

Straightening of root canals following preparation with rotary NiTi systems

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Introduction

The straightening of curved root canals is one of the most common complications in the context of endodontic treatment.¹ Due to irregular removal of circumpulpal root dentin, not all areas infected by microorganisms can be eliminated, which may question the success of the treatment. When the root canal preparation results in a straightening of the canal, and thus it is no longer possible to recapitulate the natural canal course, niches are created that cannot be reached by rinsing liquids and root-filling materials. If the canal is curved, the risk of iatrogenic damage during treatment is increased.²

Aim of the study

The aim of the present study was to investigate straightening of curved root canals after the engine-driven nickel-titanium systems Hero (Micro Mega, France), Revo-S (Micro Mega, France), Twisted Files (Kerr Endodontics, USA) and Mtwo (VDW, Germany) were used for root canal preparation.

Material and Methods

A total of 60 root canals in extracted human teeth with a curvature of at least 25° were prepared. In each case, 15 canals were randomly assigned and prepared with the Hero 642 system (H), the Revo-S system (R), the Twisted File system (T), and the Mtwo system (M) according to the manufacturer's instructions.

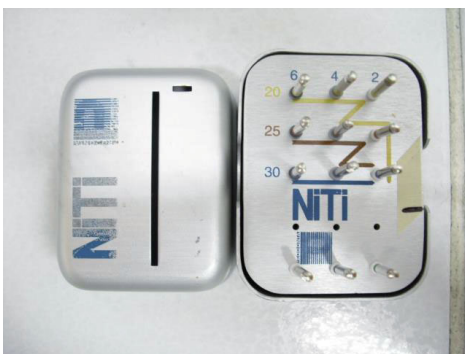


Fig. 1: HERO 642



Fig. 2: Revo-S



Fig. 3: Twisted Files



Fig. 4: Mtwo

The sequence for strongly curved canals, respectively wide canals was used. The degree of straightening was evaluated by superimposition of standardised digital x-ray images taken before and after root canal preparation. These images were generated from X-rays of 2 planes which were at an angle of 90° to each other. The curvature was determined according to Schneider.³

Results

The statistical analysis showed a significant influence of the rotary systems used to straighten the root canals ($p < 0.001$, ANOVA). For the four-test series, the following straightenings were evaluated (mean values and standard deviations in °):

Group	H	R	T	M
Mean	4.78	7.67	5.07	4.23
SD	3.24	5.04	2.91	2.33

Table 1: Mean values and standard deviations (in °) within the different groups

Pairwise comparison showed significantly higher straightening in specimens treated with Revo-S compared to the other systems ($p < 0.05$, Tukey's test). The comparison of straightening within the other groups H, T, and M showed no significant differences ($p > 0.05$, Tukey's test).

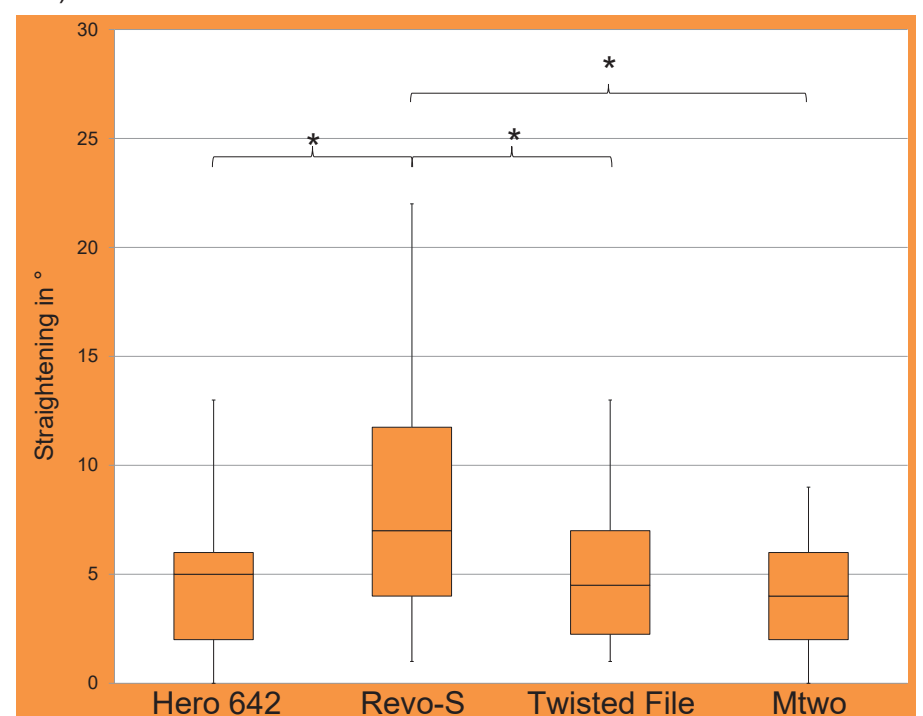


Fig. 5: Boxplot of the results (in °)

Conclusion

Regarding the limitations of an in vitro study, it can be concluded that all root canal preparation systems were associated with canal straightening, while Revo-S significantly showed the strongest straightening.

Literature

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