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Evaluation of the effect of bone morphogenetic protein-2 on stability of dental implant

A thesis

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Abstract

Background: The healing period for bone–implant osseointegration takes 3–6 months or even longer. Application of Escherichia coli-derived recombinant human bone morphogenetic protein 2 (ErhBMP-2) to implant surfaces has been of great interest on osseointegration due to its osteoinductive potential.

Objectives: The objective of the study was to (1) evaluate the effect of ErhBMP-2 on implant stability (2) to determine the effect of gender, age, jaw and implant dimension (diameter and length) on implant stability.

Materials and methods: A total of 48 dental implants (Dentium, SLA) were inserted into 15 patients. Twenty four implants coated with 0.5mg/ml ErhBMP-2 (study group) and another 24 implants uncoated with 0.5mg/ml ErhBMP-2 (control group), each patient was received at least two dental implants at the same session, one implant was coated with 10µg ErhBMP-2 by using micropipette (some of ErhBMP-2 dropped on surface of SLA fixture and the remaining amount of BMP inserted into the prepared bony hole before insertion of fixture) to serve as study group, and the other implant was inserted without ErhBMP-2, to serve as a control group. Both groups were followed with repeated implant stability measurement by means of resonance frequency analysis at different time intervals (at the time of surgery, then at 6th and 12th week postoperatively).

Results: Results showed there was no obvious statistically significant difference in mean of Implant Stability Quotient (ISQ) between study and control groups ($P > 0.05$) at baseline, whereas the mean ISQ values at 6th and 12th week postoperatively were statistically highly significant in the study group compared to the control group ($p < 0.01$). Implant length had only positive correlation and statistical significance on implant stability at 12th week postoperatively in control group (P value = 0.027), but there was no correlation of this factor on implant stability throughout the study period in study group. Implant diameter had only positive correlation and statistical

significance on implant stability at 6th week measurement in control group (P value = 0.014), whereas there was positive correlation and statistical highly significance between implant diameter and mean ISQ at the time of surgery and 12 week postoperatively ($p < 0.01$), and statistically significant after 6 week in study group ($p < 0.05$). Mandible showed higher ISQ value than maxilla throughout the study period in control group but statistically was non-significant ($p > 0.05$). Mandible showed higher ISQ value than maxilla throughout the study period in study groups and statistically was highly significant ($p < 0.01$). In both study and control groups, no statistically significant correlation was found between gender and age and ISQ value throughout the study period ($p < 0.05$).

Conclusion: The result of the present study concluded that the ErhBMP-2 coated sandblasted acid-etched endosseous dental implants was significantly increase implant stability compared with the control group. Implant diameter and jaw site affect the implant stability. Within the limitation of this study, gender and age did not affect the implant stability.