wjpmr, 2024, 10(11), 221-223

SJIF Impact Factor: 6.842

WORLD JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.wjpmr.com

Case Study

ISSN 2455-3301

WJPMR

MANAGEMENT OF INTERNAL ROOT RESORPTION BY PLACING POLYETHYLENE FIBRE - A CASE REPORT

[1]Dr. Niya Mariam Joseph, [2]Dr. Robin Theruvil, [3]Dr. Saira George, [4]Dr. Jain Mathew, [5]Dr. Midhun Paul and [6]Dr. Aida James

[1,6]PG Student, Department of Conservative Dentistry and EndodonticsSt. Gregorios Dental College, Chelad.
[2,3]Professor, Department of Conservative Dentistry and EndodonticsSt. Gregorios Dental College, Chelad.
[4]HOD, Department of Conservative Dentistry and EndodonticsSt. Gregorios Dental College, Chelad.
[5]Reader, Department of Conservative Dentistry and EndodonticsSt. Gregorios Dental College, Chelad.

***Corresponding Author: Dr. Niya Mariam Joseph**

PG Student, Department of Conservative Dentistry and Endodontics St. Gregorios Dental College, Chelad.

Article Received on 14/09/2024 **Article Revised on 04/10/2024** **Article Accepted on 25/10/2024**

ABSTRACT

The success of endodontic treatment relies on several factors which includes the restoration of endodontically treated teeth. Adhesive procedures and direct resin-bonded composites are preferred as they avoid removal of excessive tooth structure. Fiber reinforcement, particularly using polyethylene fiber Ribbond, addresses challenges like polymerization stress and shrinkage, thus improving restoration effectiveness. A 21-year-old male patient presented with discolored tooth 11. The patient gave a history of incomplete root canal treatment following trauma 10 years ago. Radiograph and CBCT showed Internal root resorption and a breach in the apical third of the root. Retreatment was initiated, MTA was applied to repair the breach and radicular reinforcement technique was done using Ribbond and dual cure composite. The integration of polyethylene fiber RIBBOND with composite resin effectively enhanced the fracture resistance of the tooth. This radicular reinforcement method provided a viable alternative totraditional posts, preserving tooth structure and ensuring robust restoration.

KEYWORDS: RIBBOND fibre, Internal root resorption, Fibre reinforcement, dual cure composite.

INTRODUCTION

The success of endodontic treatment is influenced by multiple factors, which includes post endodontic restoration to ensure the overall effectiveness of root canal therapy.[1] Restoration of a tooth with adhesive procedures and direct resin-bonded composites eliminated the need for sacrificing any tooth structure by over-preparation. Following endodontic treatment and caries removal, the residual tooth structure would be a substrate for adhesion.[2]

One of the critical factors impacting the success of the final restorations is the polymerization stress and shrinkage associated with extensive composite restorations. To address these challenges, fiber reinforcement, specifically in the form of polyethylene fiber Ribbond (Seattle, WA, USA), has been introduced in recent years as a solution to mitigate these deficiencies and enhance the overall effectiveness of the restoration process.[3]

The RIBBOND material features a three-dimensional structure created by its leno weave or triaxial braid, which enables mechanical interlocking with composite resin across multiple planes. This unique structure not only enhances the material's bonding strength but also helps to minimize microcracking during the resin's polymerization process, thereby improving the overall durability and stability of the restoration.[4]

A variety of clinical applications, including tooth splinting, tooth replacement, emergency dental care, strengthening of resin temporary fixed prosthodontic restorations, orthodontic retention have been effectively performed with ribbond.[5]

CASE REPORT

A 21-year-old female/ male patient presented to the department with a chief complaint of discolored front tooth 11. The patient gave a history of trauma 10 years ago following which a root canal treatment was peeformed. The treatment wa not completed. The patient had no other signs and symptoms. The main concern was esthetics.

An initial intraoral periapical (IOPA) radiograph revealed signs of internal root resorption. To further evaluate, it was decided to take a CBCT scan to assess

the remaining root dentin thickness. The CBCT findings indicated a breach in the buccal aspect of the apical third of the root (Fig. 1), further complicating the situation and altering the course of treatment plan.

