Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

NLM ID: 101716117

Journal home page: www.jamdsr.com

doi: 10.21276/jamdsr

Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599;

(p) ISSN Print: 2348-6805

Original Research

Assessment of effectiveness of fiber post removal using D.T Light Post Removal Drill Kit, Parapost Fiber Drill Kit and combination of diamondbur/Peeso reamer

¹Nadeem Aashiq, ²Masarat Mir

^{1,2}PG Resident, Department of Conservative Dentistry and Endodontics, IDST, NH-58, Kadrabad, Modinagar, Uttar Pradesh, India

ABSTRACT:

Background: The ability to remove an existing post depends on the type of material that it is fabricated from. The present study was conducted to assess effectiveness of fiber post removal using 3 techniques i.e., with Parapost Fiber removal drill kit, D.T. light removal kit and combination of diamond bur/Peeso reamer. **Materials & Methods:** A total of 80 extracted non carious, single rooted human teeth with complete root development, mature apex, visible canal space and patent apical foramen were selected for the study. Teeth were randomly divided into groups. Group I: Teeth receiving DT light Fiber Post no 1. Group II: Teeth receiving Parapost Fiber Post no 5. Teeth were then randomly assigned to Subgroup A1: Posts were removed with DT light post removal kit. Subgroup A2: Posts were removed using 1/2 round bur, no. 850 coarse diamond burs and no. 3 and no. 4 Peeso Reamer bur. Subgroup B1: Posts were removed using Parapost Fiber Removal Drill Kit. Subgroup B2: Posts were removed using 1/2 round bur, no. 850 coarse diamond burs and no. 3 and no. 4 Peeso Reamer bur. Subgroup A1 was 28.4, in A2 was 28.1, in subgroup B1 was 28.5 and subgroup B2 was 27.4. The difference was significant (P< 0.05). The removal time at cervical third in A1 was 2.3, at A2 was 1.3, at B1 was 2.06 and at B2 was 1.42, at middle third in A1 was 2.14 and in B2 was 1.48. The difference was significant (P< 0.05). **Conclusion:** Diamond bur/Peeso reamer removal system effectively removed the fiber post. The removal of fiber posts can be achieved in a shorter time and in a more conservative way.

Key words: Diamond bur, fiber post, Parapostfiber

Received: 12 September, 2020

Accepted: 16 October, 2020

Corresponding author: Masarat Mir, PG Resident, Department of Conservative Dentistry and Endodontics, IDST, NH-58, Kadrabad, Modinagar, Uttar Pradesh, India

This article may be cited as: Aashiq N, Mir M. Assessment of effectiveness of fiber post removal using Parapost Fiber removal drill kit, D.T. light removal kit and combination of diamond bur/Peeso reamer. J Adv Med Dent Scie Res 2020;8(11): 288-292.

INTRODUCTION

The restoration of endodontically treated teeth is complicated. Pierre Fauchard utilized metal posts, called tenons, screwed into the roots of teeth to secure the bridges. Then wood supplanted metal, a wooden post installed between the root canal and the artificial crown.¹ These wooden posts can retain liquid and swell, which usually causes fractures of the root. A variety of core and post systems are now used in dentistry.² Endodontic posts can be cast with the core, like nickel chromium and gold posts, or they might be prefabricated, like stainless-steel and titanium posts. In recent times, non-metallic materials like fiber ceramic and reinforced composites have been presented as hypothetically acceptable substitute materials.3

Post and core procedure, whether as a single unit or a combination of individual units, is a restorative procedure wherein a post can be defined as a rigid extension positioned in the root canal space of an endodontically treated tooth so as to provide retention and stabilize a weakened tooth by providing support to the core.⁴ The ability to remove an existing post depends on the type of material that it is fabricated from.⁵ In most fiber post removal situations, the clinician is generally confronted with a fiber post of unknown origin. In these instances, most removal kits would be ineffective because they are specifically designed by manufacturers for their respective post systems. A universal fiber post removal system would

be beneficial to allow removal of any fiber post system.⁶The present study was conducted to assess effectiveness of fiber post removal using 3 techniques i.e., with Parapost Fiber removal drill kit, D.T. Light Post Removal kit and combination of diamond bur/Peeso reamer.

MATERIALS & METHODS

The present study comprised of 80 human extracted, single- rooted teeth with complete root development, mature apex, visible canal space and patent apical foramen. The teeth were immersed in 3% Sodium hypochlorite solution for 15 minutes to remove the surface soft tissue and debris, and then washed under tap water. The samples were decoronated 3mm above thecement enamel junction using a water cooled safe sided diamond disc.

