Volume 5 / Issue 1 / July 2025

Case Report

Restoration of Endodontically Treated Teeth With Bundle Fiber Post; Two Case Series

Elif Yıldız[1*], Emre Bodrumlu[1]

[1]Zonguldak Bulent Ecevit University, Faculty of Dentistry, Department of Endodontics, Zonguldak, Turkey

*Corresponding author: elif.yldz.99@gmail.com

Bodrumlu, Emre., Yıldız, Elif. "Restoration of Endodontically Treated Teeth With Bundle Fiber Post; Two Case Series". *Acta Stomatologica Cappadocia.* 5;1 (July 2025): 35-44.

DOI: https://doi.org/10.54995/ASC.5.1.3
Received: 23.01.2025; Accepted: 13.05.2025

Restoration of Endodontically Treated Teeth With Bundle Fiber Post; Two Case Series

Elif Yıldız, Emre Bodrumlu

Abstract

Objective: Bundle fiber post and direct composite resin application is one of the preferred methods in conservative dentistry in root canal treated teeth with excessive material loss. The aim of this case series is to describe the restoration and function of maxillary central incisor and premolar teeth with bundle fiber post and composite resin application.

Case Reports: Excessive loss of material was detected in the maxillary central and premolar teeth of two patients who presented to our clinic with the complaint of fracture of old restorations. Radiographs obtained from the patients did not show any lesion on the root tip and surrounding tissues. After root canal treatment, a bundle fiber post was placed and a core structure was formed with composite resin. Patients were referred to the prosthesis department for the superstructures of the teeth with post core restoration.

Conclusion: Successful results are obtained with the application of bundle fiber post systems to support the remaining root structure and restore excessive material loss.

Keywords: Bundle fiber post, Core structure, Root canal treatment, Case reports.

Introduction

Endodontically treated teeth that show coronal structure damage and have undergone extensive restorations are usually restored with post and core, followed by prosthetic crown restoration (1,2). Among the various techniques, posts and materials reported in the literature for cementation and cortex construction, cast post and cortex are traditionally used due to their high mechanical strength and compatibility with the root canal (3,4). Furthermore, in teeth restored with such systems, oblique/horizontal fractures in the middle third and vertical root

fractures due to increased stress accumulation in the apical region of the post can be seen more frequently (5,6).

Fiber posts are frequently used in the repair of teeth with excessive material loss. Fiber posts are preferred because they are aesthetically compatible with the tooth colour of the patients, biocompatible, less likely to break and damage the tooth structure compared to metal posts, elastic modulus similar to dentin, and bonding properties to the tooth and composite. An ideal core and post increase the biomechanical stability of the abutment tooth, prevent dentin attachment and root fracture or abutment fracture (7). For this reason, fiber posts, especially bundled fiber posts, have been used as an alternative in recent years (8). The bundle post manufacturer reports that bundle posts, evenly distributed over the entire structure of the post and core restoration, provide better fracture resistance than fiber posts and a stronger foundation for a conventional crown or veneer. The developing bundle fiber post is based on the principle that no additional preparation is required to prevent further weakening of the tooth structure. It adapts to the existing anatomical shape of the root canal. In this way, the compatibility between the post and the canal wall increases and this allows the thickness of the cement layer to be reduced. Reduced cement thickness reduces the risk of microleakage by providing a more homogeneous adhesion on the bonding surfaces and positively affects the long-term success of the restoration (9,10). In addition, fiber posts, whose modulus of elasticity is similar to that of dentin, provide a more balanced distribution of stress to the root structure, which is considered to be an important factor in reducing the risk of root fracture.

Especially in irregular or oval shaped root canals, these new generation post systems stand out as effective methods that increase both the biomechanical and clinical success of restorative treatment.

The bundle of fiber posts consists of a package of varying numbers of thin individual posts. After removal of the sheath, the bundle is spread and the thin individual posts are distributed over the entire root canal. The post adapts to all kinds of root canal morphology. In addition, the translucency of the material increases aesthetics (11).

This case series describes the restoration of teeth with excessive loss of material with a bundle fibre post and composite core to create a suitable abutment.

