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Original Research

To compare different file system in removing root canal debris- An vitro study

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ABSTRACT :)
Background: Debris is the dentin chips, pulp remnants, and particles loosely attached to the root canal wall. The present study was conducted to compare different file system in removing debris. **Materials & Methods**: The present study was conducted on 60 freshly extracted mandibular premolars. The extracted teeth were divided into 2 groups of 30 teeth each. In group I, teeth were prepared with Protaper next file system and group II, teeth were prepared with hero shaper file system. Scoring for debris was done using Hulsmann criteria. **Results**: The mean debris score at coronal third in group I was 3.18 and in group II was 3.22, at middle third was 2.88 in group I and 2.99 in group II, at apical third was 2.34 in group I and 3.65 in group II. The difference was significant at apical third (P< 0.05). **Conclusion**: Authors found that Protaper next file system is better in removing debris as compared to Hero shaper and K3 file system.
Key words: fracture, Mandibular, ramus

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INTRODUCTION

The primary objective of root canal instrumentation is the removal of vital and necrotic pulp tissue, infected dentine and dentine debris to eliminate most of the microorganisms from the root canal system. Debris is the dentin chips, pulp remnants, and particles loosely attached to the root canal wall. The apical thirds of the root canal system are always most difficult to clean due to complex anatomies present like deltas, lateral canals, isthmuses and ramifications.[1]

Irrigating solutions promote the disinfection and the debridement of the endodontic space so they are necessary for the success of each root canal treatment. Instruments alone are not able to eliminate bacteria and all modern nickel-titanium (NiTi) systems may produce a large amount of debris along the canal walls.[2]

Several NiTi systems have been introduced in the market since they have been developed more than 20 years ago.[3] Because of their motion inside the canal, they create debris and a smear layer that have to be removed with the aid of irrigating solutions. The Pro Taper next file system having an off-centered rectangular design and progressive and regressive percentage tapers on a single file decreases the effect of the screw and dangerous taper lock by minimizing the contact between the file and the dentin. Hero shaper file system edge during manufacturing has been purposely dulled to reduce the screwing-in action.[4] The present study was conducted to compare different file system in removing debris.

MATERIALS & METHODS

The present study was conducted in the department of Endodontics. It comprised of 60 freshly extracted mandibular premolars. Ethical approval was obtained from institute prior to the study.

The extracted teeth were divided into 2 groups of 30 teeth each. The teeth were decoronated and their root lengths were standardized to 14 mm. Working lengths was determined. In group I, teeth were prepared with Protaper next file system and group II, teeth were prepared with hero shaper file system. Each prepared canal was flushed with 5 ml of 17% liquid EDTA for 60 seconds, followed by 5.25% sodium hypochlorite for 1 minute. Longitudinal sectioning

of all the teeth was done and teeth were split in half longitudinally. Each half was further divided into three parts that are the coronal third, middle third and apical third, and each third was evaluated under magnification of 40X under the stereomicroscope. SEM evaluation was done under 500X magnification.

Scoring for debris was done using Hulsmann criteria as follows. Score I was clean root canal wall, only a few small debris particles. Score 2 was few small agglomerations of debris. Score 3 was many agglomerations of debris covering less than 50% of the root canal wall. Score 4 was more than 50% of the root canal wall covered by debris and score 5 was complete or nearly complete root canal wall covered by debris. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I: Distribution of teeth

Groups	Group I	Group II
System	Protaper next file system	Hero shaper file system
Number	30	30

