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Differences in crestal bone-to-implant contact following an under-drilling compared to an over-drilling protocol. A study in the rabbit tibia.

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Abstract

OBJECTIVES: The objective of this study is to compare bone-to-implant contact (BIC) between implants inserted at high torque due to under-drilling of the crestal bone to those inserted at low torque due to over-drilling of the crestal bone.

MATERIALS AND METHODS: Forty implants with diameters of 3.75 mm (group A) or 3.55 mm (group B) were inserted in the proximal tibiae of NZW rabbits in two separate surgeries on day 0 or 21. Osteotomy of the crestal bone was finalized with a 3.65-mm drill. In group A, implants were inserted at torque ≥ 35 Ncm (under-drilling) and in group B with torque < 10 Ncm (over-drilling). Implants and their surrounding bone were retrieved on day 42, thus creating 3- and 6-week observation periods, processed for non-decalcified histology and stained with toluidine blue. Crestal BIC (c-BIC) and total BIC (t-BIC) were measured. Wilcoxon test was used to evaluate differences between groups.

RESULTS: Three weeks post-surgery, the mean c-BIC in group A was 16.3 ± 3.3 vs 31.5 ± 3.4 % in group B ($P < 0.05$). At 6 weeks, a similar trend was observed (group A: 28.7 ± 3.6 %; group B: 38.4 ± 4.9 %) ($P > 0.05$). No differences in t-BIC were noted at 3 weeks and at 6 weeks between the groups.

CONCLUSIONS: Insertion of implants with an over-drilling protocol of the crestal aspect of the osteotomy resulted in increased short-term crestal bone-to-implant contact.

CLINICAL RELEVANCE: Insertion of implants with a high torque following an under-drilling protocol, commonly used for immediate loading, may reduce crestal bone-to-implant contact at early healing stages.

KEYWORDS: BIC; Implants; Insertion; Over-drilling; Torque; Under-drilling

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