

INTRODUCTION

Extrusion of debris, microorganisms, pulp tissue, and other factors during root canal procedures is one of the main causes of treatment and retreatment failure. Extrusions have also been associated with pain, periapical inflammation, delayed periapical healing, and flare-ups. It is of no doubt that foreign bodies extruded into the periapical tissue elicit an inflammatory reaction.

SAMPLE SIZE

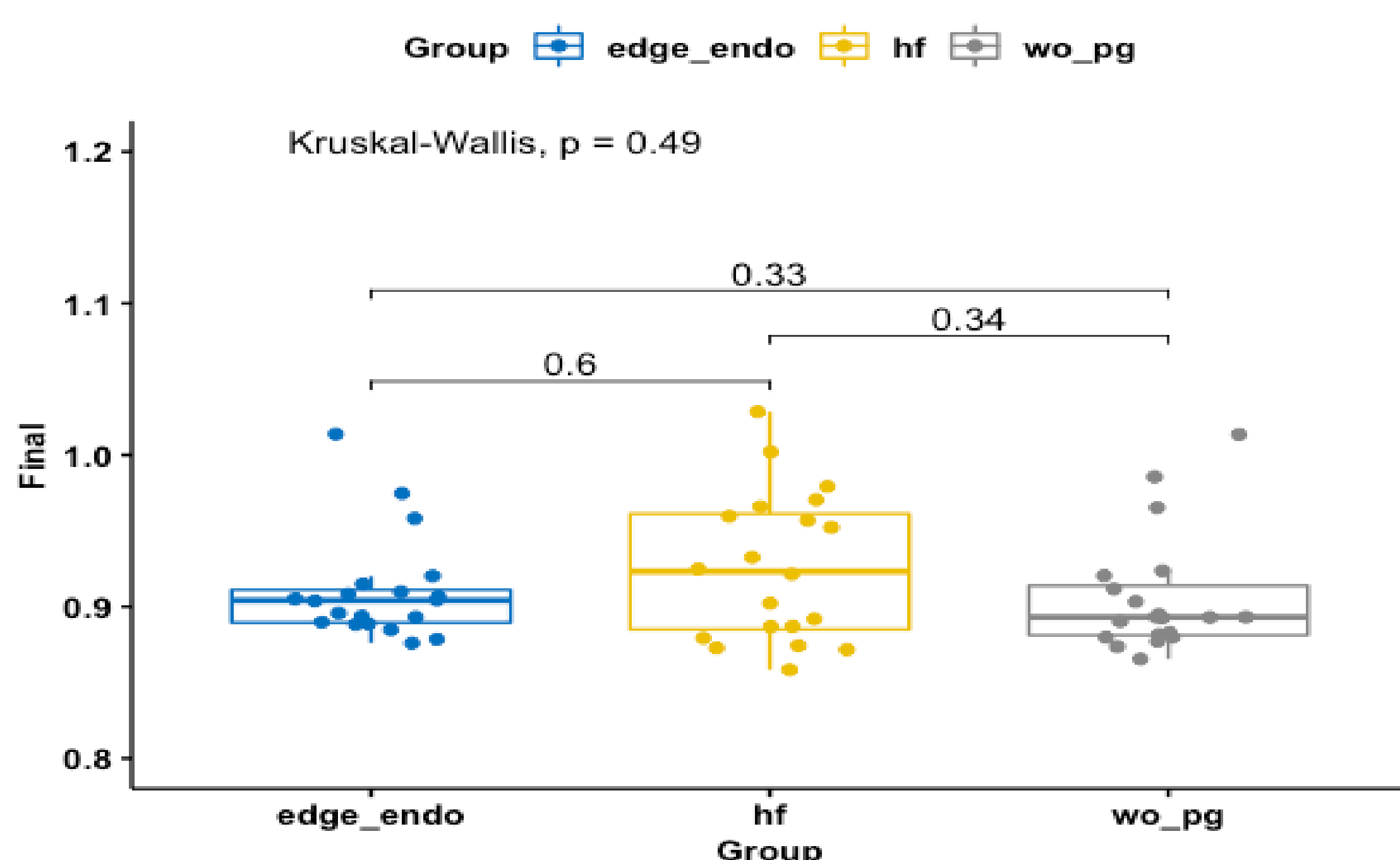
This study used 60 teeth (20 central incisors, 20 single-rooted premolars, 20 canines) from anonymous donors and is selected based on the following criteria: fully formed apices, dilacerations <15 degrees, and criteria determined by methods of Schneider.