CANAL PREPARATION

Canals were located, and the working length was determined by subtracting 1 mm from the length at which a no. 10 K-file tip extruded apically when viewed under a microscope. Apical preparation was performed using stainless steel 0.02-taper no. 15 and no. 20 K-files to the working length. Straight line access and coronal orifice enlargement were achieved using Roane Gates Glidden drills (Miltex) no. 4, no. 3, and no. 2 in a crown-down succession. A consistent irrigation, lubrication, and recapitulation regimen was followed using 5.25% NaOCl (The Clorox Company), RC-Prep (Premier Dental Products), and no. 20 K-file to working length to ensure regular action of the irrigant and the lubricant in flushing out debris and lubricating files within the canal. GT rotary files (Dentsply) were used in a crown-down manner, and apical flaring at working length was accomplished with ProFile rotary files (Dentsply) up to a size no. 35/0.04 file at working length. Root canals were irrigated with 1 mL NaOCl between instruments using a syringe and side-vented 23-gauge needle. The canal was kept full of irrigant during the cleaning and shaping phase.

POST CEMENTATION

Group I: Canals were etched with phosphoric acid(37%-Ivoclar Vivadent) for 15 seconds then rinsed with water. The canals were blotted dry with paper points, making sure not to desiccate the dentin. After dispensing, 2 applications of One-Step Plus (Ivoclar Vivadent) dental adhesive were applied to the canal walls and post surface, lightly blown with air, and light cured for 10 seconds after each coat. The posts were etched with 9% hydrofluoric acid(Ultradent products) for 30seconds and rinsed with water. The posts were dried and then silanated with coupling agent (Ultradent products). Rely X

U100 (3M ESPE) dual cured resin composite luting cement was coated to the post and applied on to the canal wall. DT Light post was then seated to a full depth of the post preparation. To prevent contact of the post with the storage medium, posts were covered with Filtek Z250 resin composite(3M ESPE Dental Products). The composite was then light cured with QTH Curing unit (Hylux, Heraeus Kulzer), and the teeth were stored in opaque individual vials containing sterile saline until post removal.

Group II: Canal and post surface treatment was done similar to that as group 1. Parapost fibre Lux post no.5 was then seated to a full depth of the post preparation. To prevent contact of the postwith the storage medium, posts were covered with Filtek Z250 resin composite(3M ESPE DentalProducts). The composite was then light cured with QTH Curing unit (Hylux, Heraeus Kulzer), and the teeth were stored in opaque individual vials containing sterile saline until post removal.

POST REMOVAL

The composite covering the posts was removed to the previous decoronated height, prior to fiber post removal, using a diamond bur with a water-cooled, high-speed handpiece.Teeth were then randomly assigned to **Subgroup A1**(n=20): Fiber posts were removed using the DT Light Post removal kit (Bisco Dental Products,RTD France) according to the manufacturer's recommendations.

Subgroup A2(n=20): DT Light fiber post were removed using a $\frac{1}{2}$ round bur,no.850 coarse diamond burs, and no.3 and no.4 Peeso reamer burs. A $\frac{1}{2}$ round bur was used at a high speed to indent the centre of the fiber post surface, followed by a no 850 coarse diamond bur in high speed hand piece to prepare a pilot hole in the centre of the fiber post. After a diamond bur is used to prepare the pilot hole, theno.3 and no.4 Peeso reamer's are used to the full length of the post, successfully hollowing out the fiber post.

Subgroup B1(n=20): Fiber posts were removed using Parapost Fiber Removal Drill Kit according to the manufacturers recommendations. The standard Parapost drills are used to the original diameter of the postpreparation.

Subgroup B2(n=20): Parapost fiber post were removed using a $\frac{1}{2}$ round bur, no 850 coarse diamond burs, and no.3 and no.4 Peeso reamer burs. A $\frac{1}{2}$ round bur was used at a high speed to indent the centre of the fiber post surface, followed by a no 850 coarse diamond bur in high speed hand piece to prepare a pilot hole in the centre of the fiber post. After a diamond bur is used to prepare the pilot hole the no.3 and no.4 Peeso reamers are used to the full length of the post, successfully hollowing out the fiber post.

RESULTS Table I Comparison of removal time in all groups

Removal	Group I		Group II		P value
	Subgroup A1	Subgroup A2	Subgroup B1	Subgroup B2	
Mean	28.4	28.1	28.5	27.4	0.02

Table I shows that mean removal time in subgroup A1 was 28.4, in A2 was 28.1, in subgroup B1 was 28.5 and subgroup B2 was 27.4. The difference was significant (P < 0.05).

Graph I Comparison of removal time in all groups



Table II Comparison of removal time at different tooth site

Removal	Group I		Group II		P value
	Subgroup A1	Subgroup A2	Subgroup B1	Subgroup B2	
Cervical	2.3	1.3	2.06	1.42	0.03
Middle	2.14	1.74	2.14	1.41	0.05
Apical	2.21	1.75	2.14	1.48	0.02

Table II, graph II shows that removal time at cervical third in A1 was 2.3, at A2 was 1.3, at B1 was 2.06 and at B2 was 1.42, at middle third in A1 was 2.14, at A2 was 1.74, at B1 was 2.14 and at B2 was 1.41. At apical third, in A1 was 2.21, in A2 was 1.75, in B1 was 2.14 and in B2 was 1.48. The difference was significant (P < 0.05).

