18th Asia-Pacific Dental and Oral Care Congress

November 21-23, 2016 Melbourne, Australia

The effect of bisphosphonate on dental implant osseointegration in rabbits: Micro-CT analysis

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Introduction & Objective: Dental implants are widely accepted as a successful means of replacing missing teeth. Dental implant osseointegration depends on many factors affecting bone quantity and quality. Bisphosphonate (BP) application is proposed to enhance this osseointegration. Experimental researches to date on the systemic (intravenous) administration of BP for improving implant fixation is insufficient for clinical application. The purpose of our study is to examine the effects of systemically administered BP (zoledronic acid) on the osseointegration of dental implants inserted in rabbit's femures.

Materials & Methods: Twenty-two (22) healthy New Zealand white rabbits were used in the study. All rabbits received insertion of custom made titanium alloy cylindrical threaded dental implants in medial side of the distal end of each femoral bone. Rabbits were randomly assigned into study and control groups. The study group received intravenous zoledronic acid in a dose of 0.1 mg/kg in single doses 1 week before implant insertion surgery, immediately before the implant insertion procedure and 1 week after implant insertion. Each group was divided into 3 subgroups according to duration of observation after dental implants insertion: 3 weeks, 6 weeks and 12 weeks before sacrifice. Rabbit's femur bone samples including the implants were subjected to micro-CT analysis for bone volume, bone implant contact and bone mineral density measurements. The data were statistically analyzed.

Results: Micro-CT analysis showed that bone volume was significantly increased in the study group after 12 weeks than in control counterpart. Bone mineral density was significantly higher in study group after 3 weeks and 12 weeks period but not significantly high in 6 weeks period. Bone implant contact showed significant increase in study group after 12 weeks than control group but it was not significant within 3 weeks or 6 weeks periods.

Conclusion: Intravenous BP (zoledronic acid) administration in perioperative period of dental implant surgery in a low dose is effective in enhancing bone formation, increasing bone mineral density and decreasing bone remodeling around dental implants in the process of osseointegration.

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New methods in the treatment of open-apex teeth with necrotic pulpal tissues

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Endodontic treatments have always been considered as one of the most significant and premiere methods of maintaining the normal functions of the teeth which have been affected by diverse types and classes of pathogens and maladies particularly when they enter the coronal and radicular pulp spaces and involve the pulpal tissue in various degrees. Root canal therapy has also shown its important role in the treatment of teeth with open-apices where, for different reasons, such as trauma, infectious diseases and so forth, the affected tooth loses its vitality and thus, its ability to mature properly, leaving the apical foramen open. For many years, so as to deal with such circumstances and their consequences, apexification (and calcium hydroxide-as a canal medication) was used, however, side effects such as immature & short roots, thin dentinal walls and lack of proper matrix for a subsequent successful root canal treatment were observed. As a result, and in order to overcome the said problems, in recent years, new concepts regarding regeneration and revascularization of pulp tissue with the use of new drug system have been taken into account, setting light to the future of open-apex teeth treatment. In these modern methods of endodontic therapy, new points in canal instrumentation next to using other medications have been paid attention to. Related studies have also revealed successful results, fewer side effects and better prognosis in the aforementioned new therapy in comparison with apexification.

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