DEBRIS COLLECTION MODEL

A size #10 K-file (Dentsply Sirona, Charlotte, NC, USA) was used to determine the WL for all 60 extracted teeth staying 1mm away from the apex. The teeth were placed in a rubber dam and sealed with cyanoacrylate gel (Gorilla Glue Company, Cincinnati, OH, USA) Prior to instrumentation and placement of the decoronated tooth with the rubber dam into the Eppendorf tubes, the Eppendorf tubes were weighed using a DHAUS Analytical plus scale and a pre-instrumentation weight was obtained and recorded. Following, the teeth were sealed with cyanoacrylate gel onto the rubber dam and transferred to Eppendorf Tubes (Eppendorf AG, Hamburg Germany). A glass vial was used to hold the Eppendorf tubes in place. 2ml Eppendorf tubes were placed for the purpose of collecting any debris and irrigating solution that extrudes during instrumentation. All Eppendorf tubes and glass vials were labeled according to its assigned number (1-60). Glass vials were used to hold Eppendorf tubes in place and provide a stable set-up for instrumentation.

The 60 teeth were divided into three groups: Group A central incisors, Group B premolars, and Group C canines. The irrigation process was performed using a double side vented 25Ga irrigating syringe (Dentsply Sirona, Pennsylvania, USA) 3mm short of the WL.

STATISTICAL ANALYSIS



OBJECTIVE

To determine which of the following intracanal preparation systems results in the least amount of extruded debris from the apical foramen during use - Edge File X1 (reciprocating system), or WaveOne Gold (reciprocating system), when compared to the historical application of K-files during canal penetration, enlarging, shaping, and cleaning.

INSTRUMENTATION

Group A: During hand instrumentation, patency was obtained by a #10 K-file. Introduction of each K file: 10, 15, 20, 25 were introduced with RC PREP (Premier Dental CO, Pennsylvania, USA). Irrigation was performed with 3ml of 5.25% sodium hypochlorite (Vista Dental Products, Racine, WI, USA) using a double-sided irrigation tips (Dentsply Sirona, Pennsylvania, USA). The same process of cleaning, shaping, and irrigation was repeated with increasing increments of K file until size 25 file was reached. Final rinse with sodium hypochlorite + EDTA (Vista Dental Products, Racine, WI, USA) was performed.

Group B: Patency, irrigation, and final rinse was performed in the same way as group A. Irrigation always performed in between filing 3ml of 5.25% sodium hypochlorite. Pro-glider file 16.02 (Dentsply Sirona, Charlotte, NC, USA) was used with RC PREP and instrumented to WL. Irrigation was the performed. WaveOne Gold primary system (Dentsply Sirona, Charlotte, NC USA) was then used to WL. When the reciprocating system flowed smoothly and reached WL, a final rinse was performed.

Group C: Patency, irrigation, and final rinse was performed in the same way as group A. Irrigation always performed in between filing 3ml of 5.25% sodium hypochlorite. Edge glide file 16.02 (Edge Endo LLC, Albuquerque, NM, USA) was used with RC PREP and instrumented to WL. EdgeOne Fire system (Edge Endo LLC, Albuquerque, NM, USA) to WL. When the reciprocating system flowed smoothly and reached WL, a final rinse was performed.

Following instrumentation, Eppendorf tubes weight was collected: 'post instrumentation weight' of the debris and irrigating solution. Eppendorf tubes were left in an incubator for 15 days to evaporate the irrigant. Weight of Eppendorf tubes with dry extruded debris was then measured (weight of irrigating solution is converted into mL of solution). Weight of apically extruded debris was recorded by the following calculation: weight of tube - weight of tube post evaporation

RESULTS

The overall mean debris extruded was 0.033 (SD = 0.038)—Table 1. Hand Filing demonstrated the largest amount of debris extruded (M = 0.048, SD = 0.042), while EdgeOne Fire had the least amount extruded (M = 0.022, SD = 0.036). Nevertheless, no group differences were found using the one-way ANOVA (p = 0.082). Similarly, no differences were found for debris extruded between each group mean and overall grand mean.

CONCLUSION

Debris extrusion is a process that cannot be fully avoided and will occur during instrumentation of the canal system. Ideally, minimizing the amount of debris extrusion is what is best. Based on the study conducted, there was no statistically significant difference found between the groups Edge Endo, WaveOne Gold Primary, and K-files for debris extrusion.