Shaping ability of austenitic versus martensitic nickel-titanium endodontic instruments in simulated canals

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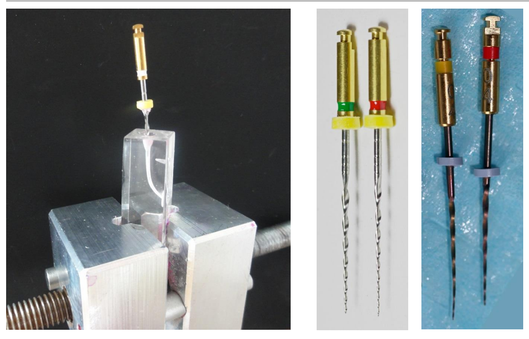
Aim

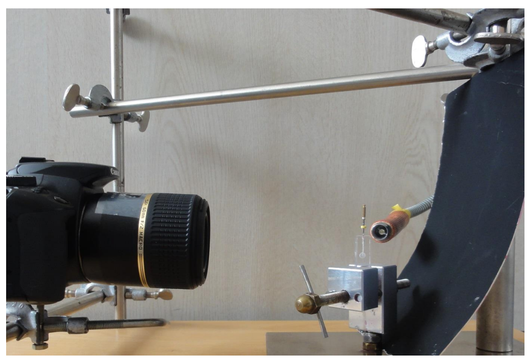
To compare canal preparation outcomes achieved by new rotary nickel-titanium systems: austenitic two- files system F360 and martensitic HyFlex®CM™ instruments of the same size.

Conclusion

Under the conditions of this study, both systems were comparable to each other in regards to their ability to enlarge root canal in the same way without procedural errors. HyFlex®CM™ instruments could be used as two- files system.

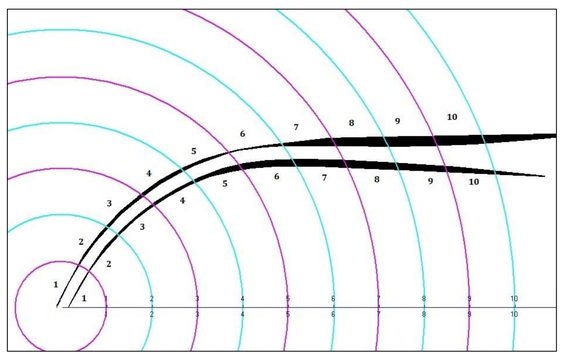
Methodology





Twenty simulated root canals each with a curvature of 35˚ in resin blocks were divided into two groups of 10 canals each. In the austenitic group F360 instruments (Gebr. Brasseler, Germany) were used to prepare the canals according to manufacturer's instruction with files size 25/ .04 taper and size 35/ .04 taper. In the martensitic group HF- HyFlex®CM™ System (Coltène Whaledent, Swiss) was used to prepare the canals with files size 25/ .04 taper and size 35/ .04 taper instead of conventional full sequence. To better illustrate the results, canals preparation was supplemented with files size 45/ .04 taper in both groups. Images were taken before canal preparation and after the use of each instrument.

The assessment of the canal shapes was accomplished with a computer image analysis program (GSA, Germany). Material removal was measured in 10 segments of root canal. Data were further statistically analysed using SPSS program, version 19 (Wilcoxon and Mann–Whitney U-tests, at a confidence interval of 95%).

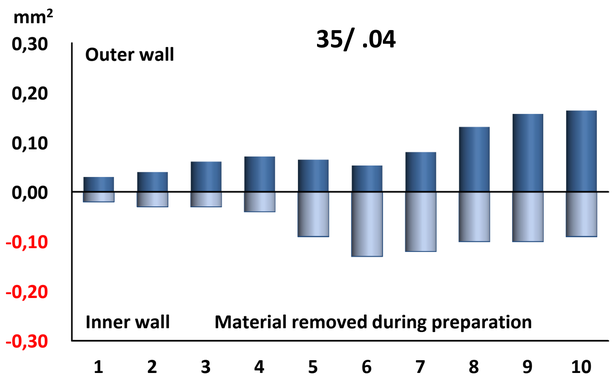


Results

Shaping ability– maintaining original canal curvature

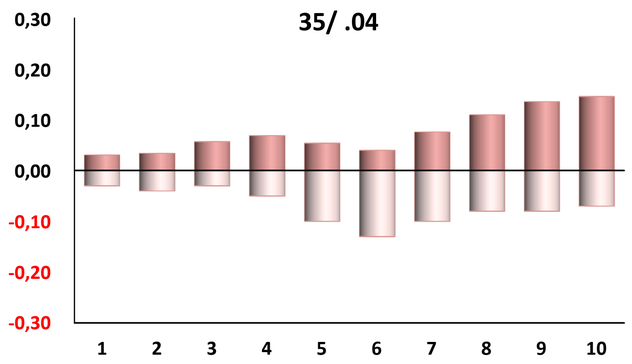
The removal of material in most canal segments was not equal on the inner and outer wall.

F360 instruments



Canal preparation to size 35/ .04 taper maintained the original canal curvature in two segments (2 and 5), where the same amount of material was removed from the inner and outer wall of the canal.

