Influence of the size of the microgap on crestal bone levels in non-submerged dental implants: a radiographic study in the canine mandible.

King GN, Hermann JS, Schoolfield JD, Buser D, Cochran DL.

ABSTRACT.

Background. Accumulating evidence suggests that alveolar crestal bone resorption occurs as a result of the microgap that is present between the implant-abutment interface in dental implants. The objective of this longitudinal radiographic study was to determine whether the size of the interface or the microgap between the implant and abutment influences the amount of crestal bone loss in unloaded non-submerged implants.

Methods. Sixty titanium implants having sandblasted with large grit, acid-etched (SLA) endosseous surfaces were placed in edentulous mandibular areas of 5 American fox hounds. Implant groups A, B, and C had a microgap between the implant-abutment connection of <10 microm, 50 microm, or 100 microm, respectively, as did groups D, E, and F, respectively. Abutments were either welded (1-piece) in groups A, B, and C or non-welded (2-piece screwed) in D, E, and F. All abutment interfaces were placed 1 mm above the alveolar crest. Radiographic assessment was undertaken to evaluate peri-implant crestal bone levels at baseline and at 1, 2, and 3 months after implant placement whereupon all animals were sacrificed.

Results. The size of the microgap at the abutment/implant interface had no significant effect upon crestal bone loss. At 1 month, most implants developed crestal bone loss compared with baseline levels. However, during this early healing period, the non-welded group (D, E, and F) showed significantly greater crestal bone loss from baseline to one month (P < 0.04) and 2 months (P < 0.02) compared with the welded group (A, B, and C). No significant differences were observed between these 2 groups at 3 months (P > 0.70).

Conclusion. Crestal bone loss was an early manifestation of wound healing occurring after 1 month of implant placement. However, the size of the microgap at the implant-abutment interface had no significant effect upon crestal bone loss. Thus, 2-piece non-welded implants showed significantly greater crestal bone loss compared with 1-piece welded implants after 1 and 2 months suggesting that the stability of the implant/abutment interface may have an important early role to play in determining crestal bone levels. At 3 months, this influence followed a similar trend but was not observed to be statistically significant. This finding implies that implant configurations incorporating interfaces will be associated with biological changes regardless of interface size and that mobility between components may have an early influence on wound healing around the implant.