

A Comparison of Implant Stability between Implant Placed without Bone Graft versus with Bone Graft Using Guided Bone Regeneration (GBR) Technique: A Resonance Frequency Analysis

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Abstract : This prospective clinical study determined the insertion torque (IT) value and monitored the changes in implant stability quotient (ISQ) values during the 12 weeks healing period from implant placement without bone graft (control group) and with bone graft using the guided bone regeneration (GBR) technique (study group). The relationship between the IT and ISQ values of the implants was also assessed. The control and study groups each consisted of 6 patients with 8 implants per group. The ASTRA TECH Implant System™ EV 4.2 mm in diameter was placed in the posterior mandibular region. In the control group, implants were placed in bone without bone graft, whereas in the study group implants were placed simultaneously with the GBR technique at favorable bone defect. IT (Ncm) of each implant was recorded when fully inserted. ISQ values were obtained from the Osstell® ISQ at the time of implant placement, and at 2, 4, 8, and 12 weeks. No difference in IT was found between groups ($P = 0.320$). The ISQ values in the control group were significantly higher than in the study group at the time of implant placement and at 4 weeks. There was no significant association between IT and ISQ values either at baseline or after the 12 weeks. At 12 weeks of healing, the control and study groups displayed different trends. Mean ISQ values for the control group decreased over the first 2 weeks and then started to increase. ISQ value increases were statistically significant at 8 weeks and later, whereas mean ISQ values in the study group decreased over the first 4 weeks and then started to increase, with statistical significance after 12 weeks. At 12 weeks, all implants achieved osseointegration with mean ISQ values over the threshold value ($ISQ > 70$). These results indicated that implants, in which guided bone regeneration technique was performed during implant placement for treating favorable bone defects, were as predictable as implants placed without bone graft. However, loading in implants placed with the GBR technique for correcting favorable bone defects should be performed after 12 weeks of healing to ensure implant stability and osseointegration.

Keywords : dental implant, favorable bone defect, guided bone regeneration technique, implant stability

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