ORIGINAL RESEARCH

Evaluation of apical extrusion of debris with different files system

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***ABSTRACT*:)**
Background: Apical debris extrusion may be associated with pain and/or swelling in the presence of a severe inflammatory response in clinical practice. The present study was conducted to assess apical extrusion of debris with different files system. **Materials & Methods:** The present study was conducted on thirty freshly extracted maxillary central incisors. The 30 roots were divided into three groups based on the NiTi system. In group I PTN files were used in the sequence ProTaper Universal SX, PTN X1, PTN X2, PTN X3, PTN X4 and PTN X5. In group II, TF adaptive instruments were used in the sequence ML1, ML2, and ML3. In group III, a Reciproc R25 instrument was used. **Results:** Debris extrusion in group I was 0.00048 grams, in group II was 0.00059 grams and in group III was 0.00051 grams. The difference was non- significant (P> 0.05). **Conclusion:** We found that maximum amount of debris were extruded by TF adaptive instruments followed by Reciproc R25 and PTN files system.
Key words: Apical debris, PTN files, Reciproc R25

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INTRODUCTION

Cleaning and shaping of the root canal is one of the most important steps in any root canal treatment.[1] Complete debridement of the root canal system is complicated by the presence of a complex system of isthmuses, accessory canals, fins, and deltas that can provide ideal locations for harbouring bacteria, debris and necrotic tissue. Therefore, chemical debridement via use of irrigant is a necessary adjunct to mechanical instrumentation to achieve the goals of canal preparation.[2]

Apical debris extrusion may be associated with pain and/or swelling in the presence of a severe inflammatory response in clinical practice.[3] However, debris extrusion is an undesired result of mechanical instrumentation of the root canal, and none of the available instrumentation systems can completely prevent extrusion. Hence, techniques to minimize the phenomenon have been investigated. Apical debris extrusion reportedly varies based on kinematics, taper, cross-section, file number, and cutting efficacy.[4]

The ProTaper Next (PTN) system consists of three instruments made of an M-wire nickel titanium (NiTi) alloy. The M-wire alloy is manufactured via a thermal process. The Reciproc single-file system features a specialized motor that performs alternating clockwise (CW) and counterclockwise (CCW) motions collectively known as reciprocating motion, and it is recommended for single use. The Twisted File Adaptive system uses a combination of rotational and reciprocating motions.[5] The present study was conducted to assess apical extrusion of debris with different files system.

MATERIALS & METHODS

The present study was conducted in the department of Endodontics. It comprised of thirty freshly extracted maxillary central incisors. The study protocol was approved from institutional ethical committee.

The incisal surfaces of the teeth were flattened with high-speed bur. Access cavities were prepared and the working length was determined. Debris collection was achieved via a model described by Myers and Montgomery. The 30 roots were divided into three groups based on the NiTi system. In group I PTN files were used in the sequence ProTaper Universal SX, PTN X1, PTN X2, PTN X3, PTN X4 and PTN X5. In group II, TF adaptive instruments were used in the sequence ML1, ML2, and ML3. In group III, a Reciproc R25 instrument was used.

The teeth were removed from Eppendorf tubes, and the apical surfaces of the teeth were irrigated with distilled water to collect adhered debris. The dry weight of the extruded debris was obtained after a 5-day storage period in a 68°C incubator. 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	Group III
Materials	PTN files	TF adaptive	Reciproc R25
Number	10	10	10

