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Published online in:
February
2014

CLINICAL ORAL IMPLANTS RESEARCH

”

Novel Hybrid Drilling Protocol: Evaluation for the Implant Healing – Thermal Changes, Crestal Bone Loss, and Bone-to-Implant Contact”

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* Calvo-Guirado JL, Delgado-Peña J, Mate-Sanchez JE, Mareque Bueno J, Delgado-Ruiz RA, Romanos GE. Novel hybrid drilling protocol. Evaluation for the implant healing. Thermal changes, crestal bone loss, and bone-to-implant contact. Clin. Oral Impl. Res. 00, 2014, 1–8



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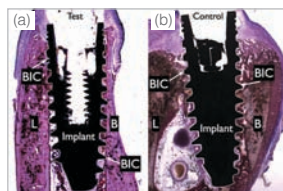
SUMMARY.

Objectives

To evaluate a new hybrid drilling protocol, by the analysis of thermal changes in vitro, and their effects in the crestal bone loss and bone-to-implant contact in vivo.

Material and methods

Temperature changes during simulated osteotomies with a hybrid drilling technique (biologic plus simplified) (test) versus an incremental drilling technique (control) were investigated. One hundred and twenty random osteotomies were performed (60 by group) in pig ribs up to 3.75mm-diameter drill to a depth of 10mm. Thermal changes and time were recorded by paired thermocouples. In a parallel experiment, bilateral mandibular premolars P2, P3, P4, and first molar M1 were extracted from six dogs. After 2-month healing, implant sites were randomly prepared using either of the drilling techniques. Forty eight C1 implants of 3.75 mm diameter and 10 mm length were inserted. The dogs were euthanized at 30 and 90 days, and crestal bone loss (CBL) and bone-to-implant contact (BIC) were evaluated.



BIC evaluation. Total implant surface C1: (a) biologic drilling at low-speed and simplified drilling (hybrid drilling) (test group); (b) conventional drilling protocol (control group).

Results

The control group showed maximum temperatures of $35.3^{\circ}\text{C} \pm 1.8^{\circ}\text{C}$, DT of 10.4°C , and a mean time of 100 s/procedure; meanwhile, the test group showed maximum temperatures of 36.7°C , DT of 8.1°C , and a mean time of 240 s/procedure. After 30 days, CBL values for both groups (test: 1.168 ± 0.194 mm; control: 1.181 ± 0.113 mm) and BIC values (test: $43 \pm 2.8\%$; control: $45 \pm 1.3\%$) were similar, without significant differences ($P > 0.05$). After 90 days, CBL (test: 1.173 ± 0.187 mm; control: 1.205 ± 0.122 mm) and BIC (test: $64 \pm 3.3\%$; control: $64 \pm 2.4\%$) values were similar, without significant differences ($P > 0.05$). The BIC values were increased at 90 days in both groups compared with the 30-day period ($P < 0.05$).

Conclusions

Within the limitations of this study, the new hybrid protocol for the preparation of the implant bed without irrigation, increase the temperature similarly to the incremental conventional protocol, and requires twice the time for the completion of the drilling procedure in vitro. Crestal bone loss and bone-to-implant contact in the hybrid drilling protocol are comparable with the conventional drilling protocol and do not affect the osseointegration process in vivo.

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