Graph II Comparison of removal time at different tooth site



DISCUSSION

Endodontically treated teeth often have a significant coronal and radicular compromise of tooth structure because of extensive caries, fracture, trauma to the tooth, iatrogenic causes and pulp pathology etc.^{7,8} Restorations of such weakened teeth are accomplished using varied intra-radicular restorations and posts to reinforce the tooth. The restoration of the endodontically treated tooth is a subject that has been evaluated and discussed widely in dental literature.⁹ It has been a controversial topic often approached empirically and is based on assumptions rather than scientific evidence.¹⁰ In cases where tooth structure is relatively intact, conservative approaches such as composite restorations for anterior teeth and full coverage restorations for posterior teeth are satisfactory.11,12The present study was conducted to assess effectiveness of fiber post removal using 3 techniques i.e., with Parapost Fiber removal drill kit,D.T. light removal kit and combination of diamond bur/Peeso reamer.

We found that mean removal time in subgroup A1 was 28.4, in A2 was 28.1, in subgroup B1 was 28.5 and subgroup B2 was 27.4. Patil et al¹³evaluated the efficiency and effectiveness of fiber post removal using 3 techniques i.e., with Parapost Fiber removal drill kit, D.T. light removal kit and combination of diamond bur/Peeso reamer. There was no difference between the three post removal systems i.e., DT Removal drill kit, Parapost removal drill kit and diamond bur/Peeso reamer in terms of efficiency of removal of fiber posts and no difference in effectiveness between DT Removal drill kit and Parapost removal drill kit. Diamond bur/Peeso reamer removal system effectively removed the fiber post.

We observed that removal time at cervical third in A1 was 2.3, at A2 was 1.3, at B1 was 2.06 and at B2 was 1.42, at middle third in A1 was 2.14, at A2 was 1.74, at B1 was 2.14 and at B2 was 1.41. At apical third, in A1 was 2.21, in A2 was 1.75, in B1 was 2.14 and in B2 was 1.48. Anderson et al¹⁴evaluated the speed (efficiency) and effectiveness of 3 different fiber post removal systems. Fiber posts D.T. Light-Post no. 1 and ParaPost Fiber no.5 were cemented into 80 singlerooted teeth after endodontic therapy and post space preparation were completed. Three methods of fiber post removal were evaluated-D.T. Light-Post removal kit,ParaPost Fiber post removal drill kit, and a combination of diamond bur/Peeso reamer. The efficiency to remove either fiber post was not significantly different, nor was efficiency of any of the 3 post removal systems significantly different. For effectiveness, no difference was observed between post types, but effectiveness was higher with the diamond bur/Peeso reamercompared with the ParaPost drills, which in turn was more effective than the D.T. Light- Post removal kit. Fiber posts are efficiently removed by all 3 methods, but effectiveness of removal is higher using the diamond bur/Peeso reamer.

Cormier CJ et al¹⁵aimed to assess the removal times of fiber posts after failure and concluded that fiber posts were easily retrievable using fiber post-removal kits. They suggested that removal kits were significantly more efficient, while the diamond bur and ultrasonic handpiece took a longer time to be removed. The two fiber posts i.e., DT Light post no 1 and Parapost no 5 did not vary significantly in amount of time (efficiency) needed for removal of fiber post removal. The Parapost removal drill kithad highest efficiency grade. DT Removal drill kit was more efficient than diamond bur/Peeso reamer combination. There was no significant difference in the effectiveness of fiber post removal with two different removal systems i.e., DT Light post and Parapost removal drill kit in retrieving their respective posts. However there was significant difference between the effectiveness of fiber post removal using diamond bur/Peeso reamer and DT removal drill kit, Parapost removal drill kit. The diamond bur/Peeso reamers combination had a higher effectiveness grade than the Parapost removal kit, which had higher grade than DT Light post removal kit. The effectiveness of fiber post removalin the present study showed that different posts did not significantly vary from each other which confirm the results of the study done by Gerald et al.¹⁹ With diamond bur/Peeso reamer combination the posts were retrieved effectively. These results are in accordance with Gerald et al¹⁹ and Lindeman et al.²⁷ In selecting a post removal system, both speed and effectiveness remain important factors to consider, while safety of the post removal system is of utmost importance.

The limitation the study is small sample size.

CONCLUSION

Authors found that diamond bur/Peeso reamer removal system effectively removed the fiber post. The removal of fiber posts can be achieved in a shorter time and in a more conservative way

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