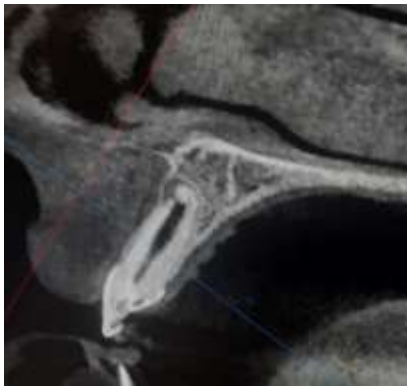

Figure 1: CBCT showing breach in buccal aspect of root.

Clinical procedure

Retreatment was initiated. Working length was established carefully using size #15 k file (Mani). Biomechanical preparation of the canals was carried out, followed by thorough irrigation using saline and sodium hypochlorite (Asian sodium hypochlorite) to disinfect the area and remove any debris. After the cleaning process, calcium hydroxide (RC- Cal, PRIME dental products) was applied as an intracanal medicament to facilitate healing and prevent further infection. The patient was then scheduled for a follow-up appointment in two weeks to continue the treatment.

At the second appointment, the canal was copiously irrigated with saline and meticulously dried with paper point to prepare it for the next stage of the procedure. A 4 mm thickness of MTA (Mineral Trioxide Aggregate) plug(SafeEndo, root repair material) was placed at the apical region of the root (Fig. 2), to repair the breach caused by the internal root resorption. This step was crucial in reinforcing the structural integrity of the tooth and ensuring a successful outcome of the root canal treatment.

Figure 2: MTA placed at the apical region of root.

Given the reduced thickness of the root dentin, a radicular reinforcement technique was employed in the subsequent appointment to strengthen the tooth structure. The canal was thoroughly irrigated with EDTA(SafeEndo) and dried to create an optimal environment for bonding. A bonding agent was then carefully applied to the canal surfaces using an applicator tip and light-cured for 20 seconds to ensure proper adhesion and reinforcement of the weakened root structure.

An appropriate length (2cm) of Ribbond was selected, measuring twice the length of the root space to ensure sufficient coverage (Fig. 3). The Ribbond fiber was then soaked in adhesive resin to thoroughly wet it, and any excess resin was carefully removed using a piece of gauze. The dual- cured resin cement was subsequently injected directly into the root canal. To position the Ribbond within the canal, the mid-point of the wetted Ribbond was draped over the end of a plugger, which was then carefully inserted and pushed into the canal until it reached the apical end of the rootspace. it was then light cured (Fig. 4). Access opening space was restored with composite.

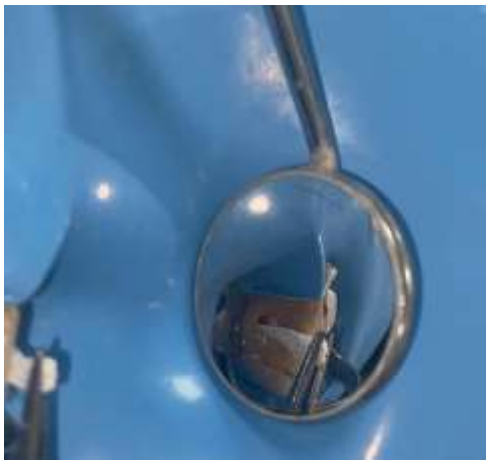

Figure 3: Placing the RIBBOND polyethylene fibre into the canal.

Figure 4: Obturation using Ribbond fibre embedded

in dual cure composite resin.

DISCUSSION

Endodontically treated teeth that have experienced significant hard tissue loss due to dental caries, endodontic access cavities, and root canal preparation are at a higher risk of fracture, making post endodontic restoration a crucial factor for their long-term success. Consequently, such teeth require specialized restoration techniques to ensure durability and effective management of their increased susceptibility to fracture.[6]

While it is generally recognized that posts can weaken the tooth structure rather than reinforce it, they become essential in cases of extensive hard tissue loss, as they are necessary to ensure the retention of core materials and the stability of the restoration.[7]

For many years, cast metal and prefabricated metal posts were commonly used in dental restorations. However, in the 1990s, fiber-reinforced composite posts were introduced, gradually replacing metal posts with their superior esthetic and biomechanical properties in the restoration of endodontically treated teeth.[8]