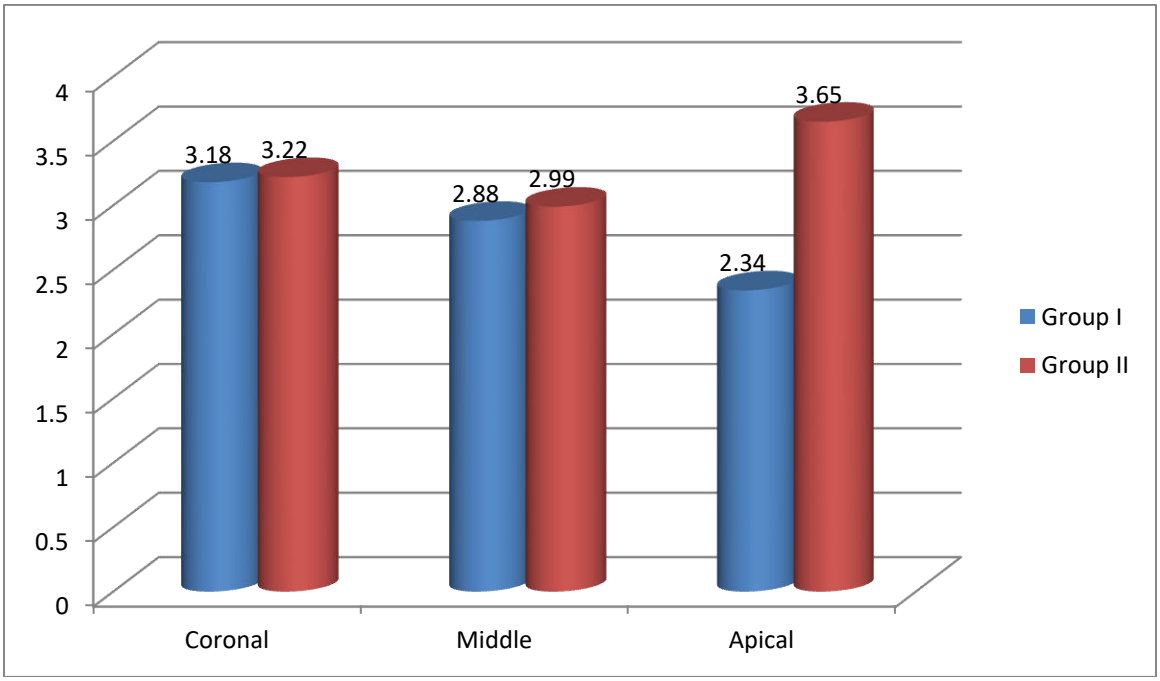
Table I shows that in group I, teeth were prepared with Protaper next file system and group II,teeth were prepared with hero shaper file system.

Table II : Mean debris score

Area	Group I	Group II	P value
Coronal	3.18	3.22	0.82
Middle	2.88	2.99	0.91
Apical	2.34	3.65	0.02

Table II, graph I shows that mean debris score at coronal third in group I was 3.18 and in group II was 3.22, at middle third was 2.88 in group I and 2.99 in group II, at apical third was 2.34 in group I and 3.65 in group II. The difference was significant at apical third (P< 0.05).

Graph I: Mean debris score



DISCUSSION

Many efforts have been made to facilitate mechanical preparation of the endodontic space and to improve the predictability of each root canal treatment, so new NiTi instruments have been created to achieve this aim.[5] Single-use and single-file systems represent the most recent solution to make the root canal treatment easier (due to the reduction of the files necessary for complete root canal shaping)and safer (due to the reduction of stresses related to reuse, to disinfecting procedures and to thermal cycles in the autoclave).[6]

All endodontic instruments create debris and smear layer as a consequence of their action on the root canal walls. This debris may be compacted along the surface of canal wall and prevents the efficient removal of microorganisms from the root canal system, one of the fundamental purposes of thorough debridement of the root canal system, increasing the risk of bacterial contamination. Moreover, debris may occupy part of the root canal space, preventing complete obturation of the root canal. Therefore, debris should be entirely removed.[7] The present study was conducted to compare different file system in reducing debris.

In present study teeth were divided into 2 groups of 30 teeth each. The teeth were decoronated and their root lengths were standardized to 14 mm. Working lengths was determined. In group I, teeth were prepared with Protaper next file system and group II, teeth were prepared with hero shaper file system.

Chäfer et al[8] evaluated & compared the cleaning efficacy of teeth instrumented with three different rotary instrumentation systems. The three file systems used in this study were Protaper Next, Hero Shaper and K3 File System. Based on the stereomicroscopic analysis of specimens, it can be concluded that in the apical third of root canal system cleaning efficacy was significantly higher for Protaper Next and K3 file system as compared to Hero Shaper file system while based on the SEM analysis of specimens, it can be concluded that in the coronal, middle and apical third of root canal system, cleaning efficacy was significantly higher for the K3 file system as compared to Hero Shaper file system.

We found that mean debris score at coronal third in group I was 3.18 and in group II was 3.22, at middle third was 2.88 in group I and 2.99 in group II, at apical third was 2.34 in group I and 3.65 in group II. The difference was significant at apical third ($P< 0.05$).Kohli et al[9] in their study forty-eight single-rooted teeth were divided into four groups and shaped with One Shape (OS), F6 Sky Taper (F6), Wave One (WO) and Reciproc. The presence/absence of the smear layer and the presence/absence of open tubules at the coronal, middle, and apical third of each canal were estimated using a five-step scale for scores. ANOVA confirmed that the apical third of the canal maintained a higher quantity of debris and smear layer after preparation of all the samples; Single-use NiTi systems used in continuous rotation appeared to be more effective than reciprocating instruments in leaving clean walls. The reciprocating systems produced more debris and smear layer than rotating instruments.

CONCLUSION

Authors found that Protaper next file system is better in removing debris as compared to Hero shaper and K3 file system.

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