Case Reports

Case 1: A 24-year-old female patient was admitted to Zonguldak Bülent Ecevit University Faculty of Dentistry with the complaint of fracture of her upper anterior teeth. The patient's anamnesis revealed that she did not have any systemic disease. Periapical radiographs showed no lesions in the apex and surrounding tissues. It was not possible to isolate the teeth with excessive material loss with rubber dam. Retractors and cotton rolls were used for isolation. After the clinical and radiographic evaluation was completed, root canal treatment was performed, a post cavity was created with a number three Gates glidden drill, maintaining a 7 mm apical seal, and 2/3 of the gutta percha was removed from the canal. After the post cavity was created, the canals were acid treated for 20 s and irrigated with distilled water, dried with a paper point (Dentsply Maillefer, Tulsa, OK). A homogeneous mixture of Biolight Bond DC Part A and Part B (Medicaux, France) was applied to slightly wet root canal walls with a brush for 15 s and polymerised with air and light for 20 s. The appropriate size Biolight Bundle Fiber Post (Medicaux, France) was selected. The length of the post was determined and confirmed using a radiograph. Bonding of the canal and post was performed by coating the canal and post using the self-etch dual cure adhesive cement Biolight Core DC (Medicaux, France). The post was then inserted into the canal and the sheath was removed. The bundled fibres were spread using a spreader and polymerised by direct light.

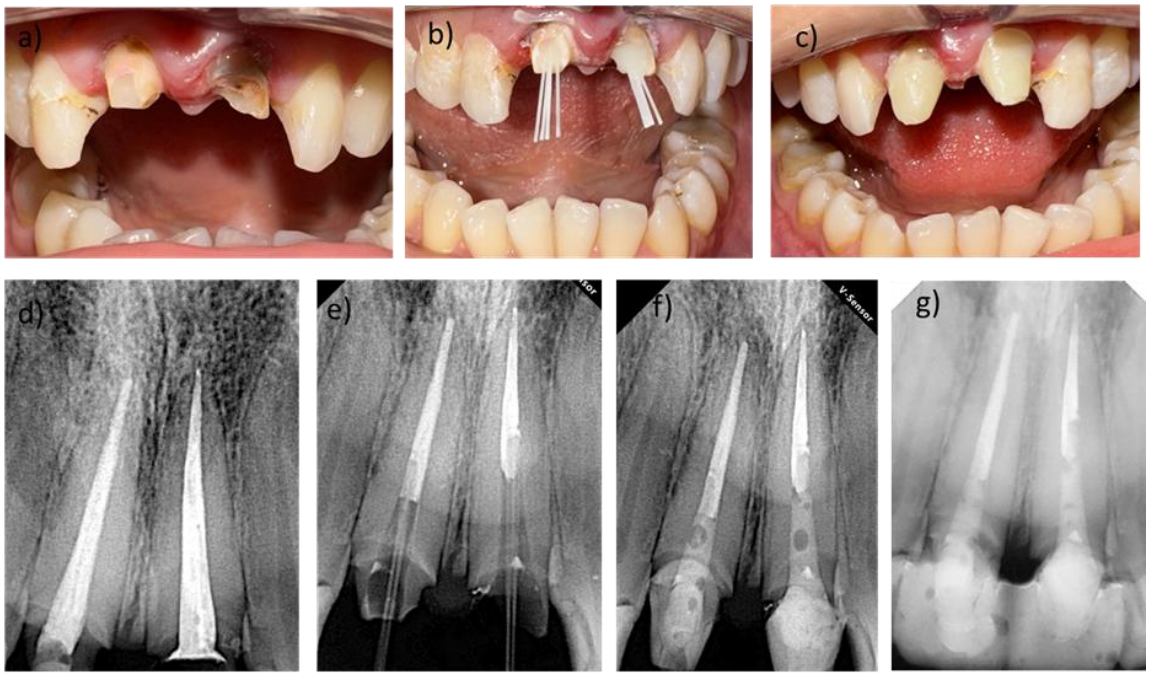

Figure 1: Visual of case 1, a) Initial intraoral view, b) Intraoral view with bundle post inserted, c) Intraoral view of the core structure, d) Radiograph after root canal treatment, e) Bundle post control radiograph, f) Post-core restoration radiograph, g) 3-months follow-up radiograph

The extra length was cut and then the core was formed by successive addition of composite resin (Tokuyama Estelite, Japan). In the 3-month follow-up, clinical and radiological examination revealed no problems (Figures 1 and 2).

