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by Tamara Yuanita

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Case Report

Monolithic Zirconia Crown with Intracanal Retention: A Case Report

Teuku C. Hafiz[1], Pradipto N. Nugroho[1], Tamara Yuanita[2], Sri Kunarti[2]

[1]Resident of Conservative Dentistry Department, [2]Staff of Conservative Dentistry Department, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia

Abstract

Intracanal retention determines the successful restoration after endodontic retreatment. Before inserting an intracanal retention, factors such as remaining amount of coronal tissue, root canal size and configuration, tooth position, functional requirements, and occlusion need to be analyzed. Fiber post is biocompatible, has good physical properties, and has the capacity of adhesive bonding to tooth tissue and core build up. This study aimed to determine the success of endodontic retreatment using prefabricated fiber post as an intracanal retention. A 31-year-old female patient came with a chief complaint of intense pain on right mandibular second premolar no. 45. In the first visit, radiograph of tooth no. 45 was taken, followed by caries removal and removal of screw post using ultrasonic tips with counterclockwise movement. In the second visit, endodontic retreatment was performed. Reduction of gutta-percha and cementing its prefabricated fiber post were carried out followed by composite core build-up until making temporary crowns using acrylic base resin. At the third visit, cementation for final restoration with a monolithic zirconia crown was performed. Endodontic retreatment is an alternative procedure for endodontics that fails even for teeth with post-intracanal therapy. Prefabricated fiber post as intracanal retention followed by a monolithic zirconia crown can be the best option so that the teeth can last as long as possible in the mouth.

Keywords: Endodontic Retreatment, Intracanal, Monolithic Zirconia Crown, Prefabricated Fiber Post, Retention

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Introduction

Endodontic retreatment is an alternative procedure for failed endodontic therapy and can be performed without surgery involved. Endodontic retreatment often exhibits severe coronal structure loss because of access preparations, extensive caries removal, previous restorations, and trauma. To restore these teeth, post-and-core retained crowns are typically used and are effective.[1,2] The function of an endodontic post is to provide retention for the core and enable full sealing of the coronal portion of the root canal. Traditionally used metal posts do not qualify the requirements of modern dental medicine due to some fairly significant drawbacks such as color, corrosion potential, nonadhesive bonding, and high modulus of elasticity, which can lead to root fracture.[3] In order to enhance the aesthetic aspects, physical properties, and biocompatibility, a wide range of aesthetic posts have been developed and become commercially available. In addition to aesthetic and health benefits,[4] dentists often place post-and-core build-ups on endodontically treated abutments for crown and bridge restorations. The main function of a post is to prevent trauma of the abutment, on which a crown is cemented, at a fracture plane that is located approximately and theoretically at the level of the crown (or ferrule) margin.[5] A crown made of full-contour solid zirconia is surprisingly popular. It is a less aesthetic option, but it is very strong and a great choice for posterior teeth.[6]

Case History

A 31-year-old female patient came to the Endodontist and Conservation Dentistry Clinic of Airlangga University in

Address for correspondence: Prof. Tamara Yuanita, Faculty of Dental Medicine, Universitas Airlangga, Mayjen. Prof. Dr. Moestopo Street 47, Surabaya Indonesia, 60132
E-mail: teukuchairilhafiz@yahoo.com

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Surabaya, Indonesia, with a chief complaint of intense pain of tooth no. 45. The tooth no. 45 was previously treated 1.5 years ago. The pain disappeared around 1 month after treatment. Objective examination showed a long composite stack of unfavorable proximal contact and pain on percussion test. Radiographic examination showed radiolucent lesions diffused apical to the teeth. Saliva examination showed hydration: 30 seconds, bubbly viscosity, pH: 6.4, quantity of 4.5 mL, buffer capacity: 8. And teeth were non-vital. The teeth were diagnosed as symptomatic of apical periodontitis with prior treatment of root canal and metal post no. 45. Radiograph examination was taken in the first visit, followed by caries removal using carbide burs and screw-post removal using ultrasonic tips with counterclockwise movement. At the second visit, endodontic retreatment was carried out. Reduction of gutta-percha and cementing prefabricated fiber post were performed followed by composite core build-up until making temporary crowns using base-acrylic resin. At the next visit, cementation for final restoration with a monolithic zirconia crown was performed [Figure 1].

