Dr. Ali Hassan has completed his orthodontic residency and Ph.D. program. Thanks to AAOF he completed this work and the manuscript has been accepted for publication.

THE USE OF BONE MORPHOGENETIC PROTEIN-2 AND DENTIN MATRIX PROTEIN-1 TO ENHANCE THE OSTEOINTEGRATION OF THE ONPLANT SYSTEM

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This study examined the possibility of enhancing the speed and effectiveness of osteointegration of onplants on rabbit calvarial bones by adding recombinant human bone morphogenetic protein-2 (rhBMP-2) and/or dentin matrix protein-1 (DMP-1). (accepted for publication, Calcified Tissue Research, 2002)

ABSTRACT

Onplants™ are known to provide absolute anchorage for orthodontic tooth movement in humans if loaded after 3 to 4 months, and can be removed after use. The purpose of this study was to evaluate the speed and effectiveness of osteointegration of onplants treated with recombinant human bone morphogenetic protein-2 (rhBMP-2) and/or dentin matrix protein-1 (DMP-1) in rabbits. Fifty-four onplants were placed on the calvaria of nine rabbits. Onplants were divided into four groups; rBMP-2, rDMP-1, BMP-2 +DMP-1 (B+D) and controls. The hydroxyapatite surface of each onplant was soaked in a solution of the assigned protein in each of the study groups or a phosphate buffer solution in the control group. Onplants were inserted into subperiosteal tunnels and allowed to heal for 6 weeks. After euthanizing the animals, bone blocks, each containing an onplant, were either prepared for histological examination or biomechanical characterization. Histological and histomorphometric results demonstrated significant bone formation at the bone-onplant interface in the BMP-2 and B+D groups when compared to DMP1 and the controls. Mechanically, onplants treated with BMP-2 withstood tensile forces ranging between 3.4 and 5.0 kg. Onplants treated with BMP-2 and DMP1 (B+D) withstood an average of 3 kg of pulling forces. On the other hand, onplants in the DMP1 and control groups withstood forces ranging between 0 kg to 1.3 kg. These results indicate a potential of enhancing the osteointegration of onplants for early loading.