

# Comparative Evaluation of The Effectiveness And Time Taken In the Removal of Root Canal Filling Material Using 3 Different Techniques-An In – Vitro Analysis

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## Abstract

**Aim:** The aim of the study was to compare the efficacy of Reciprocating Files, Rotary Files and Hand files for removing gutta-percha from root canals.

**Materials and Method:** Forty five single rooted premolars were taken for the study. The teeth were obturated using lateral condensation technique and divided into three groups for removal of gutta percha using different techniques. Group1: Hedstrom files, Group 2: Gutta percha Removal files. Group 3: Reciproc.

**Results:** None of the techniques proved complete removal of the GP from the root canal.

**Conclusion:** However, Reciproc removed root canal filling material more effectively followed by GPR and Hand-file respectively.

**Keywords:** Gutta Percha Removal, Protaper Files, Reciprocating Files

## INTRODUCTION

Secondary intraradicular infection is a major cause of post-treatment disease. Various methods are used to remove the obturating material: thermal, mechanical, chemical and a combination of them.<sup>1</sup> Nonsurgical root canal retreatment is indicated when the initial procedure has failed and can be corrected by improving root canal disinfection and debridement, and placing a consistent and homogenous filling<sup>3</sup>. The most commonly used root filling material is gutta-percha

in conjunction with a sealer. The proper removal of root canal filling materials from inadequately prepared and filled canals requires a substantial effort and can be time-consuming and challenging. However, all retreatment techniques leave residual debris in the canal walls after re-instrumentation.

A new concept was recently introduced, in which canal preparation is accomplished using a specifically designed nickel–titanium engine-driven instrument that employs a reciprocating motion. The reciprocating instrument is used with a brushing motion against the lateral walls of the canal to remove any residual filling material.

## MATERIAL AND METHODS

### Specimen preparation

Forty five extracted premolars with a proper patency of the canal, verified radiographically, were taken and stored in Formalin. Root canal length was determined with a size 15 K-file introduced passively into the canal until its tip was just visible at the major apical foramen. The length of the root canal was calculated by subtracting 1 mm from the measurement. The canal was prepared using step back technique. A total of 25 mL of 2.5% NaOCl was delivered throughout instrumentation with a 30-gauge needle between each bur and file.

### Sealer standardization

A zinc oxide–eugenol-based sealer, was mixed according to the manufacturer's instructions until it reached a thick consistency.

### Canal Filling

The canals were filled using the lateral compaction technique (Walton & Torabinejad 1996). Before filling, the canal was dried using paper points. A size

40 gutta-percha master cone was selected and customized. Afterwards, a sealer-coated master cone was placed up to the working length. Accessory cones were laterally compacted until they could not be introduced deeper than 5 mm into the root canal. A heated plugger was used to cut the gutta-percha at the entrance of the canal. The canal access was restored, and the teeth were stored under 100% humidity at 37 °C for 30 days to allow the sealer to set completely.

### **Removal of root canal filling material**

The obturated samples were divided into three groups: (Fig: 1)

Group 1: Handfiles: The root canals were re-instrumented to the original working length with K-files up to size 40. Group 2: GPR Files (Gutta percha removal Files :Mani) Group 3 : Reciproc (VDW): The root canals were re-instrumented using the Reciproc R25 instrument. The instrument was introduced into the canal. It was then moved towards the apex using an in-and-out pecking motion with an amplitude of approximately 3 mm. After three pecking motions, (Fig:2) the instrument was removed from the canal and cleaned with sterile gauze. The root canals in all groups were re-instrumented until the canal walls became smooth, and there was no evidence of filling material on the instrument.

### **Assessment of removal of root canal filling material**

The teeth were split longitudinally and examined at 3× magnification in a stereomicroscope.

The specimens were scored for remaining root canal filling material using the following scale, according to Hulsmann and Stotz.

I- No root canal filling material

II - One to 3 small isles (< 2 mm long) of root canal filling material

III - More than 3 small isles (< 2 mm long) of root canal filling material

IV - One large piece (> 2 mm long) of root canal filling material

V - Root canal filling material > 5 mm long

VI - Various isles of root canal filling material > 2 mm long

Evaluation was performed by a clinician who was blind to the experiment. The degree of removal of sealer was not assessed in this study.

### **Assessment of Gutta – Percha removal duration.**

The total time required to remove the filling from root canal was considered to be the time started from the moment the instruments were first applied in the canal until they approached the working length. The stopwatch was stopped when the instrument was removed from the canal and restarted when the preparation proceeded with another instrument.

## **RESULTS**

None of the technique were efficient in removal of the root canal filling material. The mean % of all the samples showed Reciproc to be the most efficient in removing the filling material than the other two and is less time consuming.

## **DISCUSSION**

The technical difficulties encountered during endodontic retreatment are due not only to the mechanical obstruction represented by the root-filling mass, but also to the complex anatomy of some root canals.<sup>2</sup>

The main aim of root canal retreatment is to remove the contaminated filling material. The present study compared three different filling material removal techniques with the ultimate aim of establishing whether an endodontic instrumentation technique recently launched to the market is able to remove filling material from root canals more easily and effectively than other methods. The methodology used in this study, shown to be more effective for investigation remaining filling materials compared with radiographic techniques.

The use of Hedstrom files alone is time consuming and causes more removal of dentine. The use of Hedstrom files with solvent was more time consuming than other techniques but resulted in better cleanliness.<sup>1</sup>

Several methods have been proposed for assessing the amount of filling debris remaining inside root canals after endodontic retreatment. Currently used methods include longitudinal cleavage of the teeth; association of longitudinal and transverse cleavage for separate evaluation

of the cervical, middle and apical thirds.<sup>5</sup>

Rodrig et al (2014) compared the efficacy of H –files, Protaper universal retreatment instruments and Reciproc in curved root canals and reported that Reciproc removed root canal filling material faster followed by Protaper universal and then H- file.

The use of hand files was not statistically different from the use of rotary instruments to remove filling material. However, in terms of retreatment time, the NiTi rotary files proved faster than the hand files.<sup>7</sup>

## **CONCLUSION**

Within the limitation of this study, the following conclusion was drawn that the reciprocating technique is the most rapid and efficient method for removing gutta-percha, followed by the rotary technique and hand file technique.

However, further clinical trials are required to assess the best method for removing GP.

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Group:1



Group:2



Group:3



Figure:2

Table 1:

Group	Files Used	Grades					
		I	II	III	IV	V	VI
1.	Handfiles	8	3	2	1	1	
2.	GPR Files	11	2	1	1		
3.	Reciproc	13	2				

Table 2 :

<u>Group</u>	<u>Time (s)</u>	<u>SD</u>
<u>I</u>	<u>725.00</u>	<u>161.29</u>
<u>II</u>	<u>365.56</u>	<u>90.18</u>
<u>III</u>	<u>194.44</u>	<u>60.80</u>