

## ORIGINAL PAPER

## Removal of definitive root canal obturation using three different techniques

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### Abstract

Introduction: In the course of time many techniques were recommended for the removal of the root canal filling with different efficiency, time- and work exaction. The aim of this study was to evaluate the efficiency of three different methods used for guttapercha cone and sealer removal during dezobturation. Materials and methods: 63 extracted incisors after root canal preparation were filled using sealer and gutta-percha cones. After 1 week the obturation was removed using three different techniques. Teeth were sectioned to estimate the efficiency of the techniques. Preparation time was also measured. Statistical analysis was performed, at a value of  $p < 0.05$ . Results: Visual analysis showed a more efficient cleaning of obturation when ProTaper files were used, although statistical analysis showed no differences between hand files, hand and rotary file combination and ProTaper files efficiency. ProTaper files dezobtured the canals in shortest time. Conclusion: ProTaper are recommended for root canal filling removal.

**Keywords:** endodontics, dezobturation, endodontic files, retreatment

### Introduction

A successful root canal treatment consists in ensuring optimal conditions for the periapical tissues to heal. The healing will be possible only if the root canal was shaped, cleaned and filled as correct as possible. For the three-dimensional closure of the root canal sealers and guttapercha cones are the used materials. [1]

Although the success rate of the endodontic treatment is above 80%, in some case the retreatment of the tooth may be necessary. According to Friedman, the retreatment should not be considered a failure of endodontic treatment, rather a posttreatment disease. [2]

The American Assosiation of Endodontists defined the retreatment as a procedure to remove root canal filling materials from the tooth, followed by cleaning, shaping and obturating the canals. [3]

When retreatment needed, non surgical methods and endodontic surgery techniques are available for doctors to choose from. The non surgical retreatment is an endodontic treatment procedure used to remove materials from the root canal space and, if present, address deficiencies or repair defects that are pathologic or iatrogenic in origin. [4]

In case of conservative retreatment- non surgical intervention-, before clearing the root canal walls from the sealers, guttapercha cones

need to be removed from the canals. In the course of time many techniques were recommended for the removal of the filling with different efficiency, time- and workexaction.

Endodontic hand –files, Nickel Titanium rotary instruments, Gates-Glidden burs, heated instruments, ultrasonic instruments, laser and different adjunctive solvents, such as halothane, chloroform, xylene or eucalyptol are used to dissolve and remove guttapercha from the root canals. [5-8]

Doctors should always keep in sight that retreatment is a tedious and time consuming procedure which can lead to many procedural error, such as ledge formation or perforation. Selecting the case for retreatment is a meticulous process where the pro- and contra-arguments of tooth prognosis need to be weighed thoughtfully. [9,10]

The aim of this study was to evaluate the efficiency of three different methods used for guttapercha (GP) cone and sealer removal during root canal dezobturation.

### Materials and methods

In our study, performed at the UMFST in Targu-Mures, Faculty of Dentistry, Department of Odontology and Oral Pathology, we evaluated the efficiency of three different methods used for guttapercha cone and sealer removal.

63 incisor teeth extracted for severe periodontal affection, but clinically intact were used in the study. Teeth were cleaned and sterilized in autoclave.

Access cavity was prepared on the oral surface using diamond burs, coronal pulp was removed with a globular bur. Patency of the root canals was established with a size 10 K-file (Dentsply Mailleffer®) and 2,5% sodium hypochlorite was used as irrigant.

After macroscopic working length establishment at a powerful light-source, the root canals were prepared by the same operator, using the step-back technique. The last hand file used was an ISO number 35.

After preparation, root canals were dried using paper points and filled using Endomethasone® (Septodont®) as a sealer and gutta-percha-coins (Meta®). Lateral-condensation technique was used to close hermetically the root canals. Crowns were filled with a temporary filling material.

After 1 week the removal of the root canal filling began. Teeth were divided randomly in three groups-21 teeth in each group- and three different procedures were used as follows:

-Group 1.- GP and sealer removal using Eucalyptol and hand files (Dentsply®),

-Group 2.- GP and sealer removal using Gates-Glidden burs, Eucalyptol and hand files (Dentsply®),

-Group 3.- GP and sealer removal using Ni-Ti rotary files (ProTaper® File III, Dentsply Mailleffer®) and Eucalyptol.

In the first group Eucalyptol was plonked at the acces of the root canals to plasticize the guttapercha. The GP removal was continued using different size –from ISO size 15 to 30-hand files. Canals were irrigated abundently using sodium hypochlorite to wash out the guttapercha pieces.

In the second group after Eucalyptol dropping, the guttapercha removal was performed using Gates-Glidden burs at a rotation of 800 rot/min. After irrigation, when the tip of the bur apparently did not remove more GP, the removal process was continued using hand files, maximum ISO number 30. Canals were irrigated frequently.

In the third group after Eucalyptol was plonked on the top of the root canal, the removal of GP was performed using Rotary file ProTaper size III. The file was introduced in the canal up to the apical constriction and was moved up and down, until apparently no more guttapercha was removed. Irrigant was used to wash out the remaining GP pieces.

The removal of guttapercha was considered finished, when no more material was observed on the instruments.

