



The efficiency of ProTaper rotary retreatment files in the removal of two different root filling materials

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Abstract

The ProTaper rotary retreatment files is one of the new files especially designed for retreatment. The aim of this study is to test if root canals filled with Resilon points and RealSeal sealer (SybronEndo, USA) can be retreated using ProTaper rotary retreatment files in the same manner as canals filled with gutta-percha and zinc oxide eugenol based sealer.

Twenty extracted maxillary first molars with palatal roots having single straight canal and fully formed apex were instrumented and randomly divided into two groups of ten roots each according to the root filling material used (gutta-percha and zinc oxide eugenol based sealer for group A and Resilon points and RealSeal sealer for group B). For all roots, removal of root filling material was done by using ProTaper rotary retreatment files (Dentsply-Maillefer, Ballaigues, Switzerland). The amount of root filling material remained and the time required for the removal process for all roots were recorded and statistically analyzed using SPSS version 15.

The results showed that during retreatment procedures; removal of Resilon with RealSeal sealer from root canals can be achieved with ProTaper rotary retreatment files but the amount of Resilon root filling material remained was more than GP and showed a highly significant difference, it was also obvious that removal of Resilon root filling material from root canals requires more time than roots filled with gutta-percha.

In conclusion, removal of resin based root filling material can be achieved with ProTaper rotary retreatment files but it leaves more filling remnants and takes more time than canals filled with gutta-percha.

Key words: Resilon, ProTaper rotary retreatment files, root canal retreatment.

Introduction

Root canal therapy despite having a high degree of success, may not lead to the desired response and failure may occur. When root canal therapy fails, re-treatment option is preferred because it is the most conservative method to solve the problem⁽¹⁾.

The primary purposes of the retreatment therapy are adequate cleaning and disinfection of the root canal system. The complete removal of

old filling materials is very important; this material represents a mechanical barrier that hinders contact of irrigating solutions and intra canal dressings with the root canal walls⁽²⁾.

The use of rotary nickel-titanium files with the recommended speed is a common method to remove the root filling material nowadays. The rotary movement might have produced a frictional heat to further soften the

gutta-percha, making it easier to remove. It has been reported that the retreatment time using rotary instruments was significantly shorter than using conventional manual files. The retreatment files stand out because of their resilience and high safety in addition, desobturation is easier and faster (2).

To date, there is few studies concerning retreatment of teeth filled using Resilon points and Realseal sealer. According to the manufacturer, the new material has the same handling properties as gutta-percha and it should be expected that removal of this material can be performed in a way similar to the removal of gutta-percha. Thus, the aim of the current study is to test if root canals filled with Resilon points and RealSeal sealer can be retreated using ProTaper rotary retreatment files in the same manner as canals filled with gutta-percha and zinc oxide eugenol based sealer.

Materials and Methodes

Twenty extracted maxillary first molars with palatal roots having single straight canal and fully formed apex were used (Diagnostic X-ray was taken to confirm the existence of a single straight canal, fully formed apex and no signs of internal resorption, calcification or previous endodontic therapy). The apical 14 mm of the palatal roots was sectioned for use to standardize canal length in all teeth ⁽³⁾.

Working length was determined with size 15 stainless steel hand file as the distance from the reference point to 1mm shorter than the tip of the root ⁽⁴⁾.

A rubber surgical tube with a diameter of 0.75cm was adjusted with a diamond disc to a length of 2.5cm, after that, two vents were made at the bottom and side of the tube to prevent the movement of the acrylic block inside the mould. Clear cold cure

acrylic (powder and liquid) was mixed according to manufacturer's instruction and then placed inside the mould where it was left until reaching the dough stage after which the root was embedded. The root was held in the correct position by attaching it to a dental survey.

ProTaper rotary files were used to prepare all root canals using crown down technique following manufacturer instruction, The teeth (twenty) will be divided into two groups (ten teeth each) according to the root filling material employed, root canal obturation was done by lateral compaction technique using ProTaper gutta-percha cone (F2) with TubliSeal (ZOE-based sealer) for group A and Resilon points with Realseal sealer for group B.