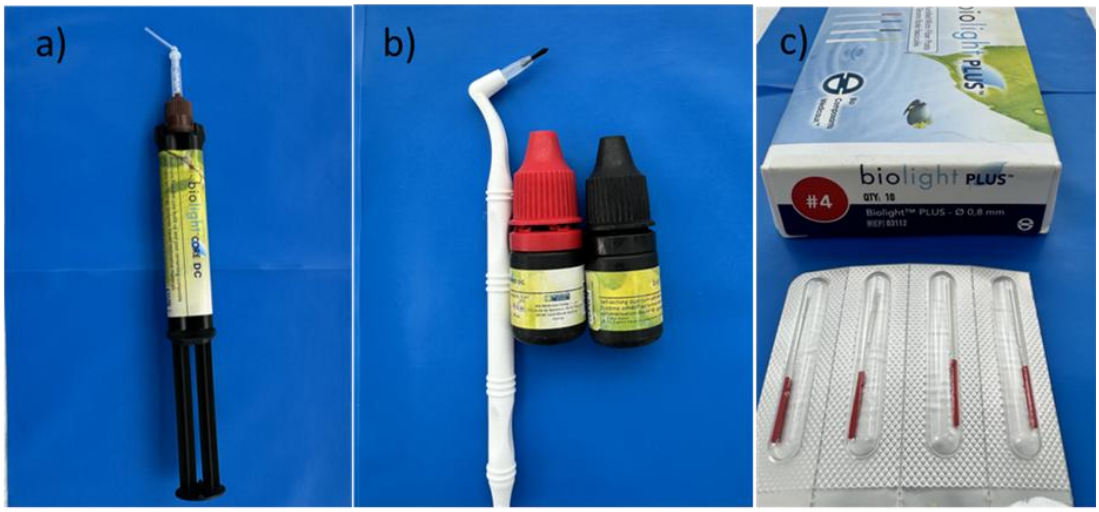

Figure 2: Bundle post sytsem, a) Biolight Core DC , b) Biolight Bond, c) Bundle fiber post

Case 2: A 27-year-old female patient came to Zonguldak Bülent Ecevit University Faculty of Dentistry with the complaint of a fracture in her upper right first premolar tooth. The patient's anamnesis revealed that she was systemically healthy. It was not possible to isolate the teeth with excessive material loss with rubber dam. Retractors and cotton rolls were used for isolation. After the clinical and radiographic evaluation was completed, root canal treatment was performed, a post cavity was created with a number three Gates glidden drill, maintaining a 7 mm apical seal, and 2/3 of the gutta percha was removed from the canal. After the post cavity was created, the canals were acid treated for 20 s and irrigated with distilled water, dried with a paper point (Dentsply Maillefer, Tulsa, OK). A homogeneous mixture of Biolight Bond DC Part A and Part B (Medicaux, France) was applied to slightly wet root canal walls with a brush for 15 s and polymerised with air and light for 20 s. The appropriate size Biolight Bundle Fiber Post (Medicaux, France) was selected. The length of the post was determined and confirmed using a radiograph. Bonding of the canal and post was performed by coating the canal and post using the self-etch dual cure adhesive cement Biolight Core DC (Medicaux, France). The post was then placed in the canal and the sheath was removed. The bundled fibres were spread using a spreader and polymerised by direct light. The extra length

was cut and then core formed with composite resin (Tokuyama Estelite, Japan). In the 3-month follow-up, clinical and radiological examination revealed no problems (Figure 3).

