Changes in Implant Stability Using Different Site Preparation Techniques: Twist Drills versus Piezosurgery. A Single-Blinded, Randomized, Controlled Clinical Trial

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ABSTRACT

Purpose: The objective of the present investigation was to longitudinally monitor stability changes of implants inserted using traditional rotary instruments or piezoelectric inserts, and to follow their variations during the first 90 days of healing.

Materials and Methods: A randomized, controlled trial was conducted on 20 patients. Each patient received two identical, adjacent implants in the upper premolar area: the test site was prepared with piezosurgery, and the control site was prepared using twist drills. Resonance frequency analysis measurements were taken by a blinded operator on the day of surgery and after 7, 14, 21, 28, 42, 56, and 90 days.

Results: At 90 days, 39 out of 40 implants were osseointegrated (one failure in the control group). Both groups showed an initial decrease in mean implant stability quotient (ISQ) values: a shift in implant stability to increasing ISQ values occurred after 14 days in the test group and after 21 days in the control group. The lowest mean ISQ value was recorded at 14 days for test implants (97.3% of the primary stability) and at 21 days for the control implants (90.8% of the primary stability). ISQ variations with respect to primary stability differed significantly between the two groups during the entire period of observation: from day 14 to day 42, in particular, the differences were extremely significant ($p < .0001$). All 39 implants were in function successfully at the visit scheduled 1 year after insertion.

Conclusions: The findings from this study suggest that ultrasonic implant site preparation results in a limited decrease of ISQ values and in an earlier shifting from a decreasing to an increasing stability pattern, when compared with the traditional drilling technique. From a clinical point of view, implants inserted with the piezoelectric technique demonstrated a short-term clinical success similar to those inserted using twist drills.

KEY WORDS: clinical trial, implant site preparation, implant stability, piezosurgery, resonance frequency analysis