An In Vitro Evaluation of Primary Stability Values for Two Differently Designed Implants to Suit Immediate Loading in Very Soft Bone.

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Krischik et al. (2021) compared in their in vitro study the primary stability of two dental implants with different thread designs in soft bone to suit immediate loading. The implants used were the ICX Active Master implant (3.75 x 12.5 mm, medentis medical GmbH, Germany) and the Conelog® Progressive-Line implant (3.8 x 11 mm, Camlog GmbH, Germany). A total of 11 implants of each group were inserted in the narrow part of fresh bovine ribs imitating very soft bone. The ICX Active Master implant was placed according to the standard drilling for soft bone (group A), and the Conelog® Progressive-Line implant was inserted according to two different drilling protocols: the original drilling protocol for soft bone (group B1) and the alternative (undersized) drilling protocol for very soft bone (group B2). After insertion, healing abutments of 2 mm height were connected to the implants and the primary stability was determined first by electronic percussion testing (Periotest M, Medizintechnik Gulden, Germany). Afterwards, magnetic pegs were installed on the implants instead of the gingiva formers and resonance frequency analysis (RFA, Mega ISQ Implant Stability Measurement Device, Megagen, Switzerland) was performed. The average of two measurements for each method and for each implant was used for statistical analysis.

The stability measurements resulted in the following order from highest to lowest stability: ICX Active Master implants (group A) showed highest primary stability (RFA: 71.39 ± 8.92; Periotest: -5.45 ± 1.69) followed by the Conelog® Progressive-Line implants placed in very soft bone according to the undersized drilling protocol (group B2) (RFA: 68.55 ± 6.67; Periotest: -3.84 ± 1.91). Conelog® Progressive-Line implants placed according to the original drilling protocol (group B1) obtained the lowest primary stability values (RFA: 61.93 ± 4.33 and Peri-otest: -1.7 ± 1.92). Statistical analysis of the resonance frequency analysis revealed that the primary stability obtained for group A implants was significantly higher than for group B1 implants. Other comparisons for RFA values between the three different groups did not show significant differences. Statistical analysis of the per-cussion testing showed significantly lower values for group A implants compared to group B1 implants. Again, other comparisons for percussion testing values failed to show significant differences.

Within the limitations of the study, the results suggest that the thread design of the implants as well as undersized drilling protocol are important for increasing implant stability, so that even in very soft bone sufficient primary stability is achieved as shown for the group A implants as well as for the group B2 implants. Future studies might be conducted to focus on the different primary stability values for immediate loading in vivo experiments. Future studies may be designed as prospective cohort study in order to determine lowest and safest primary stability values on type 4 and even very soft bone.