



In vitro comparison of apical debris extrusion produced by different instrumentation techniques

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INTRODUCTION

During instrumentation, apical extrusion of debris (AED) from the inside of the root canal to the periapical tissues may occur. All preparation techniques and devices are associated with AED¹. However, different instrumentation techniques and different instruments are associated with different amounts of AED. These differences can be justified by^{2,3}:



- Instrument design
- Irrigation substances and technique application
- Anatomical features
- Root canal instrumentation to the apex
- Glide Path execution

OBJECTIVE: Compare the amount of AED by the apical foramen, created by two hybrid techniques: TruNatomy[®]/ProTaper Gold[®] (TN/PTG), and TruNatomy[®]/ProTaper Next[®] (TN/PTN), and two single system techniques: ProTaper Gold[®] (PTG) and ProTaper Next[®] (PTN).

METHODS AND MATERIALS

80 permanent teeth with single root were selected. Inclusion criteria were: closed apex, without root caries and resorption/calcification or previous endodontic treatment. The 80 teeth were randomly assigned into 4 groups (n=20), according to the instrumentation technique: TN/PTG; TN/PTN; PTG e PTN. The debris was collected in Eppendorf tubes (ET).

Groups in test and discrimination of the files used		
Group	Shaping files	Finishing files
1- TN/PTG	TN Glider, TN Small	F1, F2 F3, F4
2-TN/PTN	TN Glider, TN Small	X2, X3, X4
3- PTG	S1, S2	F1, F2, F3, F4
4- PTN	X1	X2, X3, X4



Fig. 1. ADE after instrumentation followed by filling the ET with 1,5 mL of NaOCl

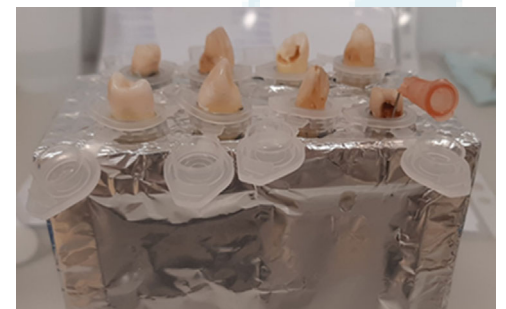


Fig. 2. Deviced adapted by Myers &Montgomery

After instrumentation, each tooth was removed from the ET and, after filling with 1.5 mL NaOCl, each ET was stored in an incubator at 70°C for 5 days. Three ET, without AED, containing 1.5mL 3% NaOCl were used as control. After the incubation period, each ET was weighed three times to obtain an average weight. The amount of AED, in each ET of the test's group, was calculated by subtracting the control-weighed ET to the post-preparation weight. After checking normality (Shapiro-Wilk test), the Kruskal-Wallis non-parametric test was performed followed by the Mann-Whitney test with Bonferroni correction to identify significant differences ($\alpha=0.05$).

RESULTS

	Apical Extruded Debris (g) vs. Instrumentation Technique			
	G1 TruNatomy/ ProTaper Gold	G2 TruNatomy/ ProTaper Next	G3 ProTaper Gold	G4 ProTaper Next
n	20	20	20	20
AV ± StDev	0.041 ± 0.015	0.019 ± 0.018	0.067 ± 0.022	0.038 ± 0.012
Me (P25-P75)	0.045 (0.033-0.050)	0.012 (0.007- 0.025)	0.064 (0.051-0.081)	0.038 (0.032-0.046)
p*	<0,001 p (G1 vs. G2) = 0.005; p (G1 vs. G3) = 0.012; p (G2 vs. G4) = 0.046; p (G3vs. G4) = 0.001			

Av ± StDev, average and standard deviation; Me (P25-P75), Median value and interquartile range between brackets; * p values of the Kruskal-Wallis test followed by multiple comparison of the median of 2 groups through the Mann-Whitney test with Bonferroni correction

The hybrid techniques TN/PTG and TN/PTN groups produced significantly less extrusion compared to the PTG and PTN techniques ($p=0.012$ and $p=0.046$, respectively). The TN/PTN technique had a significantly lower AED than the other groups ($p \leq 0.046$) and the PTG technique significantly higher ($p \leq 0.012$).

CONCLUSION

CLINICAL SIGNIFICANCE

AED might cause *flare-ups* and decrease the success rate of the endodontic treatment. The file design, preparation technique and irrigation protocol may affect the amount of AED. According to the results of this study, hybrid technique with TN *Glide Path* preparation caused less apical debris extrusion than PTG and PTN systems.

Hybrid instrumentation techniques TN/PTG and TN/PTN produced significantly less AED than the PTG and PTN techniques

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