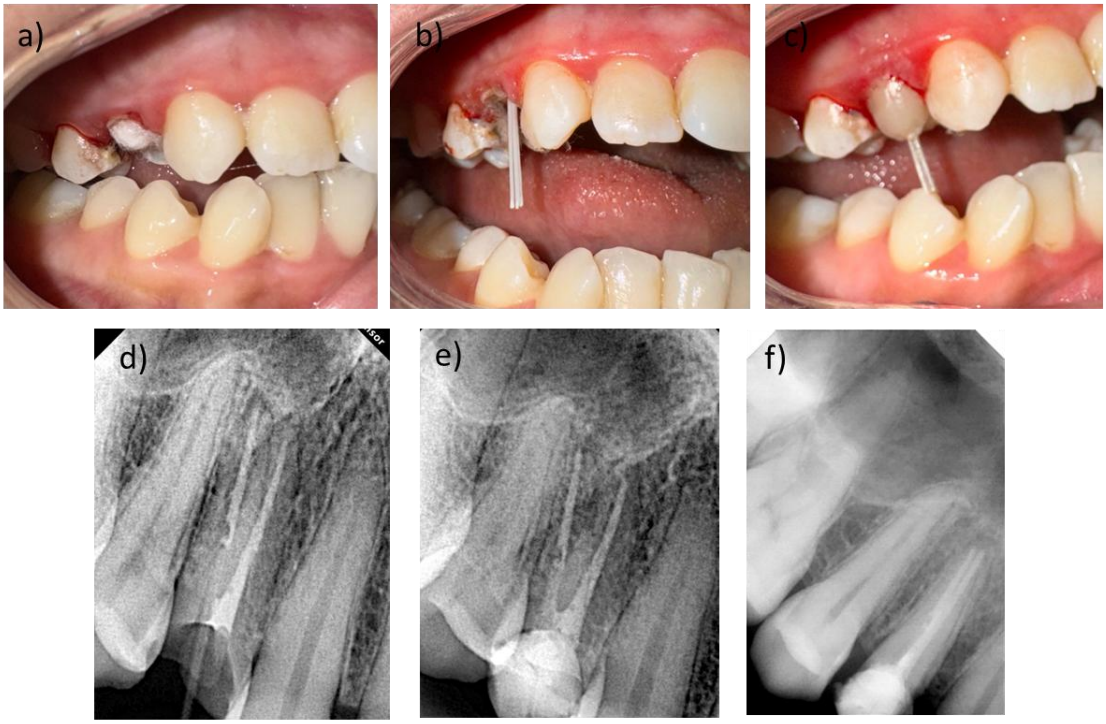

Figure 3: Visual of case 2, a) Initial intraoral view, b) Bundle post intraoral view, c) Core structure intraoral view, d) Bundle post control radiograph, e) Post-core restoration radiograph, f) 3-months follow-up radiograph

Discussion

The clinical success rate of fiber posts is evaluated in longitudinal studies. Fiber posts are preferred in cases where a metal post may compromise aesthetic results. Furthermore, the fracture resistance of fiber posts against the risk of root fracture in an endodontically treated tooth is higher than that of metal posts, because fiber posts have similar physical properties to dentin, especially in terms of modulus of elasticity. Physical properties, aesthetic factor, root and restoration fracture risk, adhesion, radiopacity, biocompatibility, chemical stability and many other aspects show many additional advantages over conventional post systems (12).

The main problem encountered when using the prefabricated post system is to compromise the remaining root dentin thickness in order to open the post cavity to place the post in the root canal. Therefore, the durability of the tooth may be threatened. In their in vitro study, Eric et al (13). concluded that intra-canal preparation up to a size 5.0 milling cutter increases the risk of perforation or root weakening in the buccal and palatal directions, especially

at the apical level. Fiber posts are used to hold the coronal segment and reduce the stress on the two separate parts and minimise the stress on the remaining tooth structure (14). A new concept, the bundle fiber post, is a strip of multiple small and flexible posts that are spread across the canal cavity and can be adjusted to adapt to any root canal configuration. For this reason, this post can be used in elliptical or curved root canal conditions (15).

Bundle fiber posts, a new concept, are multiple small and flexible post strips that are spread into the canal cavity. The manufacturer reports that bundle posts increase fracture resistance by homogeneously distributing the stress on the post core restoration. The use of the bundle post system has the advantage that they conform to the canal morphology, thus minimising the loss of residual dentin thickness to achieve the conformity that leads to conservative root preparation for the post.

In a study by Hedge et al. (16) in which bundle fiber posts were compared with other post systems, it was found that bundle fiber posts showed more resistance to both vertical and oblique loads. Bundle fiber posts can be used to strengthen the weakened tooth, especially in cases with large canal spaces. This is because the individual fibres spread out and adapt to the canal morphology, filling and strengthening the canal cavity well. The results of a study revealed a significant increase in the fracture resistance of endodontically treated teeth restored with bundle fiber posts compared to a single wider post. The results were similar at different load angles in the posterior and anterior regions. In the canine region, the fracture resistance of teeth restored with bundle fiber posts was 1843.80 N, while this value was 1623.98 N in the single fiber post group. A similar trend was also observed with the metal post, corresponding to values of 1493.17N and 1648.99 N, respectively. Researchers have reported large differences in the stress produced and its distribution within teeth restored with intact post-cor (17).

The presence of bundle posts allows the cement layer to be minimised, similar findings were also found in the study by Latempa et al. (18) and it was concluded that the bond strength to dentin could be increased by using accessory posts (19). In addition, due to the increased number of fibers, it provides better attachment to the core structure and adaptation to the canal walls. All of these together result in increased strength (20).

Due to the above-mentioned advantages of bundle posts, bundle fiber post and composite core were preferred in both of our cases. While the treatment proved successful in the

two cases that utilised bundle fiber post, further research is necessary to comprehensively assess its efficacy. Longer-term studies and a more extensive case series are required to provide a more robust evaluation of the impact of bundle fiber post and core restorations.

Conclusion

Bundle fiber posts represent a treatment option for the repair of teeth with excessive material loss, due to their adaptation to the morphology of the canal system, and their fast and straightforward application without the need for large post slots.

