

# Apical extrusion of debris produced by reciprocating and continuous rotation systems



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## INTRODUCTION

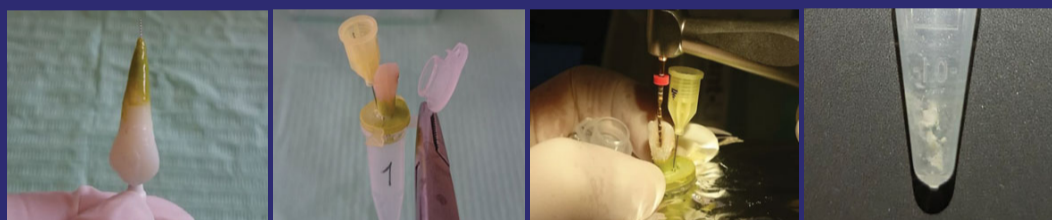
Apical extrusion debris (AED), an undesirable consequence of root canal instrumentation can be associated with pain or edema and may delay the periapical healing. It has been shown that it can depend on different factors, as the kinematics, alloy type, number and diameter of instruments used.

## OBJECTIVE

To evaluate and quantify the AED in root canal instrumentation with continuous and reciprocating rotary systems.

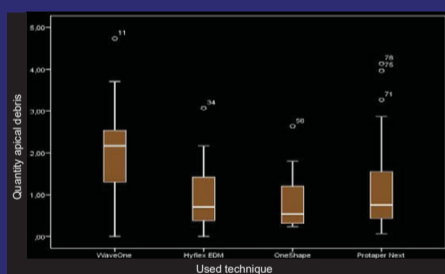
## METHODS AND MATERIALS

80 single root canal teeth were randomly divided into 4 groups (n = 20): One Shape® (OS) Protaper NEXT® (PTN), Hyflex® EDM (HF) and WaveOne Gold® (WOG). Eppendorf tube (ET) was weighed in advance with an analytical precision scale, and with an inserted tooth, it was mounted on a modified device similar to the method described by Myers & Montgomery(1991). The root canals were instrumented according to the manufacturer and irrigated with distilled water. The instrumented teeth were removed from the ET and these were filled with distilled water up to 1.5 ml, incubated at 70°C for five days and weighed again, the difference between the initial weight and final was calculated determining the weight of debris. Data was statistically analysed using IBM SPSS Statistics 22, considering  $\alpha = 0.05$ . Kruskal-Wallis test and post-hoc adjustment of p-value by Dunn-Bonferroni method was carried out.

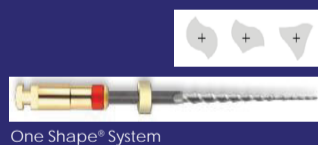


## RESULTS

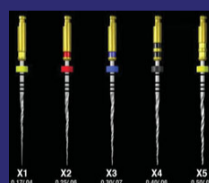
There was AED in all instrumentation techniques. Statistical analysis showed significant differences in AED between the techniques used ( $\alpha = 0.002$ ). Among the WOG and OS techniques ( $\alpha = 0.003$ ), WOG and PTN ( $\alpha = 0.023$ ) and WOG and HF ( $\alpha = 0.028$ ).



Extreme and quartiles diagrams of the amount of EAD in each technique.



One Shape® System



Protaper Next® System



WaveOne Gold® System



Hyflex® System

| Compared techniques        | $\alpha$ set |
|----------------------------|--------------|
| OneShape - Protaper Next   | 1,000        |
| OneShape - Hyflex EDM      | 1,000        |
| OneShape - WaveOne         | 0,003*       |
| Protaper Next - Hyflex EDM | 1,000        |
| Protaper Next - WaveOne    | 0,023*       |
| Hyflex EDM - WaveOne       | 0,028*       |

Post-hoc adjustment of p-value by Dunn-Bonferroni method

## CONCLUSION

HF technique presented lower AED while WOG technique with reciprocating movement is a major risk factor due to greater AED. The results of this study indicated that practitioners should be aware of the debris extrusion with each instrument, which could help with the decision for selection of a particular instrument.

## CLINICAL IMPLICATION

The choice of root canal instrumentation system influences the extrusion of debris.

## KEYWORDS

Extrusion debris, root canal instrumentation, continuous rotation, reciprocating movement, M-Wire, CM-Wire.

## BIBLIOGRAPHY

Myers, G. L., & Montgomery, S. (1991). A comparison of weights of debris extruded apically by conventional filling and Canal Master techniques. *Journal of endodontics*, 17(6), 275-279.