In each group we measured the needed time for the GP removal. After removal of guttapercha, teeth were sectioned usig a disc. (figure 1,2,3)



Figure 1.  
Sectioned teeth after obturation removal using Eucalyptol and hand files



Figure 2.  
Sectioned teeth after obturation removal using Eucalyptol, Gates-Glidden burs and hand files



Figure 3.  
Sectioned teeth after obturation removal using Eucalyptol and Ni-Ti rotary files

The efficiency of the obturation removal was evaluated as follows:

- 1– no visible obturation on the root canal walls
- 2– only visible sealer
- 3– small quantity of sealer and GP present
- 4– a considerable amount of sealer and GP present

Statistical analysis was performed using Chi2 test to evaluate if the used methods efficiency are significantly different from each

other. Statistical significance level was set at a value of  $p < 0.05$ .

## Results

Or results after root canal filling removal in the three groups are presented in Table 1.

Statistical analysis using the Chi2-test showed no significant difference between the found values in the three groups. (Table 2)

Table 1. The number of samples in each group with the mentioned values (1– no visible obturation on the root canal walls, 2– only visible sealer, 3– small quantity of sealer and GP present, 4– a considerable amount of sealer and GP present) after evaluation of root canal filling removal

Values	Group 1	Group 2	Group 3
1	6 (28,5%)	1 (4,7%)	3 (14,5%)
2	3 (14,5%)	8 (61,7%)	14 (66,3%)
3	6 (28,5%)	6 (28,5%)	3 (14,5%)
4	6 (28,5%)	6 (28,5%)	1 (4,7%)

Table 2. -Statistical analysis of the found values after filling removal in the three groups

	1	2	3	4	Row Totals
Group 1	6 (3.33) [2.13]	3 (8.33) [3.41]	6 (5.00) [0.20]	6 (4.33) [0.64]	21
Group 2	1 (3.33) [1.63]	8 (8.33) [0.01]	6 (5.00) [0.20]	6 (4.33) [0.64]	21
Group 3	3 (3.33) [0.03]	14 (8.33) [3.85]	3 (5.00) [0.80]	1 (4.33) [2.56]	21
<b>Column Totals</b>	10	25	15	13	<b>63 (Grand Total)</b>

$p=0.013093$ . The result is significant at  $p < 0.005$ .

The time needed for guttapercha removal for each tooth in the three groups is presented in figure 4.

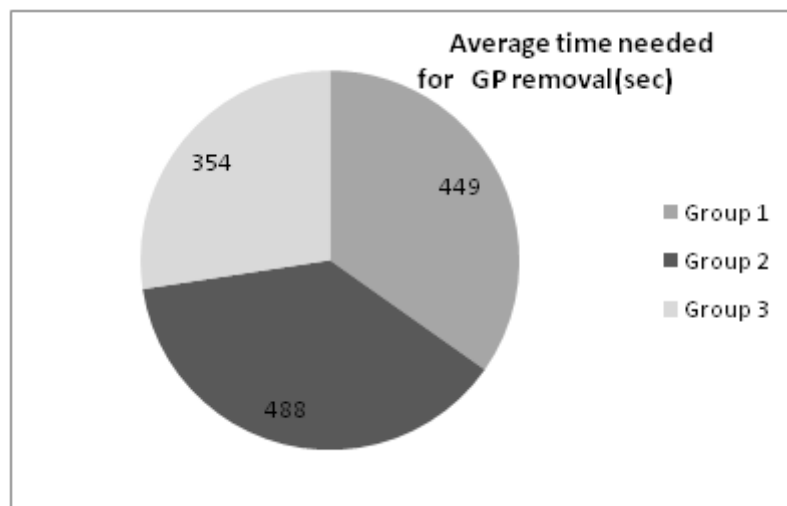


Figure 4. The needed time for guttapercha removal expressed in seconds

The root canal obturation was removed in less time using Ni-Ti rotary files and Eucalyptol. Deobturation using only hand files and hand files combined with Gates-Glidden burs and Eucalyptol needed almost the same amount of time.

## Discussion

Root canal system anatomy plays an important role in endodontic treatment success and failure.

Endodontic failures occur in case of inadequacies in shaping, cleaning and

obturation, iatrogenic events or re-infection of the root canal system when the coronal seal is lost after root canal obturation. To correct the failures doctors should decide among nonsurgical retreatment, surgical retreatment or extraction. [3,4,9]

Nonsurgical endodontic retreatment procedures present a high success rate if the teeth are selected correctly and precise techniques are utilized.

The first step of a proper retreatment consists in the removal of the root canal obturation-guttapercha cones and sealer.

For the removal of guttapercha several methods and combination of methods are described in the literature. Hand and rotary files, different solvents and Ni-Ti rotary systems are used for cleaning the root canal from the obturation. [11,12]

Based on our results, Ni-Ti rotary files (ProTaper, Dentsply®) removed the guttapercha most efficiently and with the less time needed compared to the other two methods- hand files, rotary and hand files combination. Eucalyptol was choosed as solvent, because of its beneficial properties discribed in literature- such as antibacterial effect or decreased irritative chances than other solvents-, although Xylol is more effective according to several studies. [7,8]

In the first group, where conventional hand files and Eucalyptol were used for removal of the guttapercha cones and sealer made possible a dezobturation time 39 seconds faster and a more effective cleaning of root canals, than in the second group, where rotary files (Gates-Glidden) were used in combination with Eucalyptol and hand files.

The best tehniqe from the three used in this study for the removal of definitve obturation turned out to be the use of ProTaper files and Eucalyptol, which was the most effective and the fastest also. Thus, we did not found statistically significant differences between the three groups when analysing the efficiency of the tehniques. Our results are similar to other studies about removal of root canal obturation. [13-17]

## Conclusion

Although no statistically significant differences were found between the studied groups, based

on visual analysis the Ni-Ti rotary endodontic files turned out to be the most efficient in removal of definitive root canal fillings.

**Conflict of interest:** None to declare.

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