Excess root filling material was removed with preheated instrument. The extension of the root canal filling was limited to 12 mm from the apical extension of the filling and the coronal part was sealed with temporary filling material. The teeth were stored at 37°C and 100% humidity for seven days.

The removal of root filling material was done with Protaper rotary retreatment files at a constant speed of (500 RPM) using a speed reduction handpiece (Endo-Mate DT, NSK, Japan). Root filling material was removed following manufacturer's instructions by using D1 file (30/.09) for removing materials from the coronal third, D2 (25/.08) for removing materials from the middle third and D3 (20/.07) for removing materials from the apical third. The file was removed frequently and flutes were inspected and cleaned in a clean stand.

For group A and group B, the criteria for complete removal from each third was that no more root filling material appeared on the flutes of the file that was used in that third while the

retreatment was considered to be completed when the initial WL was reached and no more root filling material could be seen on last instrument flutes or in the irrigating solution ^(1, 5, 6). To achieve standarization during retreatment, one set of instruments was used per each tooth.

Evaluation

The roots were grooved longitudinally from the buccal and lingual aspects with a diamond disk and split into halves with a hand chisel. The root half with the greater amount of filling debris on visual inspection was examined. Images were captured with a digital camera (Nikon, Tokyo, Japan) and analyzed with adobe photoshop CS2 software. A specific software tool was used to outline the total canal area and the filling debris area.

The percentage of filling material remained for all of the samples were calculated which is equal to (filling debris area/total canal area).

The time required to remove the filling material was recorded using digital stop timer and expressed as the time of filling material removal in minutes.

Analysis

Descriptive statistics including: minimum, maximum, mean and standard deviation was calculated for the percentage of root filling material remaining for each group. The data were collected and analyzed using SPSS (version 15) for statistical analysis. One-Way Analysis of Variance (ANOVA) was used to determine whether there is a statistical difference among the groups. Descriptive and inferential statistics were also carried for time of removal.

In the above tests, Level of significance was set at $P < 0.05$.

Results

The minimum, maximum, mean values and the (\pm SD) for the percentage of remaining filling material (The filling debris area/total canal area) by different removal techniques are shown in **(Table 1)**.

In the present study, it is obvious that mean percentage of remaining filling material in the Resilon (with realseal sealer) group was more than GP (with TubliSeal sealer) group as shown in **(table 1) & (figure 1)**.

ANOVA test was performed and showed a highly significant difference (P value < 0.01) among the different types of root filling materials used **(Table 2)**.

The minimum, maximum, mean (minutes) and \pm SD of the time required for filling material removal for each group are listed in **(Table 3)**.

ANOVA test was performed To see if there was any difference exist in the time required for removal of different root filling material and showed a highly significant difference (P value < 0.01) **(Table 4)**.

Discussion

The result of this study showed that during retreatment procedures; removal of Resilon with RealSeal sealer from root canals can be achieved with ProTaper rotary retreatment files which is not advised by the manufacturer. The amount of Resilon root filling material remained was more than GP, this result is in agreement with a previous study ⁽⁷⁾ since the sealer is a resin composite material that most probably exhibited higher surface hardness and compressive strength and adheres more to dentine compared with other sealers,

while it disagrees with other studies^(8, 9) who noted that Resilon with its sealer forms a monoblock thus, sealer might be better removed if it is bound together with the core material resulting in less filling material than removal of gutta-percha.

It is clear from the results of this study that Resilon root filling material required more time for removal than GP this result is in agreement with a previous study⁽⁷⁾ which attributed these results to the fact that resin sealer has harder surface and more adhesion to canal wall. Consequently, it required a longer working time for removal from the canal wall. While this result disagrees with other studies^(9, 10, 11) may be because of different methods of obturation and removal of filling material.

Conclusions

Under the experimental conditions of this in vitro study, it can be concluded that removal of resin based root filling material can be achieved with ProTaper rotary retreatment files but it leaves more filling remnants and takes more time than canals filled with gutta-percha.