Informed consent was taken at the first visit. Then local anesthesia was given (local infiltration and intra-ligament techniques). After confirming anesthesia was effective, isolation was carried out using rubber dam (split dam technique). Ultrasonic tip was used to retrieve metal screw posts with counterclockwise movements. Pre-endodontic build-up was performed on distal wall using selective etching on the enamel for 20 seconds. The bonding for 20 seconds (prime&bond one Select, Dentsply), and BulkFill Flowable Composite (SDR, Dentsply Sinora, USA) was applied to the proximal cavity and then light cured for 20 seconds (Woodpecker Lux V Light Cure, China). Next step was removal of old Gutta-Percha ProTaper Next X2 using (Reciproc blue rotary file R40 VDW). Root canal preparation using ProTaper Next (Dentsply) with crown-down pressure-less techniques to X2. Gutta point X2 trial was then confirmed through X-rays. NaOCl (5%) irrigation was carried out using a syringe with one side vent 30G needle and activated with sonic agitation using Eddy (VDW, Munich, Germany). The root canals were dried with sterile paper points, given dressings using $Ca(OH)_2$ paste with barium sulfate, and temporarily restored [Figure 2]. At the next visit, obturation was performed using single-cone technique (Gutta-Percha Point X2, ProTaper Next, Dentsply). One week after, reduction of gutta-percha was carried out and continued with fiber post cementation (LuxaPost; DMG, Germany; radiopaque and pre-silanized). Cementation of fabricated fiber post was carried out with self-adhesive resin cement (dual-cured, Ivoclar, USA), and core build-up was using dual-cured, composite core build-up (MultiCore, Ivoclar). Preparation technique for the crown as final restoration was supra gingiva shoulder. After preparation finished, impression was carried out using polyvinyl siloxane. The technique used was double impression two-step putty-wash technique. Shade taking and communication to lab (A-D shade guide, Ivoclar) was also performed. Then temporary crowns were made using base-acrylic resin [Figure 3]. At the next visit, rubber dam and tooth isolation was first performed. That was followed by etching with phosphoric acid 37% of the entire tooth surface for 30 seconds, and rinsed and dried. After that the application of total etch bonding was carried out and then light cured. Cementation was performed using dual-cured resin cement (Relyx ADR, 3M) for the final restoration with monolithic zirconia crown. Finishing and polishing margin restoration was conducted with OptraPol and Astrobrush (Ivoclar) [Figure 4].

Discussion

The cause of endodontic treatment failure in this case was under-filled obturation that did not reach the apex (less than 5mm from the apex), possibly caused by instrumentation that did not reach working length. One of the purposes of endodontic treatment is hermetic root preparation and filling; therefore, the accuracy of measuring the length of the root canal to the dentin–cement border is an important initial stage.[7] Obturation plays an important role in the success of endodontic treatment. Secondary infections in root canal treatment are a major cause of failure in endodontic treatment. The

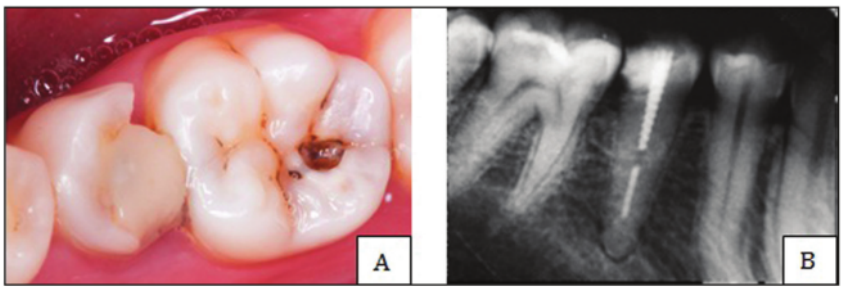

Figure 1: (A) Initial intraoral condition of tooth no. 45. (B) Intraoral periapical radiograph showing previously treated root canal treatment and metal post

