Comparison of heat generation between internally guided (cannulated) single drill and traditional sequential drilling with and without a drill guide for dental implants.

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Abstract

PURPOSE: To determine whether a wire-guided single drill protocol could be utilized without causing an increase in bone temperature beyond those seen with the traditional techniques of sequential drilling with and without a drill guide.

MATERIALS AND METHODS: A bovine femoral bone model was used with thermocouples and infrared temperature measurements to record thermal increase of the bone and drills during implant site preparation. Two thermocouples, one on each side of the osteotomy, were placed 1 mm from the outer diameter of the final drill. Drilling was performed at a constant speed (2,100 rpm) and pressure (2 kg) under continuous room temperature irrigation. Infrared temperature measurements of each drill were taken immediately before and after drilling. The six study groups included standard sequential drilling protocols for 3.5-mm and 4.2-mm final drills with and without the use of a surgical guide, and cannulated single drill technique for 3.5-mm and 4.2-mm drills. Statistical analysis was performed using a Tukey post hoc one-way ANOVA test. P<.05 was determined to be significant.

RESULTS: No significant difference in thermal increase was found between single drill cannulated implant site preparation and sequential drilling with or without the use of a drill guide for the 3.5-mm or 4.2-mm drilling sequences, respectively. The thermal increase was found to be significantly less for the 4.2-mm single drill compared with the 3.5-mm sequential drill with surgical guide (P=.046). Infrared temperature measurement revealed no significant difference in drill temperatures throughout the study.

CONCLUSIONS: Cannulated single drill technique does not cause an increase in bone temperature greater than that seen with standard sequential drilling with or without a surgical guide.

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