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ORIGINAL RESEARCH

Evaluation of Gutta-Percha and Resilon Retreatment - an in-vitro study

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Abstract:

Persistent or secondary intraradicular infection is a major cause of endodontic failures. Nonsurgical retreatment is the treatment of choice for the management of endodontic failures when access to the root canals is feasible. Endodontic retreatment consists of cleaning, shaping, and three-dimensional obturation of previously obturated root canals. Various techniques are employed to remove the root canal filling materials including the use of hand or rotary instruments with or without heat application, solvents, and/or ultrasound Ni-Ti rotary instruments have also been used for removing filling materials from root canal walls. Gutta-percha, in combination with a variety of sealers, is the most commonly used material for root canal obturation. Resilon, a thermoplastic, synthetic, polyester polymer-based root canal filling material, was recently proposed as an alternative to gutta-percha. The purpose of this study was to compare the amount of residual filling material on the canal walls in root canals filled with gutta-percha or Resilon and retreated using the Protaper treatment files.

Key words: ***Retreatment, Resilon, Persistent periapical infection, Retreatment files.***

INTRODUCTION:

Cross-sectional studies have demonstrated persistent apical periodontitis associated with over 45% of root filled teeth. [1,2] Persistent apical periodontitis is caused mainly by root canal bacteria that survive primary treatment. It can be treated by means of orthograde retreatment. [3] During retreatment, it is essential to remove all the filling material so that the residual microbial population can be eliminated and create favourable conditions for periradicular healing. [4] To allow retreatment when indicated, the obturating material should be retreatable / retrievable. [5]

Most widely accepted root canal filling material is gutta-percha (GP) in conjunction with a variety of sealers. Resilon, a thermoplastic, synthetic, polyester polymer based root filling material was recently proposed as an alternative to GP. Resilon was introduced in 2004 and composed of bioactive glass and radiopaque fillers. It performs like GP and has same handling properties. The sealer, Epiphany is a dual curable dental resin composite sealer which has total filler content of 70% of its weight allowing its easy removal in retreatment cases. [6]

Ni-Ti files have been used increasingly in root canal preparation because of their unique physical

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properties. The ability of rotary systems to remove filling materials has been widely studied.[7,8,9] Recently, ProTaper Universal, a new system was introduced which contains retreatment files D1, D2, D3 and two finishing files F4 and F5. Therefore, the purpose of the present study was to evaluate the efficacy of retreatment in teeth obturated with gutta-percha and resilon.

MATERIALS AND METHODS:

This in-vitro study was conducted in the Department of Conservative Dentistry and Endodontics, Kamineni Institute of Dental Sciences, Nalgonda.

SPECIMEN PREPARATION:

Twenty single rooted human anterior teeth were selected and stored in 5% NaOCl for 1 hour and then in saline until use. Conventional access cavity preparation was done using #2 round carbide bur (Mani, Prime dental, Mumbai, India) and coronal flaring was done with gates glidden #2-4 (Mani, Prime dental, Mumbai, India). The working length was defined to be 1mm short of the apical foramen determined by inserting a size #15 K-file into the canal until the tip of the file was just visible at the apical foramen.

Patency of the canal was maintained throughout the procedure by passing #10 K-file approximately 0. 5mm through the apex.

Cleaning and shaping of the canal was carried out with EndoSequence (Brassler, USA) files. During preparation & between each file 2ml of 5% sodium hypochlorite was used as an irrigant. All canals were prepared to 0. 06 taper #35 file. The smear layer removal was done using 10ml of 17% EDTA followed by a final rinse of 10ml of 5% sodium hypochlorite and finally with 5ml saline. The canals were then dried with paper points and divided into two groups of 10 teeth each.

