

Original Research

Efficacy of Three Different Methods in the Retreatment of Root Canals Filled with Resilon/Epiphany SE

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ABSTRACT:

Aim- This study aimed to assess the effectiveness of three different methods for removing the Resilon/New Epiphany self-etch (SE) soft resin endodontic obturation system. **Materials and methods-** 45 single-rooted extracted teeth were decoronated to a standardized root length and prepared for root canal treatment. Working lengths were established at 1 mm short of the apical foramen, and root canals were instrumented using Mtwo rotary instruments with irrigation protocols including 2.5% NaOCl, 17% EDTA, and saline. Canals were dried with paper points and obturated using Resilon cones and Epiphany SE sealer via cold lateral compaction. The teeth were divided into three groups (n=15). Group 1 underwent retreatment using Mtwo R/Mtwo rotary files. Group 2 employed Endosolv R. Group 3 used the same files with chloroform to soften the filling material. In all groups, smooth canal walls free of visible debris marked the completion of retreatment. Final irrigation included 17% EDTA followed by saline, and canals were dried for SEM analysis. Data analysis was done using SPSS software. **Results-** The Mtwo R/Mtwo group showed mean cleanliness scores of 8.56 ± 1.12 at the coronal portion, 15.53 ± 4.04 at the middle portion, and 14.76 ± 1.73 at the apical portion, with an overall mean score of 14.48 ± 4.82 . For the Mtwo R/Mtwo + Endosolv R group, the mean scores were 4.21 ± 2.84 at the coronal portion, 4.73 ± 2.69 at the middle portion, and 5.92 ± 1.32 at the apical portion, with a total mean score of 4.87 ± 2.91 . The Mtwo R/Mtwo + Chloroform group recorded mean scores of 5.98 ± 0.99 at the coronal portion, 6.50 ± 1.12 at the middle portion, and 1.54 ± 0.49 at the apical portion, with an overall mean of 7.93 ± 0.25 . **Conclusion-** All methods left some remnants of filling material and debris on the root canal walls. Nevertheless, the use of Endosolv R in conjunction with rotary files was the most efficient at removing the filling material, with the greatest effectiveness observed in the apical third of the root canals.

Keywords- sealer, debris, filling

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INTRODUCTION

Approximately one-third of endodontically treated teeth exhibit unsatisfactory outcomes, with periapical radiolucency often observed, necessitating retreatment. When treatment failure is identified through clinical or radiographic evaluation, two main approaches are considered: root canal retreatment or apical surgery. While both can be effective when appropriately indicated, endodontic retreatment is

generally preferred whenever access to the root canal is feasible.^{1,2}

Various techniques are employed for the removal of filling materials, including manual and rotary instrumentation, often combined with heat or solvents to soften the material. Despite these advancements, no method has been shown to completely eliminate filling materials, leaving residual debris on the canal walls after reinstrumentation^{3,4}.

The effectiveness of retreatment depends largely on the complete removal of obturation materials from the canal system to allow for thorough cleaning and disinfection. Resilon, paired with Epiphany self-etch (SE) sealer, is a thermoplastic-based soft resin system commonly used for root canal obturation due to its favorable sealing properties and bond to dentin. However, its removal during retreatment poses significant challenges.^{5,6}

Various methods have been developed to enhance the efficacy of removing such materials, including the use of rotary instruments, solvents like chloroform, and specialized agents such as Endosolv R. This study explores the efficacy of three different retreatment techniques—Mtwo rotary files alone, Mtwo files with chloroform, and Mtwo files with Endosolv R—in removing Resilon/Epiphany SE from root canals. The findings aim to provide insights into the most effective strategies for achieving clean canal walls and improving retreatment outcomes.^{7,8}

Hence this study aimed to assess the effectiveness of three different methods for removing the Resilon/New Epiphany self-etch (SE) soft resin endodontic obturation system.

RESULTS

Table 1- Mean scores (SD) of canal wall cleanliness for different retreatment groups at the coronal, middle, and apical portions.

