Figure 2), also food remains were present. (Figure 3).

The blade implant was removed, then a bone curettage was practiced in this area and a gauze impregnated with ambramicina hydrochloride Sanofi - Aventis of Colombia was placed in for 20 minutes, subsequently the site was washed with plenty of saline solution.

Immediately 2 Implants (Seven[®] MIS[®] Implants Technologies) were placed in areas of tooth 43 (4.20x10mm) and 46 (6x8mm), this last implant was placed impregnated with a mixture of PRP and biphasic calcium sulfate BONDBONE[®] (calcium sulfate hemihydrate CaSO₄·0.5H₂O - calcium sulphate dihydrate CaSO₄·2H₂O MIS[®] Implants Technologies) (Figure 4).

After the insertion of the implants, implant 46 had a large space around it (Figure 5) so a graft of BONDBONE[®] mixed with platelet-rich plasma was inserted (Figure 6). The implants had primary fixation and the area was closed leaving the implants submerged. On the left side of the jaw, 2 Implants (Seven[®] MIS[®] Technologies) were placed in tooth areas of 33 (3.75x13mm) and 36 (6x8mm).

The patient was formulated etoricoxib 120 mg, Arcoxia[®] Merck Sharp & Dohme Mexico, every 24 hours for 7 days and rinse with a Chlorhexidine digluconate 0.2mg mouth wash, (Clorhexol[®] Farpag Laboratory - Colombia)

every 12 hours for 7 days. 15 days later a bilateral sinus lift procedure was performed using BONDBONE[®] and hydroxyapatite (biphasic calcium phosphate HA \ TCP 60:40 4BONE MIS[®] Implants Technologies) as a filler, mixed with PRP and 2 implants Seven[®] were placed in tooth area of 18 and 28. 6 months later, a CT was taken to evaluate the grafted area.

The CT showed bone formation around Implant 46 with normal radiopacity (Figure 7). The Implants were uncovered in the lower jaw, final abutments were placed and a fixed prosthesis was processed (Figure 8). In the maxilla, 2 implants (Seven[®] MIS[®] Technologies) were placed in area 16 (4.20x13mm) and 26 (4.20x11.5) and 2 mini implants in area 12 and 22. After four weeks, a transitional total denture was fabricated.

Discussion

The immediate placement of implants with bone regeneration procedure, has a good clinical predictability if the principles of mechanical stability and good blood supply is taken in account. By impregnating the surface of the implant with PRP, this stimulates migration, proliferation and differentiation of osteoprogenitor cells and their adherence to the titanium surface, creating a dynamic surface that can accelerate bone healing and potentiate the osseointegration.

Combining calcium sulfate with PRP forms a solid biomaterial that can be shaped and stable in the grafted site, increases the amount of calcium and the activation of the platelets that releases growth factors increasing the concentration of adhesive proteins, vascularization and inducing cell differentiation.

Calcium ions that are released during the dissolution of calcium sulfate increases its concentration, stimulating the mitogenesis of stem cells and osteoblast differentiation, also this high concentration of calcium inhibits

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osteoclast mediated resorption and promoting bone remodeling. Biphasic calcium sulfate as a mixed compound has better properties than the individual forms, specially the hemihydrate form which increases the setting time significantly in the presence of fluids, when adding the dihydrate molecule a mixture of fast setting is formed, great mechanical stability and better hardness, that will not be altered when contact with blood and saliva occurs.

Bone regeneration has been reported of not finding any residues of this material, making it optimal when compared with bovine bone, which studies of similar application have encountered remanent of graft material between 25 and 35%.

Conclusion

The Osteoconductive properties of biphasic calcium sulfate added to the potential of cell differentiation and angiogenic growth factors present in the Platelet Rich Plasma have a beneficial role in grafted sites.

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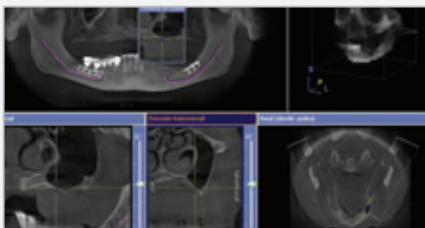


Fig. 1



Fig. 2



Fig. 3



Fig. 4

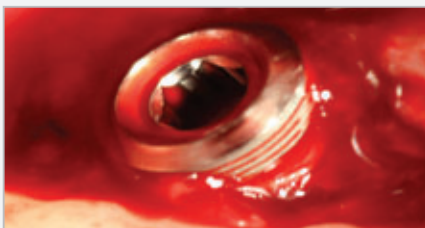


Fig. 5



Fig. 6

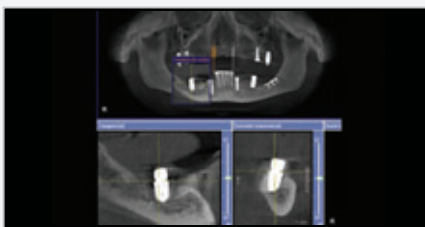


Fig. 7



Fig. 8

MIS's Quality System complies with international quality control standards: ISO 13485:2003 - Quality Management System for Medical Devices, ISO 9001: 2008 – Quality Management System and CE Directive for Medical Devices 93/42/EEC. MIS's products are cleared for marketing in the USA and CE approved.

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