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main bacterium that causes secondary infections in the failure of endodontic treatment is *Enterococcus faecalis*.[8] *E. faecalis* has the ability to penetrate into dentinal tubules, allowing the bacteria to avoid instrumentation of preparation devices and irrigation materials used during biomechanical preparation. $Ca(OH)_2$ has a working action through the release of Ca^2 ions that play a role in the process of tissue mineralization and OH^- ions that can provide antimicrobial effects through increasing pH, so that an alkaline environment is formed, which is not suitable for the development of microorganisms. When applied in root canals, $Ca(OH)_2$ decomposes into Ca^{2+} ions and OH^- ions, which subsequently diffuse through dentinal tubules.[9] The treatment plan for tooth no. 45 is an endodontic retreatment with a final restoration in the form of an artificial crown with prefabricated fiber posts. The loss of tooth tissue structure after endodontic treatment greatly varied; the selection of appropriate materials and restoration techniques is determined by the amount and structure of the remaining teeth.[10] Stake retention is influenced by preparation, post length, post diameter, post surface texture, and luting material use. The condition of the post length is the same as the length of the clinical crown or the length of the anatomical crown, or at least 2/3 of the root length.[11] The zirconia crown also has good mechanical properties and dimensional stability so that it is also applied as a material for making space shuttle, motorized vehicles, cutting tools, and combustion engines on vehicles.[10] Zirconia is a fixed restoration that covers the coronal surface of the clinical