Group	Coronal	Middle	Apical	Total
Mtwo R/Mtwo	8.56(1.12)	15.53(4.04)	14.76(1.73)	14.48(4.82)
Mtwo R/Mtwo + endosolv R	4.21(2.84)	4.73 (2.69)	5.92(1.32)	4.87(2.91)
MtwoR/Mtwo+ Chloroform	5.98(0.99)	6.50(1.12)	1.54(0.49)	7.93(0.25)

The mean scores and standard deviations (SD) of canal wall cleanliness for the different retreatment groups were analyzed across the coronal, middle, and apical portions. The Mtwo R/Mtwo group showed mean cleanliness scores of 8.56 ± 1.12 at the coronal portion, 15.53 ± 4.04 at the middle portion, and 14.76 ± 1.73 at the apical portion, with an overall mean score of 14.48 ± 4.82 . For the Mtwo R/Mtwo + Endosolv R group, the mean scores were 4.21 ± 2.84 at the coronal portion, 4.73 ± 2.69 at the middle portion, and 5.92 ± 1.32 at the apical portion, with a total mean score of 4.87 ± 2.91 . The Mtwo R/Mtwo + Chloroform group recorded mean scores of 5.98 ± 0.99 at the coronal portion, 6.50 ± 1.12 at the middle portion, and 1.54 ± 0.49 at the apical portion, with an overall mean of 7.93 ± 0.25 .

DISCUSSION

Endodontic retreatment is a crucial procedure aimed at resolving treatment failures and restoring the health of teeth affected by incomplete or unsuccessful root canal therapy. When initial treatments fail, removing the existing filling material is essential to allow thorough cleaning, disinfection, and reshaping of the root canal system. Resilon, paired with Epiphany SE, is a widely used thermoplastic-based obturation

MATERIALS AND METHODS

45 single-rooted extracted teeth were decoronated to a standardized root length and prepared for root canal treatment. Working lengths were established at 1 mm short of the apical foramen, and root canals were instrumented using Mtwo rotary instruments with irrigation protocols including 2.5% NaOCl, 17% EDTA, and saline. Canals were dried with paper points and obturated using Resilon cones and Epiphany SE sealer via cold lateral compaction.

The teeth were divided into three groups (n=15). Group 1 underwent retreatment using Mtwo R/Mtwo rotary files. Group 2 employed Endosolv R. Group 3 used the same files with chloroform to soften the filling material. In all groups, smooth canal walls free of visible debris marked the completion of retreatment. Final irrigation included 17% EDTA followed by saline, and canals were dried for SEM analysis.

Samples were prepared by splitting each root longitudinally, fixing one half in 2% glutaraldehyde, and dehydrating with ethanol before sputter-coating with gold. SEM imaging at $\times 500$ magnification assessed residual filling material and debris across apical, middle, and coronal segments. Data analysis was done using SSPS software.

system known for its adhesive properties and sealing ability. However, its removal during retreatment can be challenging due to its strong bond to dentin and resilient composition.^{9,10,11}

This study evaluates the efficacy of three different methods for removing Resilon/Epiphany SE from root canals: rotary files alone, rotary files with Endosolv R and rotary files with chloroform. By comparing these approaches, the study aims to determine the most effective technique for achieving cleaner canal walls with minimal residual debris, ultimately enhancing retreatment outcomes and contributing to the broader understanding of endodontic retreatment strategies.

In our study, the Mtwo R/Mtwo group demonstrated the least canal cleanliness, with mean scores of 8.56 ± 1.12 in the coronal portion, 15.53 ± 4.04 in the middle portion, and 14.76 ± 1.73 in the apical portion, resulting in an overall mean of 14.48 ± 4.82 . The Mtwo R/Mtwo + Endosolv R group showed superior cleanliness with lower mean scores of 4.21 ± 2.84 , 4.73 ± 2.69 , and 5.92 ± 1.32 in the coronal, middle, and apical portions, respectively, yielding a total mean score of 4.87 ± 2.91 . The Mtwo R/Mtwo + Chloroform group had intermediate performance, with scores of 5.98 ± 0.99 , 6.50 ± 1.12 , and 1.54 ± 0.49 in

the coronal, middle, and apical portions, respectively, and an overall mean of 7.93 ± 0.25 .

Similarly, in the study by Ramzi et al.¹², Endosolv R combined with rotary files was also identified as the most effective method for material removal, followed by chloroform with rotary files and rotary files alone. In their study, the Mtwo R/Mtwo group had significant differences in cleanliness between the coronal and middle/apical thirds, while the chloroform group had more material remnants in the apical third. The Endosolv R group showed consistent cleanliness across all root canal segments, aligning with our findings that this method was the most efficient. Both studies conclude that while no method achieved complete removal of filling materials, Endosolv R combined with rotary files offered superior performance, particularly in the apical region.

In a study by Soares et al.¹³, the challenge of retreating endodontically treated teeth, specifically focusing on the complete removal of previous filling materials, was explored. They aimed to identify the most efficient method for removing Resilon (RS) root fillings and to compare the speed and efficacy of RS and gutta-percha (GP) removal techniques. The study concluded that the ProTaper system, whether manual or rotary, combined with chemical solvents, was the most efficient method for removing Resilon root fillings. Furthermore, retreatment of Resilon was found to be faster and left fewer remnants of debris compared to other methods.

