COMPARISON OF DIFFERENT RETREATMENT TECHNIQUES: A RADIOGRAPHICAL *IN VITRO* ANALYSIS

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Introduction

Despite the high success of endodontic treatment, failure occurs, mainly, because of poor disinfection achieved during it or reinfection of the root canal system, after its conclusion. To restore oral health it's often necessary a non-surgical endodontic retreatment.

Objective

The aim of this study was to compare the efficacy of rotary and reciprocating techniques for removing filling material from root canals, using a radiographic method. A system – OneShape (Micro-Mega, France) was intentionally included for the first time in a retreatment research.

Material and Methods

80 single root teeth were instrumented with hand k-files up to size 30 according to a crown-down and step-back techniques and filled with gutta-percha and an epoxy resin-based sealer using Tagger's hybrid technique. Teeth were divided into four groups (n=20): Reciproc®(R) (VDW, Germany), WaveOne®(WO) (Dentsply Sirona, Switzerland) ProTaper Universal Retreatment®(PTR) (Dentsply Sirona, Switzerland), and One Shape®(OS) (Micro-Mega, France). All teeth were radiographed with two incidences, mesio-distal (MD) and bucco-lingual (BL), u (Figure 1) using a paralleling angle technique with digital Image Plate Plus size 2 (Dental Durr, Germany) and a film positioner holder (Figure 2) before and after filling material removal. The total area of the initial filling material and the remaining one was measured using the analysis software Adobe Photoshop CC 2017® (Figure 3) in order to calculate the percentage of removed material. Data were compared using D'Agostino & Pearson, Krusskal-Wallis & Dunns and t-Student tests at 5 % significance level.

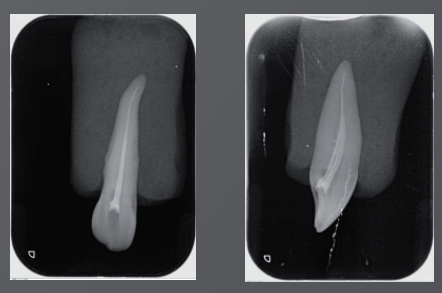

Figure 1. Teeth displaying a good obturation

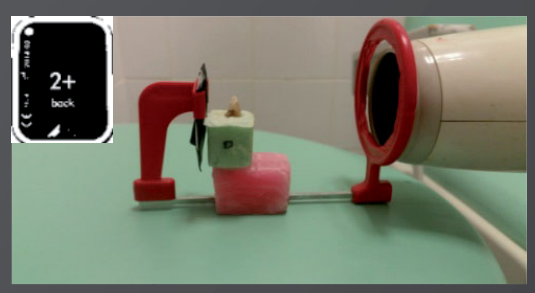

Figure 2. Film positioner holder for radiograghy standardization and Image Plate Plus size 2 (Dental Durr, Germany)

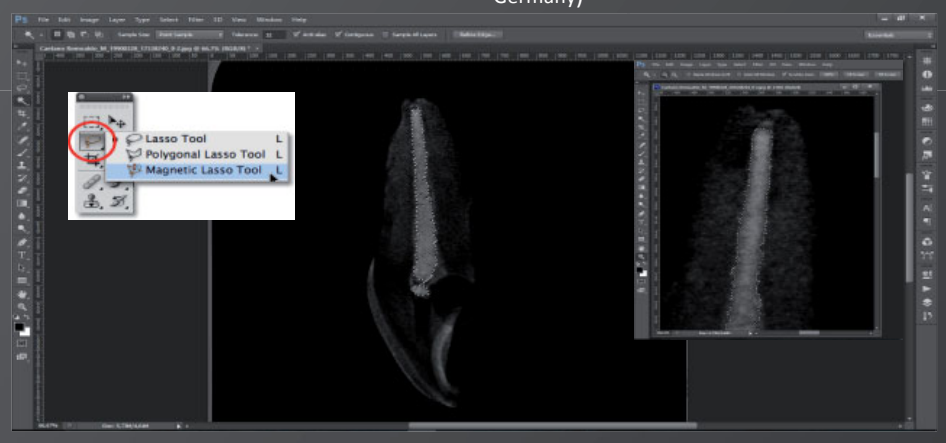

Figure 3. The use of Adobe Photoshop CC 2017® software and magnetic lasso tool to measure the total filling material area inside the root canal

Results and Discussion

No significant statistical differences between groups were found; however, the WO group showed higher values of reduction, followed by R, PTR and OS, respectively (Chart 1).