Conflıcts of Interest

The authors have nothing to declare.

Acknowledgement

There is nothing to declare.

Financing

No funding was used for the study.

Authors' Contributions

Concept: Star E, Design: Yıldız E, Data Collection or Processing: Yıldız E, Analysis or Interpretation: Bodrumlu E, Literature Review: Star E, Summer: Star E, Bodrum E

Ethics

Written informed consent was obtained from our patients.

References

1. Okamoto K, Ino T, Iwase N, et al. Three-dimensional finite elementanalysis of stress distribution in composite resin cores with fiber postsof varying diameters. Dent Mater J. 2008;27(1):49-55.
2. Ishikawa Y, Komada W, Inagaki T, et al. The effects of post and corematerial combination on the surface strain of the 4-unit zirconia fixedpartial denture margins. Dent Mater J. 2017;36(6):798-808.
3. Skupien JA, Sarkis-Onofre R, Cenci MS, et al. A systematic review offactors associated with the retention of glass fiber posts. Braz OralRes. 2015;29(1):1-8.
4. Soejima H, Takemoto S, Hattori M, et al. Effect of adhesive system onretention in posts comprising fiber post and core resin. Dent Mater J.2013;32(4):659-666.

5. Qing H, Zhu Z, Chao Y, Zhang WQ. In vitro evaluation of the fractureresistance of anterior endodontically treated teeth restored with glassfiber and zircon posts. J Prosthet Dent. 2007;97(2):93-98.

6. Ni CW, Chang CH, Chen TY, et al. A multiparametric evaluation ofpost-restored teeth with simulated bone loss. J Mech Behav BiomedMater. 2011;4(3):322-330.

7. Mamoun J. Post and core build-ups in crown and bridge abutments:bio-mechanical advantages and disadvantages. J Adv Prosthodont.2017;9(3):232-237

8. Zogheib LV, Pereira JR, do Valle AL, et al. Fracture resistance ofweakened roots restored with composite resin and glass fiber post.Braz Dent J. 2008;19(4):329-333

9. Desai P, Dutta K, Das UK. Comparison of push out bond strength of customizable fiber post using two self adhesive resin cement-an in-vitro study. Adv Dent Oral Health. 2016;2(1):6.

10. Amin RA, Mandour MH, El-Ghany OS. Fracture strength and nanoleakage of weakened roots reconstructed using relined glass fiber-reinforced dowels combined with a novel prefabricated core system. J Prosthodont. 2014;23(6):484-94.

11. Yanık D, Turker N. Stress distribution of a novel bundle fiber post with curved roots and oval canals. J Esthet Restor Dent, 2022; *34*(3), 550-556.

12. R Sarkis-Onofre, JA Skupien, MS Cenci RR de Moraes, T Pereira-Cenci. The Role of Resin Cement on Bond Strength of Glass-fiber Posts (GFPs) Luted Into Root Canals: A Systematic Review and Meta analysis of In Vitro Studies. Operative Dentistry · August 2013.

13. Eric et al. The impact of post preparation on the residual dentin thickness of maxillary molars. J Prosthet Dent 2011;184-90.

14. Zarow M et al. Effect of fiber posts on stress distribution of endodontically treated upper premolars: Finite element analysis. *Nanomaterials*. 2020;*10*(9), 1708.

15. Alkhalidi EF, Ahmad ZA. Bond Strength of New Fiber Post-system (Rebilda GT). Open Access Maced J Med Sci. 2022;10(D), 347-351.

16. Vibha Hegde, Nikita Arora. Fracture Resistance of Endodontically Treated Teeth Restored Using Three Different Esthetic Post Systems. J Operative Dent and Endod. (January–June 2019);Volume 4 Issue 1

17. Tuma Halabi MA, Bakry SI, Aly YM. Fracture Resıstance Of Dıfferent Fıber Post Materıals (In Vıtro Study). Alex Dent J. 2024

18. Latempa AM, Almeida SA, Nunes NF, Da Silva EM, Guimarães JG, Poskus LT. Techniques for restoring enlarged canals: An evaluation of fracture resistance and bond strength. Int Endod J. 2015;48(1):28-36.

19. Bouillaguet S, Bertossa B, Krejci I, Wataha JC, Tay FR, Pashley DH. Alternative adhesive strategies to optimize bonding to radicular dentin. J Endod. 2007;33(10):1227-30.

20. Egilmez F, Ergun G, Cekic-Nagas I, Vallittu PK, Ozcan M, Lassila LV. Effect of surface modification on the bond strength between zirconia and resin cement. J Prosthodont. 2013;22(7):529-36.