

Original Research

Assessment of efficacy of D-RaCe files and Manual Hedstrom files in removing filling material from the root canals: A Comparative Study

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ABSTRACT:

Background: Success is the expected outcome after root canal treatment (RCT), regardless of the clinical conditions. Several techniques have been proposed to remove filling materials from root canal system, including the use of endodontic hand files, Nickel Titanium rotary instruments, Gates Glidden burs, heated instrument, ultrasonic instruments, laser, and use of adjunctive solvents. Hence; we planned the present study to compare the efficacy of D-RaCe files and Manual H-files in removing filling material from the root canals. **Materials & methods:** A total of 20 freshly extracted mandibular premolars were included in the present study. Decoronation of the teeth specimen was done upto a length of 15 mm from the apex. Root canal therapy was performed followed by obturation with gutta-percha and AH Plus sealer using cold lateral compaction technique. All the specimens were divided broadly into two study groups with 10 specimens in each group as follows: Group A: D-RaCe files- Retreatment was done by D-RaCe files, and Group B: Hedstrom files with Solvent- Retreatment were done with Hedstrom files. Evaluation of remaining root canal filling material was done. All the results were analysed by SPSS software. **Result:** Percentage of remaining root canal filling material among specimens of group A was 7.11%. Percentage of remaining root canal filling material among specimens of group B was 16.22%. Significant results were obtained while comparing the mean remaining root canal filling material in between the two study groups. **Conclusion:** Root canal wall retracement is more effective with D-RaCe files in comparison to Manual Hedstrom files.

Key words: Hedstrom, Files, Retreatment

Received: 26 February, 2019

Revised: 29 March, 2019

Accepted: 30 March, 2019

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This article may be cited as: Majeti C, B Pradeep, T Saikrishna. Assessment of efficacy of D-RaCe files and Manual Hedstrom files in removing filling material from the root canals: A Comparative Study. J Adv Med Dent Scie Res 2019;7(5): 106-109.

INTRODUCTION

Success is the expected outcome after root canal treatment (RCT), regardless of the clinical conditions. The dentist's skills are crucial to interpret correctly the radiographic features and establish a diagnostic hypothesis. For the patient, the value of symptom (no pain) is essential. Apart from this, RCT success is associated with predictive aspects that eliminate the need of interventions and establishes treatment conclusion. The life of an endodontically treated tooth implies understanding that biological and mechanical events have a multifactorial nature and cannot be viewed separately. Ideally, it is expected to preserve the largest possible number of teeth until the end of life.¹⁻³

The failure to localize and treat all of the canals of the root canal systems on the part of the operator is considered as one of the major causes of the root canal treatment failures. It has been shown that in majority of

cases the general dental practitioners were responsible for the endodontic failures.⁴

Retreatment is a procedure to remove root canal filling material from the tooth, followed by cleaning, shaping and obturation of the canals. Complete removal of gutta-percha from root canal walls, re-establishing working length, promoting disinfection and re-obturing the root canal are the main goals of non-surgical retreatment to re-establish healthy periapical tissues and obtain predictable success.⁵⁻⁷ Several techniques have been proposed to remove filling materials from root canal system, including the use of endodontic hand files, Nickel Titanium rotary instruments, Gates Glidden burs, heated instrument, ultrasonic instruments, laser, and use of adjunctive solvents. Conventionally, the removal of guttapercha using hand files with or without solvent can be a tedious, time consuming process especially when the root filling material is well compacted.⁸

Hence; under the light of above mentioned data, we planned the present study to compare the efficacy of D-RaCe files and Manual H-files in removing filling material from the root canals.

MATERIALS & methods

The present study was conducted in the department of conservative dentistry of the dental institute and it included assessment and comparison of efficacy of D-RaCe files and Manual H-files in removing filling material from the root canals. Ethical approval was obtained from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. A total of 20 freshly extracted mandibular premolars were included in the present study. Inclusion criteria for including premolars included:

- Non- carious teeth,
- Teeth with absence of any sign of internal resorption,
- Teeth with one root canal,
- Teeth with absence of cracks

Decoronation of the teeth specimen was done upto a length of 15 mm from the apex. Root canal therapy was performed followed by obturation with gutta-percha and AH Plus sealer using cold lateral compaction technique.

All the specimens were divided broadly into two study groups with 10 specimens in each group as follows:

- **Group A: D-RaCe files**
Retreatment was done by D-RaCe files.
- **Group B: Hedstrom files with Solvent**
Retreatment was done with Hedstrom files.

Evaluation of remaining root canal filling material was done based on criteria described by Schirrmeister et al.⁶All the results were analysed by SPSS software. Chi-square test and student t test was used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

In the present study, a total of 20 premolars were analysed. Mean area of remaining root canal filling material among specimens of group A was 1.52 mm². Percentage of remaining root canal filling material among specimens of group A was 7.11%. Mean area of remaining root canal filling material among specimens of group B was 3.84 mm². Percentage of remaining root canal filling material among specimens of group B was 16.22%. Significant results were obtained while comparing the mean remaining root canal filling material in between the two study groups.

