Abstract

Background: To assess the effect of implantoplasty and implant-abutment design on the fracture resistance and macroscopic morphology of narrow-diameter (3.5 mm) dental implants.

Material and Methods: Screw-shaped titanium dental implants (n = 48) were studied in vitro. Three groups (n = 16) were established, based on implant-abutment connection type: external hexagon, internal hexagon and conical. Eight implants from each group were subjected to an implantoplasty procedure; the remaining 8 implants served as controls. Implant wall thickness was recorded. All samples were subjected to a static strength test.

Results: The mean wall thickness reductions varied between 106.46 and 153.75 μm. The mean fracture strengths for the control and test groups were, respectively, 1211.90±89.95 N and 873.11±92.37 N in the external hexagon implants; 918.41±97.19 N and 661.29±58.03 N in the internal hexagon implants; and 1058.67±114.05 N and 747.32±90.05 N in the conical connection implants. Implant wall thickness and fracture resistance ($P < 0.001$) showed a positive correlation. Fracture strength was influenced by both implantoplasty ($P < 0.001$) and connection type ($P < 0.001$).

Conclusions: Implantoplasty in diameter-reduced implants decreases implant wall thickness and fracture resistance, and varies depending on the implant-abutment connection. Internal hexagon and conical connection implants seem to be more prone to fracture after implantoplasty.

Key words: *Dental implants, narrow diameter, implant connection, peri-implantitis, implantoplasty, fracture strength.*