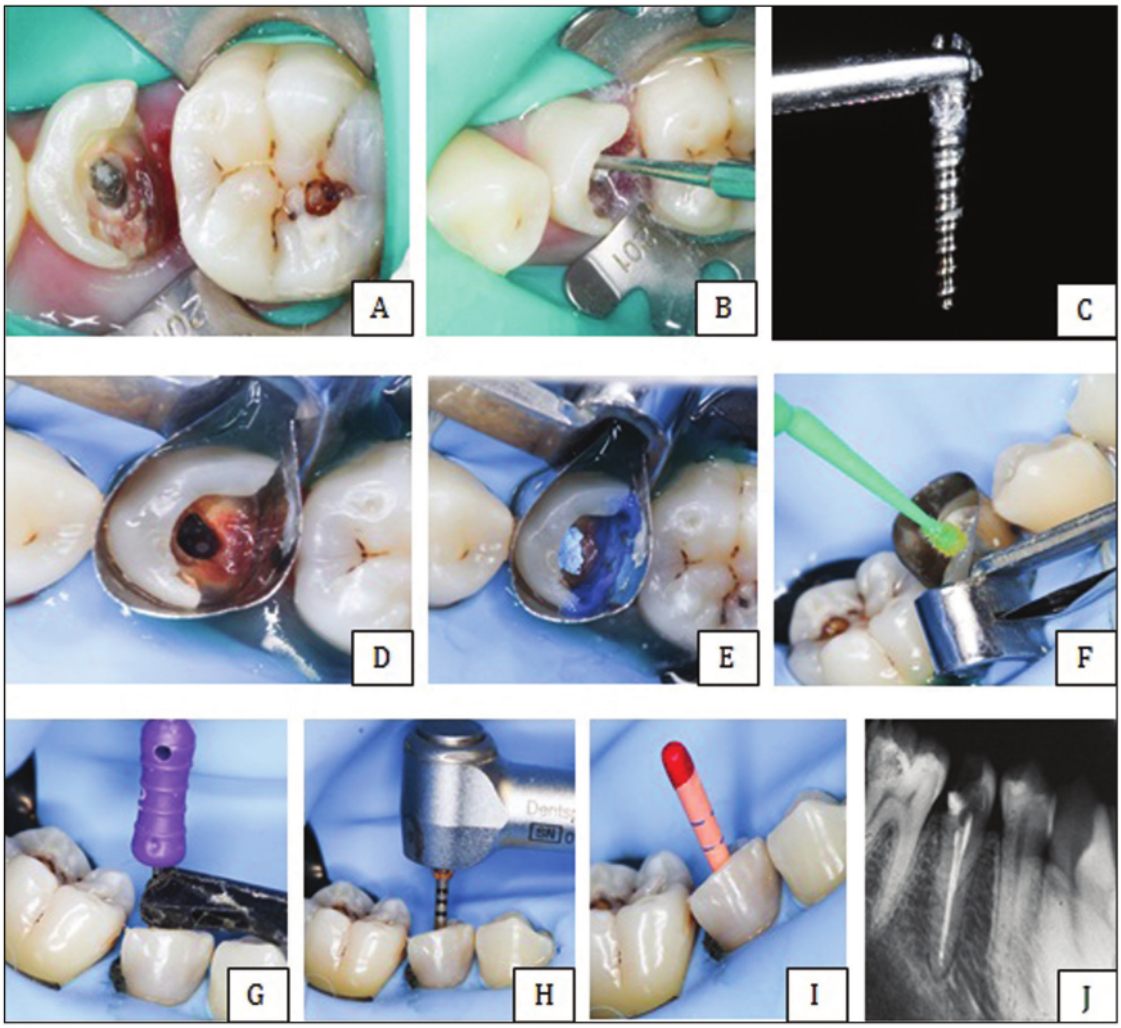

Figure 2: (A) Removing old composite restoration. (B) Retrieving metal screw posts using ultrasonic tips with counterclockwise movements. (C) Removing old metal post. (D) Using matrix for rewalling of tooth no. 45. (E) Etching. (F) Bonding. (G) Endodontic retreatment, working length using K-File #10. (H) Root canal preparation with rotary file (ProTaper Next). (I) Gutta Percha X2 (ProTaper Next). (J) Obturation radiograph

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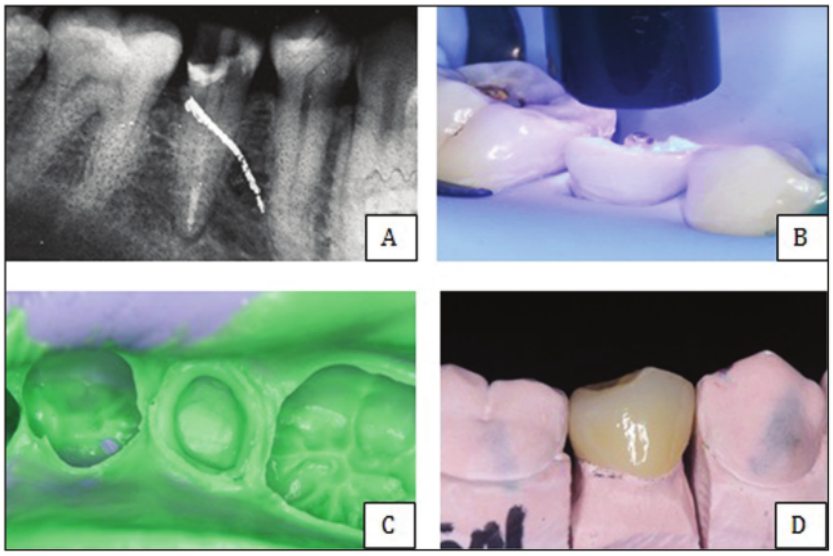

Figure 3: (A) Reduction of gutta-percha. (B) Cementing fiber post and light cure. (C) Double impression two-step putty-wash technique. (D) Zirconia crown finished from dental lab