Table 1: Group A- D-RaCe Files

Parameter	Area of remaining root canal filling material (in mm ²)	Remaining root canal filling material (in %)
Mean	1.52	7.11

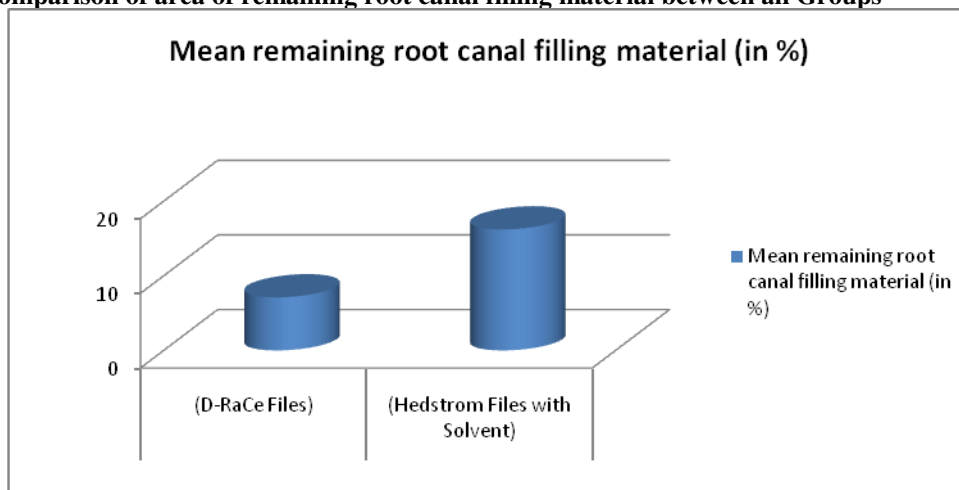
Table 2: Group B- Hedstrom Files with Solvent

Parameter	Area of remaining root canal filling material (in mm ²)	Remaining root canal filling material (in %)
Mean	3.84	16.22

Table 3: Comparison of area of remaining root canal filling material between all Groups

Parameter	GROUP A (D-RaCe Files)	GROUP B (Hedstrom Files with Solvent)	p- value
Mean remaining root canal filling material (in %)	7.11	16.22	0.00(Significant)

Graph 1: Comparison of area of remaining root canal filling material between all Groups



DISCUSSION

The successful endodontic treatment depends upon thorough debridement of infected or necrotic pulp tissue and microorganisms, and complete obturation of the canal space, thus preventing the persistence of infection and re-infection of the pulp space. If a root-filled tooth is functional, clinically symptomless and has no evidence of disease radiographically, then treatment can be considered a success.⁷Retreatment is the treatment of choice for management of endodontic failures when access to the root canal is feasible. Whenever possible, retreatment is preferred as it is the most conservative method to solve the problem, while surgical treatment results in postoperative discomfort.⁸There are several types of mechanical rotary systems available for gutta-percha removal, including rotary file systems such as the ProFile, a mechanical push-pull, quarter-turn file system, the Canal Finder, and specifically designed gutta-percha removal instruments, such as the GPX, the ProTaper Retreatment files, Mtwo Retreatment files, R-Endo, D-RaCe, etc.⁹

In the present study, a total of 20 premolars were analysed. Mean area of remaining root canal filling material among specimens of group A was 1.52 mm². Percentage of remaining root canal filling material among specimens of group A was 7.11%. Rossi-Fedele G et al discussed the effectiveness of different instrumentation procedures in removing root-canal filling materials assessed by micro-computed tomography. An electronic search in PubMed and major endodontic journals was conducted using appropriate key words to identify investigations that examined the effectiveness of obturation material removal assessed by micro-computed tomography. Among 345 studies, 22 satisfied the inclusion criteria. Seven studies compared hand instrumentation with Nickel-Titanium rotary or reciprocating systems. Three studies investigated rotary systems, and another three studies explored reciprocation. Eight studies compared rotary systems and reciprocation in removing filling materials from the root canal system. Other factors, such as the role of solvents and irrigant agitation, were discussed. The application of different instrumentation protocols can effectively, but not completely, remove the filling materials from the root canal system. Only hand instrumentation was not associated with iatrogenic errors. Reciprocating and rotary systems exhibited similar abilities in removing root filling material. Retreatment files performed similarly to conventional ones. Solvents enhanced penetration of files but hindered cleaning of the root canal.¹⁰

In the present study, mean area of remaining root canal filling material among specimens of group B was 3.84 mm². Percentage of remaining root canal filling material among specimens of group B was 16.22%. Significant results were obtained while comparing the mean remaining root canal filling material in between the two study groups. Kesim B et al compared the efficacy of manual and mechanical instrumentation techniques, including ProTaper Universal retreatment system, Mtwo retreatment system, Reciproc system, and Hedström files,

regarding removal of overextended root canal filling material. Eighty extracted human mandibular premolar teeth were prepared at the apical foramen level using Revo-S rotary files and subsequently obturated. The root canal filling material was deliberately extruded from the apex. Samples were transferred to glass vials that simulated the periapical area. Eighty samples of overfilled teeth were randomly assigned to four equal groups (n = 20) for removal of the root filling material with ProTaper Universal retreatment files (Group 1), Mtwo retreatment files (Group 2), Reciproc system (Group 3), and hand files (Group 4). Removal of the root canal filling material and additional preparation were performed by individual instruments from each different system up to a #40 size. The external apical surface of the teeth and the surrounding glass vials were checked using a dental operation microscope with ×12.5 magnification. Samples were divided into two groups based on whether removal of the overextended root canal filling material was successful or not. The success rate for removal of overextended gutta-percha was greater for the Mtwo (30%) and hand files (30%) compared with the ProTaper (20%) and Reciproc (10%). However, no significant statistical differences existed among the experimental groups (P > 0.05). This study demonstrated that all tested systems had similar efficacy in removing overextended root canal filling material.¹¹

CONCLUSION

Under the light of above obtained results, the authors conclude that root canal wall retracement is more effective with D-RaCe files in comparison to ManualHedstrom files.

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