References

- 1- Saad AY, Al-Hadlaq SM, Al-Katheeri NH. Efficacy of two rotary NiTi instruments in the removal of gutta-percha during root canal re-treatment. *Journal of Endodontics* 2007; 33(1): 38-41.
- 2- Ferreira EL, Baratto-Filho F, Fidel RAS, Fariniuk LF, Rached RN. The performance of ProTaper system during the endodontic re-treatment. *Revista Sul- Brasileira de Odontologia* 2006; 3(1): 65-68.
- 3- Fabiana VV, Marcus VR, Caroline S, Miriam LM, Marcelo M. Efficacy of Protaper retreatment system in root canals filled with gutta-percha and two endodontic sealers. *Journal of Endodontics* 2008; 34(10): 1223-1225.
- 4- Dall'Agnol CD, Hartmann MDM, Barletta FB. Computed tomography assessment of the efficiency of different techniques for removal of root canal filling material. *Brazilian Dental Journal* 2008; 19(4): 306-312.
- 5- Barletta FB, Rahde NDM, Limongi O, Moura AAM, Zanesco C, Mazocatto G. In vitro comparative analysis of two mechanical techniques for removing gutta-percha during re-treatment. *JCDA* 2007 a; 73(1): 65-65e.
- 6- Bodrumlu E, Uzun O, Topuz O, Semiz M. Efficacy of three techniques in removing root canal filling material. *JCDA* 2008; 74(8): 721-721e.
- 7- Iizuka N, Takenaka S, Shigetani Y, Okiji T. Removal of resin-based root canal filling materials with K3 rotary instruments: Relative efficacy for different combinations of filling materials. *Dental Materials Journal* 2008; 27(1): 75-80.
- 8- Schirmeister JF, Wrbas KT, Meyer KM, Altenburger MJ, Hellwig E. Efficacy of different rotary instruments for gutta-percha removal in root canal re-treatment. *Journal of Endodontics* 2006; 32(5): 469-472.
- 9- Somma F, Cammarota G, Plotino G, Grande NM, Pameijer CH. The effectiveness of manual and mechanical instrumentation for the retreatment of three different root canal filling materials. *J Endod* 2008; 34:466-9.
- 10- de Oliveira DP, Barbizam JV, Trope M, Teixeira FB. Comparison between gutta-percha and Resilon removal using two different techniques in endodontic retreatment. *J Endod* 2006;32:362-4.
- 11- Ezzie E, Fleury A, Solomon E, Spears R, He J. Efficacy of retreatment techniques for a resin-based root canal obturation material. *J Endod* 2006;32:341-4.

(Table 1): Descriptive statistical analysis for the percentage of remaining root filling material.

groups	N	Min. %	Max. %	Mean %	±SD
A	10	6.77	12.82	10.4115	1.71789
B	10	17.67	23.42	21.7285	1.75754

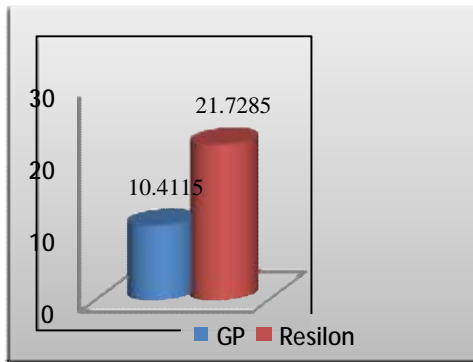


Figure 1: Bar chart showing means percentage of remaining root filling material.

Table 2: ANOVA test for the percentage of remaining root filling material among different types of root filling materials.

Source of variation	Sum of Squares	Df	Mean Square	F	p	Sig.
Between Groups	640.373	1	640.373	212.041	0.000	HS
Within Groups	54.361	18	3.020			
Total	694.734	19				

Table (3): Descriptive statistics of the time required for root canal filling material removal.

groups	N	Min. (min.)	Max. (min.)	Mean (min.)	±SD
A	10	3.29	5.45	4.3850	0.77121
B	10	4.40	8.13	6.2250	1.12759

Table (4): ANOVA test of the time required for removal of different types of root filling material.

Source of variation	Sum of Squares	df	Mean Square	F	p	Sig.
Between Groups	16.928	1	16.928	18.142	0.000	HS
Within Groups	16.796	18	0.933			
Total	33.724	19				