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Literature Abstract

Effect of implant healing time on crestal bone loss of a controlled-load dental implant.

A successful implant treatment outcome requires that osseointegration be achieved and cervical bone height maintained. This study hypothesized that early application of a mechanical stimulus (decreased implant healing time) leads to increased bone formation and decreased crestal bone loss. The study design had internal controls, which assessed the healing bone's condition before loading, and external controls, which assessed the bone after loading. This design permits the following comparisons to be made: *(1)* loading vs no loading, comparing bone adaptation at the end of the implant period; *(2)* implant healing time (1, 2, or 4 months); and *(3)* length of implant healing time. An intraoral hydraulic device was used to control in vivo load and healing time quantitatively. There was a significant difference between loading and nonloading for 4 months of healing (P = .008), but not for 1 month (P = .900) or 2 months (P = .360). Crestal bone loss during loading for the 1-month healing group was slightly larger than for the unloaded controls. The 2- and 4-month groups had 2 times and 4 times as much bone loss as the external controls, respectively. The crestal bone of the loaded 1-month healing implants was radiographically denser and more opaque than in the other groups, indicating that loading at 1 month stimulates bone formation more effectively. Trabeculae appeared to orient along the long axis of the implant, matching the direction of loading, suggesting the adaptation occurred in response to the early loading. The tendency to such an adaptation pattern under functional loading decreased as the healing time increased. Mean elastic moduli were 7.3 GPa, 7.9 GPa, and 8.4 GPa for the 1-, 2-, and 4-month groups, respectively; consequently, early-healing bone is more compliant under functional loading. Loading and bioactivities of osteoblasts exert a synergistic effect on osseointegration that likely supports the hypothesis that early loading produces more favorable osseointegration.

Ko CC, Douglas WH, DeLong R, et al. *J Dent Res* 2003;82:585–591. **References:** 30. **Reprints:** Dr C. C. Ko, Minnesota Dental Research for Biomaterials and Biomechanics, Graduate School, University of Minnesota, Minneapolis, Minnesota 55455 . e-mail: koxxx007@unm.ed —*Myung W. Brian Chang, Lincoln, Nebraska*