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## Primary Apical Stability of Tapered Implants Through Reduction of Final Drilling Dimensions in Different Bone Density Models: A Biomechanical Study”

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## SUMMARY.

### Objectives

A biomechanical study of the primary apical stability obtained in tapered implants through the reduction of final drilling dimensions in different bone density models.

### Material and methods

An in vitro study of maximum insertion torque and primary stability based on the resonance frequency analysis (RFA) of 24 conical implants measuring 13mm in length and 3.75 and 4.20mm in diameter (C1 Implants, MIS Implants Technologies Ltd.), randomly inserted in 10mm sockets prepared in 4 polyurethane blocks with a density of 15, 20, 30, and 40 pounds per cu ft, respectively, reducing the diameter of the final drill at constant speed (400 rpm) to obtain exclusive 4mm anchoring of the apical third of each implant.

### Results

The decrease in drilling diameter resulted in an increase in the insertion torque and implant stability quotient (ISQ) values in all implants, although without reaching statistical significance. In turn, a significant direct correlation was found between increasing bone analog block density and the insertion torque and ISQ values.

### Conclusions

Under the conditions of this study, the primary apical stability obtained may be more dependent on bone density than on reduction of the final drilling diameter.

Variable	N	Bone Density Blocks	Mean (m±SD)	Range		Significance
				Low	High	
Insertion torque (N*cm)	6	15 pcf (D4)	6.50±3.01	3	10	0.000
	6	20 pcf (D3)	25.50±4.27	18	30	
	6	30 pcf (D2)	46.00±8.48	35	60	
	6	40 pcf (D1)	90.00±31.46	45	120	
RFA stability (ISQ)	6	15 pcf (D4)	19.33±4.92	11	26	0.000
	6	20 pcf (D3)	33.33±5.31	27	42	
	6	30 pcf (D2)	44.66± 4.32	37	49	
	6	40 pcf (D1)	55.83±2.78	52	59	

Table 1. Insertion Torque and RFA Stability Values by Different Bone Density Blocks. Low insertion torque and RFA values obtained in the 15 pcf bone block analog to D4 bone do not suppose that sufficient initial stability for placement of immediate implants in this type of bone is obtained.

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