Stability of Narrow Diameter Implants in Dense Bone. An In-Vitro Study.

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INTRODUCTION

Narrow diameter implants have been used in clinical situations with horizontal bone loss, in order to avoid alveolar ridge augmentations or ridge extension techniques. The aim of this study was to evaluate the initial stability of dental implants with narrow diameters placed in dense bone in vitro.

MATERIALS & METHODS

A total of 60 narrow diameter dental implants were inserted into artificial bone blocks representing type II bone quality according to Lekholm and Zarb (1986). 20 implants (**Dentatus Anew**®) with 2.4mm/10mm, 20 with 3.5mm/11mm and 20 tapered threaded implants with 3.7mm/11mm were placed using 1,500 RPM by a calibrated clinician. The primary stability was evaluated using the Periotest device (PV) by another unbiased, and calibrated clinician. Statistical analysis with non-parametric Kruskal Wallis test followed by Dunn's multiple comparison test, were performed to compare the initial stability of the different implant designs.

RESULTS

The results showed Periotest stability values within the normal limits. The greatest stability was found for the narrow diameter implants with diameters 2.4 and 3.5mm ($p > 0.05$). There was no statistical significant difference found for implant stability between the implant designs with 2.4 and 3.5mm diameters ($p > 0.05$) but it was significantly ($p < 0.05$) lower stability (higher PVs) for implants with greater diameter (see Tables).

Statistics	(D) 2.4mm	(D) 3.5mm	(D) 3.7mm
Mean (PV)	0.95	1.11	2.25
Standard Deviation (SD)	0.39403	1.1192	1.1642
Sample Size (N)	20	20	20

Group Comparison	Mean Rank Difference	P- Value
Implants (2.4mm vs 3.7mm)	-21.200	<0.001
Implants (2.4mm vs 3.5mm)	-5.875	>0.05
Implants (3.5mm vs 3.7mm)	15.325	<0.01

Figure 1. Periotest Device

CONCLUSIONS

Within the limitations of this study, narrow diameter implants with diameters narrower than 3.5 mm present an excellent stability in dense bone qualities. This is likely due to the simplified drilling protocol technique, which does not require sequential drills and may further violate implant stability.

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