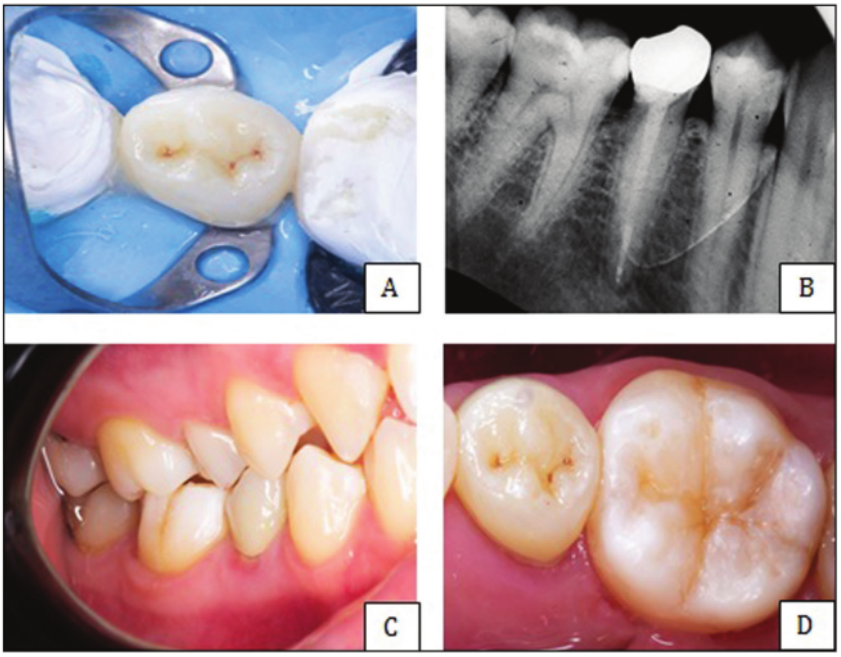

Figure 4: (A) Rubber dam and tooth isolation and then cementing zirconia crown. (B) Periapical radiograph after cementation. (C) Occlusion check. (D) After 2 weeks control

crown of a natural tooth, which must be able to improve the morphology and contour, and protect the remaining tooth tissue from further damage. A restoration must be able to meet aesthetic needs and functions, which means a denture crown expected to have a satisfying and powerful appearance.[12]

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Conclusion

Fiber prefabricated as intracanal retention followed by zirconia crown restoration can be an option so that the teeth can last as long as possible in the mouth.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Gresnigt MM, Özcan M, van den Houten ML, Schipper L, Cune MS. Fracture strength, failure type and Weibull characteristics of lithium disilicate and multiphase resin composite endocrowns under axial and lateral forces. Dent Mater 2016;32:607-14.
2. Yang A, Lamichhane A, Xu C. Remaining coronal dentin and risk of fiber-reinforced composite post-core restoration failure: A meta-analysis. Int J Prosthodont 2015;28:258-64.
3. Ivana P, Amižić, Anja B. Esthetic intracanal posts. Acta Stomatol Croat 2016;50:143-150.
4. Tay FR, Pashley DH. Monoblocks in root canals: A hypothetical or a tangible goal. J Endod 2007;33:391-8.
5. Mamoun J. Post and core build-ups in crown and bridge abutments: Bio-mechanical advantages and disadvantages. J Adv Prosthodont 2017;9:232-7.
6. Navanya K, Shashidhara HS. Zirconia verses lithium disilicate restorations in different indications: A clinical case series. IOSR J Dent Med Sci 2016;15:52-6.
7. Al-Dahman Yousef H, Al-Hawwas Abdullah Y, Al-Jebaly Asma S. Root canal treatment of a 32-mm length maxillary canine—A case report. Int J Contemp Med Res 2017;4:2297-9.
8. D'Costa VF, Bangera MK, Stevens SM. Non surgical retreatment in endodontics—A case study. Int J Adv Res 2016;4:773-8.
9. George J, Lakshminarayanan L. Anti-microbial effect of various calcium hydroxide preparation—An in vitro study. Endodontology 2001;13:2-7.
10. Báez A, Durán G, de Nordenflycht D, Fuentes M. Anterior composite resin crown in an adverse situation: A dental technique with a 3-year follow-up. J Prosthet Dent 2018;121:1-4.
11. Atia RM, Omar N, Nabil H, Aly Y. Efficacy of fiber post bonding to root dentin after different obturation techniques and cementation timings: In vitro study. Open Access Maced J Med Sci 2018;6:1707-11.
12. Anusavice KJ, Shen C, Rawls HR. Phillip's Science of Dental Materials. 12th ed. St. Louis, Missouri: Elsevier-Saunders; 2013. p. 418-73.

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