There were differences in the values of reduction between BL and MD in all groups, but not significant differences that justifies the need of two radiographic incidences.

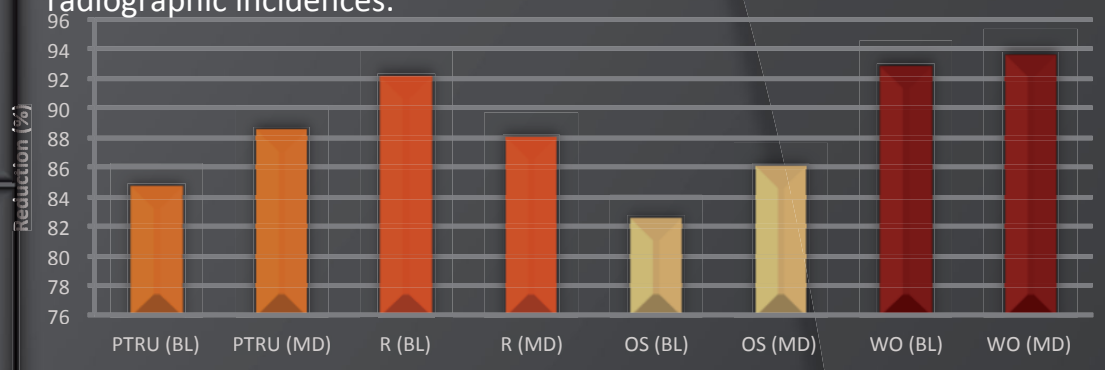

Chart 1. Mean reduction of Reciproc®, Protaper Universal Retreatment®, WaveOne® and One Shape® systems in two views – BL and MD

The current literature is contradictory (Chartr 2) with regard to the results of the studies carried out to test and quantify the effectiveness of various systems of endodontic retreatment. Two independent studies, Crozeta et al. (2016)[1] and Koçak et al. (2016)[2], analyzed the efficiency of three systems also assessed in this study (PTUR, R and WO) and got completely different results. Although there isn't consonance between those two studies, both suggest a reciprocating system as the more efficient as well the present study.

Other studies such as Silva et al. (2015)[3] and Akbulut et al. (2016)[4] defending a similarity in the efficacy between reciprocating and continuous rotary systems claiming that don't exist significant differences between the two.

Despite this disagreement between authors, the inability of any one of the systems to remove completely the canal fillings is of universal consensus.

Chart 2 – Conflict results among published data.

Authors	- Efficacy +			
This study	OS	PTUR	R	WO
Koçak, M. M. et al. (2016)	PTUR	R	WO	
Crozeta, B. M. et al. (2016)	WO	PTUR	R	
Silva et al. (2015)	WO / PTRU			
Akbulut et al. (2016)	WO / R			

1. Crozeta, B. M. et alii (2016). A micro-computed tomography assessment of the efficacy of rotary and reciprocating techniques for filling material removal in root canal retreatment, *Clinical Oral Investigations, 20, pp 2235–2240*
2. Koçak, M. M. et alli (2016). Cleaning efficacy of reciprocal and rotary systems in the removal of root canal filling material, *Journal of Conservative Dentistry, 19, pp 184-188*
3. Silva, E. J. N. L. et alii (2015). Effectiveness of rotatory and reciprocating movements in root canal filling material removal, *Brazilian Oral Research, 29(1), pp 1-6*
4. Akbulut, M. B. et alii (2016). Efficacy of Twisted File Adaptive, Reciproc and ProTaper Universal Retreatment instruments for root canal filling removal. A cone-beam computed tomography study, *Dental Materials Journal, 35(1), pp 126–131*

Conclusions

None of the tested systems were able to completely remove the filling material; reciprocating systems proved to be more efficient than continuous rotary systems: nevertheless, without significance differences between them.

Clinical relevance

This study provided consistent information on filling material removal capacity of One Shape, a system never tested in this purpose. Considering that all tested systems were safe, One Shape may be an alternative for endodontic retreatment as, in spite of poor performance, that difference was not significant to the others systems tested. Additionally, a supplementary approach with a finishing instrument or an ultra-sound system may enhance filling material removal.

Keywords

Endodontics; retreatment; gutta-percha removal; reciprocating files; continuous rotation files; OneShape

Sponsorship

Micro-Mega, France; Dentsply Sirona, Switzerland and VDW, Germany.