Effect of an Oversized Implant Site Preparation on Osseointegration of Submerged Tapered Titanium Implants: A Study in the Minipig Mandible

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Abstract

Objective: To evaluate the effect of oversized implant site preparation on marginal peri-implant bone level (MBL) and parameters of osseointegration of tapered implants, compared to implants installed with a standard drilling protocol.

Methods: Ten hydrophilic implants were inserted in the edentulous mandible of female minipigs, by applying different drilling protocols (standard [SD, control] *vs.* oversized [OD, test]). SD included a 3-step series of drills without profiling of the cortical bone, while OD comprised a 5-step series and profiling of the cortical bone. Insertion torque values (ITV; N.cm) were recorded and non-submerged healing was allowed for 12 weeks. Following termination, mandibular blocks were harvested for non-decalcified histomorphometric evaluation.

Results: OD produced statistically significant lower ITV and it showed reduced marginal bone changes, however without significant differences when compared to SD. In contrast, OD showed statistically significant higher values of bone-to-implant (BIC; %) and peri-implant bone density (BD; %) compared to SD ($P < 0.05$).

Conclusion: Oversized drilling yielded low insertion torque of a tapered implant presenting a hydrophilic surface technology, but enhanced osseointegration and peri-implant bone density, and preserved better the MBL.