In Group I, the canals were filled with GP (Dentsply Malliefer, Switzerland) AH Plus sealer (Dentsply Malliefer, Switzerland) using lateral condensation technique. The canals in Group II were coated with the primer using a soaked paper point and excess was removed with a dry paper point, and the sealant was then placed into the root canal with a previously selected master Resilon cone (Pentron Clinical Technologies, Wallingford, CT, USA). Medium fine accessory cones were used for lateral condensation. A heated instrument was used to seal the filling material off at the orifices of all the canals, and in Group II, the root canal entrances were immediately light-cured for 40 s. The teeth were radiographed to confirm the adequacy of the root filling. After placing a temporary restoration of Cavit (3M ESPE, Germany), each tooth was stored in a humidor at 37°C for 2 weeks to allow the sealer to set completely.

RETREATMENT TECHNIQUE:

All temporary cements were removed by fissure bur and a drop of 0. 5 ml RC-Solve was introduced in each canal to soften the filling material, and then removed by ProTaper retreatment files D1, D2, and D3. (Dentsply Malliefer, Switzerland) The working length was regained gradually using a pecking motion and then the canals were instrumented with finishing files F4 and F5. Root canals were constantly irrigated with 5% NaOCl. The criteria for completion of retreatment were the presence of clean filings, no evidence of filling material on the files or paper point and smooth canal walls. After final instrumentation, all canals were irrigated with EDTA and dried with paper points.

The teeth were grooved vertically with diamond disc on labial and lingual surfaces. They were then split into two halves with chisel. The amount of residual material was evaluated with a stereomicroscope (Magnus) under 15x magnification. Area of the remaining material was calculated with Image analysis software and the data was statistically analyzed using t test and one way ANOVA.

RESULTS:

Residues of the obturating material were observed in all the specimens, regardless of the root filling material.

Percentage of canals with different cleanliness scores in each treatment group :

	Group I (G. P)	Group II (Resilon)
Coronal	12. 09 %	9. 92 %
Middle	12. 85 %	17. 51 %
Apical	7. 7 %	11. 27 %

Mean and Standard deviation values of Group I in coronal, middle and apical regions:

Coronal	12. 09 ± 6. 20
Middle	12. 85 ± 8. 68
Apical	8. 1 ± 4. 8
	p- 0. 25

Mean and Standard deviation values of Group II in coronal, middle and apical regions:

Coronal	10. 3 ± 5. 12
Middle	14. 3 ± 8. 9
Apical	7. 25 ± 4. 9
	p - 0. 28

DISCUSSION:

The success of endodontic retreatment is directly related to the complete removal of obturating material from the root canal system. The most widely used root canal filling material is GP with various sealers and resilon is a viable alternative to gutta-percha. A number of techniques have been proposed for retreatment including manual files, Gates Glidden drills, heat, ultrasound and adjunctive solvents. [10,11,12]

The conventional methods of removing GP can be tedious and time consuming process. Several studies have shown that Ni-Ti rotary files are safe to use in removing filling materials. ProTaper retreatment files are the most frequently used and the efficacy of these files has been demonstrated in the previous studies. [13]

Wilcox et al. & Friedman et al. have shown that epoxy resin based sealers adhere to the dentin and are more difficult to remove than non adhesive sealers. [14, 15] Therefore resin based sealer was used in gutta-percha group to have fair assessment between the groups.

Retreatment procedure was considered complete when there was no evident filling material on the flutes of the file. [10] Results of this study indicate that the absence of filling material is not a valid criterion to demonstrate complete removal of the filling materials from the root canal. (Schirmeister et al., 2006.)[11]

Various organic solvents like chloroform, xylene, halothane, eucalyptol, turpentine etc are used to dissolve the obturating material. Chloroform and xylene are the most commonly used solvents. In the present study, the solvent had no softening effect on Resilon – Epiphany system.

Even though gutta-percha and AH plus sealer do not adhere as well to the canal wall as epiphany, removal of epiphany left significantly less filling material than removal of gutta-percha and AH plus. This is in comparison with the previous studies. [10, 11]

CONCLUSION:

Within the limitation of this study, the Resilon-Epiphany system is retreatable and orthograde retreatment of this material left cleaner dentinal walls in comparison to gutta-percha and AH Plus. Further research is needed to clarify the effectiveness of other alternative rotary file systems.

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