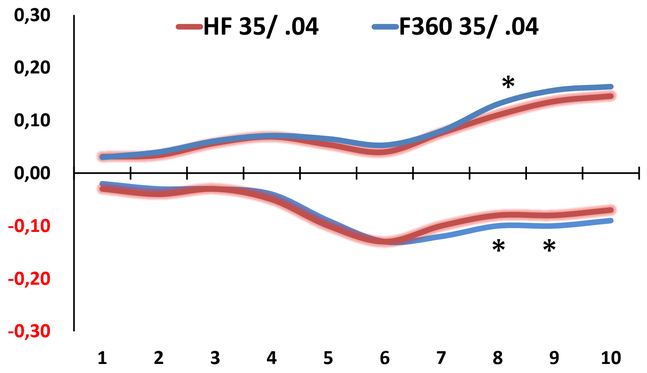
HyFlex®CM™ instruments



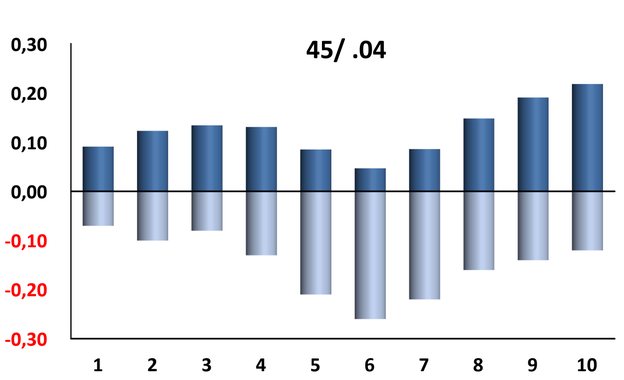
Canal preparation to size 35/ .04 taper maintained the original canal curvature in three segments (1, 2 and 7), where the same amount of material was removed from the inner and outer wall of the canal.

Instruments comparison

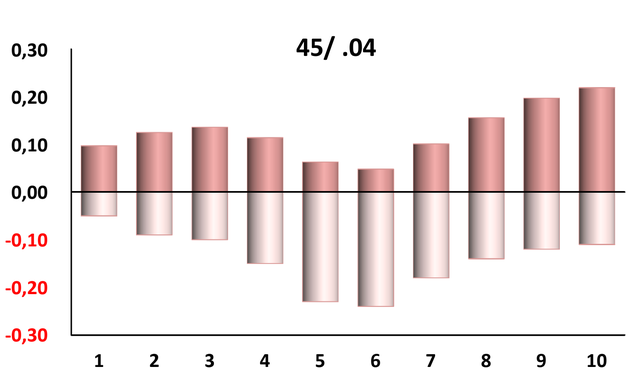
In most canal segments, no significant differences were observed between either systems in the amount of material removed.



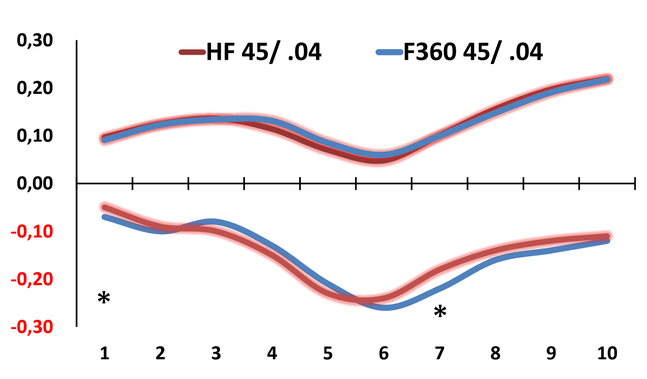
Statistically significant difference was found in one segment (8) on the outer wall and in two segments (8 and 9) on the inner wall (* P ≤ 0.05).



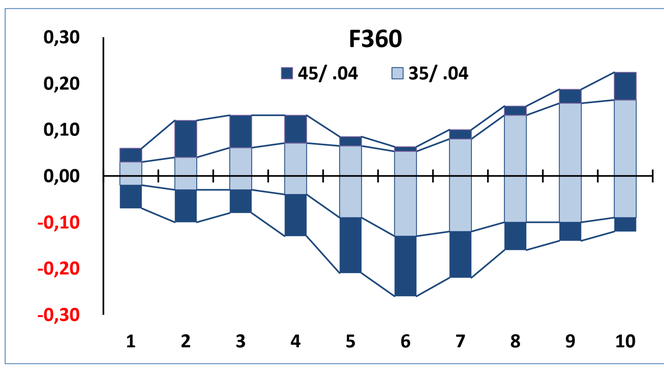
Continuous preparation with size 45/ .04 taper maintained the original canal curvature in four segments (1, 2, 4 and 8), where the same amount of material was removed from the inner and outer wall of the canal.

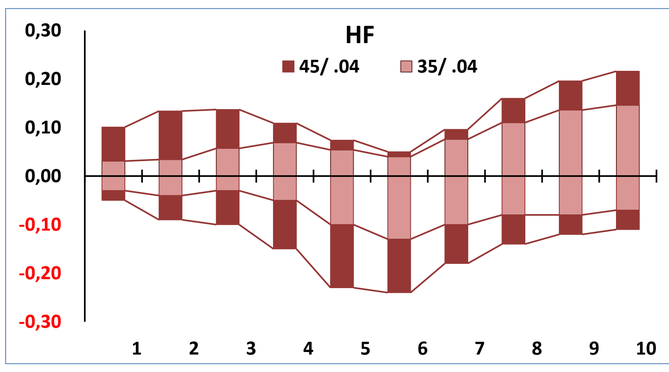


Continuous preparation with size 45/ .04 taper maintained the original canal curvature in two segments (4 and 8), where the same amount of material was removed from the inner and outer wall of the canal.



Statistically significant difference was found only in two segments (1 and 7) on the inner wall (* P ≤ 0.05).





When canals were enlarged up to size 35/.04 taper files, HF instruments maintained canal shape better than those of F360.

Further enlargement to size 45/ .04 taper files showed better canal shape for F360 instruments than those for HF.