The present study underscores the superior efficacy of the Endosolv R combined with rotary files for removing Resilon/Epiphany SE from root canals, particularly in terms of achieving cleaner canal walls with minimal debris, especially in the apical third. These findings align with previous studies, including those by Ramzi et al. and Soares et al., which also identified Endosolv R and ProTaper systems with chemical solvents as effective methods for retreatment. Despite the promising results, it is important to note the limitation of a small sample size in this study, which may affect the generalizability of the conclusions. Future research with larger sample sizes is necessary to confirm these findings and further refine retreatment strategies for Resilon-filled canals.

CONCLUSION

All methods left some remnants of filling material and debris on the root canal walls. Nevertheless, the use of Endosolv R in conjunction with rotary files was the most efficient at removing the filling material, with the greatest effectiveness observed in the apical third of the root canals

REFERENCES

1. Del Fabbro M, Taschieri S. A systematic review on the outcome of surgical vs non-surgical procedure for the retreatment of periapical lesions. *Minerva Stomatol.* 2007;56:621–32.
2. Kvist T. Endodontic retreatment. Aspects of decision making and clinical outcome. *Swed Dent J Suppl.* 2001;144:1–57.
3. Bramante CM, Fidelis NS, Assumpção TS, Bernardineli N, Garcia RB, Bramante AS, et al. Heat release, time required, and cleaning ability of MTwo R and ProTaper universal retreatment systems in the removal of filling material. *J Endod.* 2010;36:1870–3. doi: 10.1016/j.joen.2010.08.013.
4. Jantarajit J, Malhotra W, Sutimuntanakul S. Efficacy of grapefruit, tangerine, lime, and lemon oils as solvents for softening gutta-percha in root canal retreatment procedures. *J Investig Clin Dent.* 2013;4:60–3. doi: 10.1111/j.2041-1626.2012.00143.x.
5. Kvist T, Reit C. Postoperative discomfort associated with surgical and nonsurgical endodontic retreatment. *Endod Dent Traumatol.* 2000;16:71–4. doi: 10.1034/j.1600-9657.2000.016002071.x
6. Kaufman D, Mor C, Stabholz A, Rotstein I. Effect of gutta-percha solvents on calcium and phosphorus levels of cut human dentin. *J Endod.* 1997;23:614–15. doi: 10.1016/S0099-2399(97)80171-9.
7. Erdemir A, Eldeniz AU, Belli S, Pashley DH. Effect of solvents on bonding to root canal dentin. *J Endod.* 2004;30:589–92. doi: 10.1097/01.don.0000121613.52816.03.
8. Shokouhinejad N, Sabeti MA, Hasheminasab M, Shafiei F, Shamshiri AR. Push-out bond strength of Resilon/Epiphany self-etch to intraradicular dentin after retreatment. *J Endod.* 2010;36:493–6. doi: 10.1016/j.joen.2009.11.009.
9. Roda SR, Gettleman BH. Nonsurgical Retreatment. In: Cohen S, Hargreaves KM, editors. *Pathways of the pulp.* 9th Edition. St Louis: Mosby; 2006. pp. 944–1010.
10. de Souza Filho FJ, Gallina G, Gallottini L, Russo R, Cumbo EM. Innovations in endodontic filling materials: guttapercha vs Resilon. *Curr Pharm Des.* 2012;18(34):5553–8. doi: 10.2174/138161212803307635.
11. Lee B-S, Wang C-Y, Fang Y-Y, Hsieh K-H, Lin C-P. A Novel Urethane Acrylate-based Root Canal Sealer with Improved Degree of Conversion, Cytotoxicity, Bond Strengths, Solubility, and Dimensional Stability. *J Endod.* 2011;37(2):246–9. doi: 10.1016/j.joen.2010.11.008.
12. Ramzi H, Shokouhinejad N, Saghiri MA, Samieefard A. Efficacy of Three Different Methods in the Retreatment of Root Canals Filled with Resilon/Epiphany SE. *Iran Endod J.* 2010 Fall;5(4):161-6. Epub 2010 Nov 15. PMID: 23130046; PMCID: PMC3471576.
13. Soares C, Maia C, Vale F, Gadê-Neto C, Carvalho L, Oliveira H, Carvalho R. Comparison of Endodontic Retreatment in Teeth Obturated With Resilon or Gutta-Percha: A Review of Literature. *Iran Endod J.* 2015 Fall;10(4):221-5. doi: 10.7508/iej.2015.04.002. PMID: 26523136; PMCID: PMC4609657.