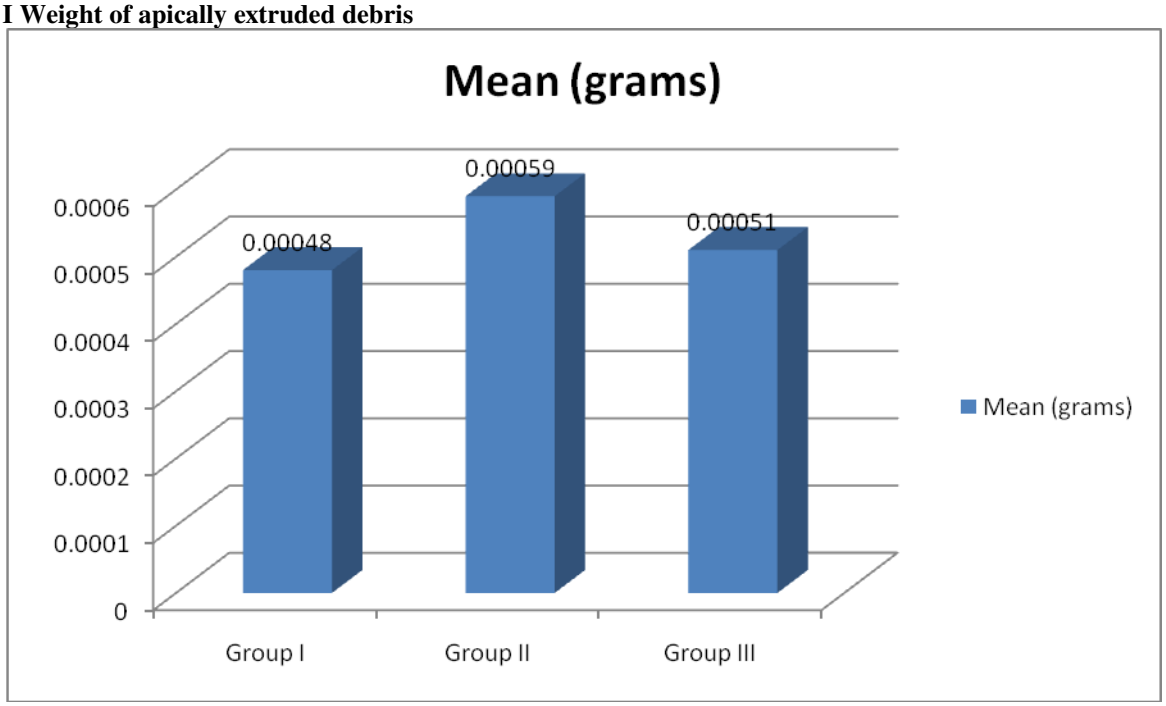
Table I shows type of files system used in all groups. Each group had 10 teeth each.

Table II Weight of apically extruded debris

Groups	Mean (grams)	P value
Group I	0.00048	0.61
Group II	0.00059	
Group III	0.00051	

Table II, graph I shows that debris extrusion in group I was 0.00048 grams, in group II was 0.00059 grams and in group III was 0.00051 grams. The difference was non- significant (P> 0.05).

Graph I Weight of apically extruded debris



DISCUSSION

Apical extrusion of irrigation solution as well as intracanal debris can accidently extrude into the periapical area. These two components were responsible for post-operative flare-ups. Vande Visse and Brilliant[6] were the first to quantify the amount of debris extruded apical-ly during instrumentation. They found that when instrumentation with irrigation was done, there was significant extrusion of debris. Whereas, when instrumentation was done alone there was no debris extrusion. Debris extruded from the apical foramen intraoperatively may result in postoperative pain. Thus, a reduction in debris extrusion during canal preparation is desirable in order to reduce postoperative pain following root canal treatment. The number of instruments used and the kinematics involved may contribute to debris extrusion during instrumentation.[7] The present study was conducted to assess apical extrusion of debris with different files system.

In present study, 30 roots were divided into three groups based on the NiTi system. In group I PTN files were used in the sequence ProTaper Universal SX, PTN X1, PTN X2, PTN X3, PTN X4 and PTN X5. In group II, TF adaptive instruments were used in the sequence ML1, ML2, and ML3. In group III, a Reciproc R25 instrument was used.

Tinoco et al[8] conducted a study in which thirty extracted upper six molars were selected. In all teeth the distal roots were sectioned and shortened to a length of 15 mm. The specimens were randomly divided into two groups (n= 15) according to the instrumentation system used. Group A: One shape file (single file system), Group B: Revo-S (multiple-file rotary system). Bi-distilled water was used as the irrigant with traditional needle irrigation delivery system. The apically extruded debris and irrigant were collected into pre-weighed glass vials. The amount of extruded debris and irrigant were assessed with a precision electronic balance. The liquid inside the tubes was dried and the mean weight of debris was assessed. The One shape file system produced significantly less amount of debris and irrigant compared with Revo-S file system.

We found that debris extrusion in group I was 0.00048 grams, in group II was 0.00059 grams and in group III was 0.00051 grams. Arslan et al[9] in their study found that the Reciproc file system produced significantly more debris compared with One Shape file system (P<0.05), but no statistically significant difference was obtained between the two reciprocating instruments (P>0.05). Extrusion of irrigant was statistically insignificant irrespective of the instrument or instrumentation technique used.

Karatas et al[10] conducted a study to compare the amount of apically extruded debris during root canal instrumentation using ProTaper Next (PTN), Twisted File (TF) Adaptive, and Reciproc instruments. Forty-five extracted human maxillary canines were selected and randomly assigned into 3 groups. The greatest amount of debris extruded by TF Adaptive and the least by PTN, but

the difference was insignificant between groups (p=0.259). All instrumentation systems were associated with debris extrusion.

CONCLUSION

Authors found that maximum amount of debris were extruded by TF adaptive instruments followed by Reciproc R25 and PTN files system.

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