It is well-established that incorporating fibers into materials enhances their mechanical properties, as these woven fibers possess a modulus of elasticity comparable to that of dentin. This design aims to establish a monoblock system consisting of dentin, post, and core, which facilitates a more even distribution of forces along the root.[9]

A study conducted by Aggarwal et al. investigated the fracture resistance and fracture modes of endodontically treated teeth with wide root canals, comparing using various dowel materials, including Reforpost and Ribbond. The findings revealed that the specimens restored with Ribbond exhibited the higher resistance to fracture, when compared to all other groups studied.[10]

In contrast, a study by Kivanc et al. found no significant differences in fracture resistance among various types of fiber-reinforced composite (FRC) posts, including Luminex, Dentatus, Ribbond, and EverStick, when tested. However, it is important to note that this study was conducted on thin- walled roots.[11]

During the preparation of the fiber post space, it is common to remove a significant amount of root dentin, which reduces resistance to occlusal forces and increases the risk of fracture. However, in this particular case, the post preparation was carried out without the use of a peezoreamer, which typically contributes to such dentin removal. Adhering to correct bonding procedures and ensuring the precise placement of the fiber will contribute to achieving a well-sealed, microleakage-free zone within the root canal. This meticulous approach helps to prevent leakage and ensure the integrity of the restoration.

CONCLUSION

The combined use of polyethylene RIBBOND fiber and composite resin improved the fracture resistance of the root. This method of radicular reinforcement was designed to enhance the strength of the tooth without compromising the remaining structure. It served as a viable alternative to traditional cast posts or prefabricated fiber posts, offering a solution that maintained the integrity of the existing tooth structure while providing effective reinforcement.

REFERENCES

1. Belli S, Erdemir A, Yildirim C. Reinforcement effect of polyethylene fibre in root-filled teeth: comparison of two restoration techniques. Int Endod J., 2006; 39: 136–42.
2. Grandini S, Goracci C, Tay FR, Grandini R, Ferrari M. Clinical evaluation of the use of fiber posts and direct resin restorations for endodontically treated teeth. Int J Prosthodont, 2005; 18: 399–404.
3. Rahman H, Singh S, Chandra A, Chandra R, Tripathi S. Evaluation of fracture resistance of endodontically treated teeth restored with composite resin along with fibre insertion in different positions in vitro. Australian Endodontic Journal, Aug. 2016; 42(2): 60-5.
4. Ramesh P, Mathew S, Murthy SB, George JV, Hegde S, Premkumar R. Efficacy of Ribbond and a fibre post on the fracture resistance of reattached maxillary central incisors with two fracture patterns: a comparative in vitro study. Dental Traumatology, Apr. 2016; 32(2): 110-5.
5. Rudo DN, Karbhari VM. Physical behaviors of fiber reinforcement as applied to tooth stabilization. Dental Clinics of North America, Jan. 1, 1999; 43(1): 7-35.
6. Sorensen JA, Martinoff JT. Intracoronal reinforcement and coronal coverage: a study of endodontically treated teeth. J. Prosthet. Dent., 1984; 517: 80–84.
7. Trope M, Maltz DO, Tronstad L. Resistance to fracture of restored endodontically treated teeth. Dent. Traumatol, 1985; 1: 108–111.
8. Schwartz RS, Robbins JW. Post placement and restoration of endodontically treated teeth: a literature review. J. Endod, 2004; 30: 289–301.
9. Vitale MC, Caprioglio C, Martignone A, Marchesi U, Botticelli AR. Combined technique with polyethylene fibers and composite resins in restoration of traumatized anterior teeth. Dent. Traumatol, 2004; 20: 172–177.
10. Aggarwal V, Singla M, Miglani S, Kohli S. Comparative evaluation of fracture resistance of structurally compromised canals restored with different dowel methods. J Prosthodont, 2012; 21: 312–6.
11. Kivanc¸ BH, Alacam T, Ulusoy OI, Genc O, Gorgul G. Fracture resistance of thin-walled roots restored with different post systems. Int Endod J., 2009; 42: 997–1003.