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RESEARCH ARTICLE
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Successful Single Visit Endodontic Using Bioceramic Sealer and Esthetic Restoration with Porcelain Fused to Zirconia: A Case Report

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ABSTRACT

Background: Single visit endodontic therapy may be defined as the conservative non surgical treatment of an endodontically involved tooth, consisting of complete chemomechanical instrumentation and obturation of the root canal system accomplished in one visit. **Case:** A 35-year-old woman comes with chief complaint on her upper front left tooth. Clinical examination revealed that the tooth #22 had deep caries dan reached the pulp, non vital teeth. Periapical radiolograph showed radiolucent area in the apical area of tooth #22. The diagnosis is necrosis of pulp with asymptomatic apical periodontitis. **Case Management:** Tooth #22 was treated with single visit root canal treatment using bioceramic sealer followed by fiber post cementation and porcelain fused to zirconia crown. Patients had no longer complain of pain after treatment. **Conclusion:** Single visit endodontic can successfully eliminate patient complaints and restore tooth function.

Keywords: single visit endodontic; bioceramic sealer; porcelain fused to zirconia

INTRODUCTION

Single visit endodontic therapy is defined as 'the conservative non-surgical treatment of an endodontically involved tooth consisting of complete biomechanical cleaning, shaping and obturation of the root canal system during one visit.(1) Indications for single visit endodontics are physically disabled patients who cannot to dental clinics frequently, uncomplicated vital teeth, vital pulp exposures due to caries or trauma with symptomatic pulpitis, non vital teeth with sinus tract, intentional endodontic.(2)

Contraindications for single visit endodontics are severe pain on percussion suffering from acute apical periodontitis, teeth with anatomic anomalies for e.g. calcified and curved canals, acute alveolar abscess cases with pus discharge, unable to keep mouth open for long time for e.g. TMJ disorders, teeth with limited access, symptomatic non vital teeth and no sinus tract.(2)

The success of endodontic treatment is closely related to the complete debridement and disinfection of the root canal system associated with its three-dimensional seal. According to guidelines by European Society of Endodontology, the assessment of root canal filling should be checked with a radiograph and this radiograph should show the root apex with at least 2–3 mm of the periapical region. Adequate density of root canal filling is an important factor for long term success of endodontic treatment.

With the advent of new instrumentation techniques, material science and technology, it is no more an orthodox empirical procedure for obturation of root canals. Although a number of clinical research studies have shown favourable results with single visit protocols, evidence-based studies do report that there is a lack of clinical evidence to support these result. Thus, it is still a dilemma for the contemporary general practitioner as well as the specialist as to when and how to proceed with single visit endodontics. This article describes case of necrosis pulp treated in single visit.

METHODS

A 35-year-old woman comes with a complaint on her upper left tooth. Clinical examination revealed that the tooth #22 had deep caries dan reached the pulp, non vital teeth. The tooth gave negative response to electric pulp test and was not tender to percussion and palpation. Periapical radiograph showed radiolucent area in the apical area of tooth #22. The diagnosis was necrosis of pulp with asymptomatic apical periodontitis (Figure 1).

RESULTS

Case Description

Informed consent was obtained at the first visit. Isolation using rubber dam was caried out on tooth #22. Then debridement the cavity from caries and necrotic tissue. Working length was measured and determined using K-File #10 by apex locator (Propex pixi, Dentsply) and confirmed with radiograph (Figure 2). After that root canal preparation using Proglider file (Dentsply) as glide path and Protaper Next (Dentsply) until X2 files. 2.5% Sodium hypochlorite and 17% EDTA were used as irrigants simultaneously one after another. The root canal were dried with sterile paper points and gutta percha (F2) trial was done. Obturation was performed with single cone technique and bioceramic sealer (One-Fil Mediclus). Periapical photographs were taken post obturation (Figure 3).

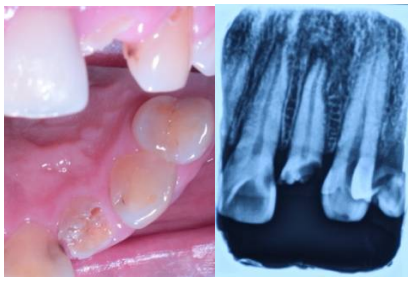

Figure 1. a. clinical view, b. periapical radiograph #22

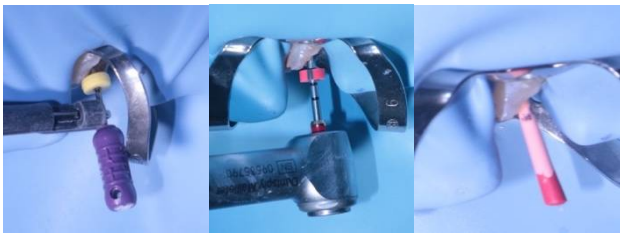

Figure 2. Working length measurement, root canal preparation, irrigation, trial gutta percha, obturation with bioceramic sealer

Figure 3. periapical radiograph post obturation

Next visit, gutta percha was removed with Gates Gidden Drill and the apical sealing was preserved. After gutta percha removal and root canal preparation, a periapical radiograph was employed to check the preparation quality and to select the fiber post size, according to the anatomical dimensions of the root canal. Fiber post (LuxaPost, DMG) were cemented using dual cure resin cement (PermaCem, DMG) then proceed with core build up (LuxaCore, DMG) (Figure 4).

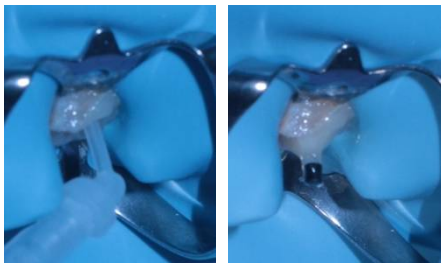

Figure 4. Fiber post cementation using dual cure resin cement

Crown preparation was carried out on tooth #22 with a chamfer margin finishing line placed subgingival that would later be fitted with a porcelain fused to zirconia crown. The impression was started by performing gingival retraction using the gingival retraction cord (Figure 5). Negative impression were made using a double impression technique using a combination of heavy and light body. The negative impression is filled with a type IV cast to produce a positive impression (die). The colour selection is determined by the shade guide (Vita 3D Master).

Try-in crown (Figure 6) must pay attention to the esthetic aspect. Contact point and occlusion were evaluated and adjusted after the temporary restoration was removed. Furthermore, silane coupling agent (Ultradent) was applied to the surface of the PFZ crown for 60 seconds and dried. Dentin bonding agent (Multilink, Ivoclar Vivadent) was applied to the surface and light cured for 20 seconds.[3,4]

The prepared teeth were etched with 37% phosphoric acid for 15 seconds, then washed with water and dried. A frosted appearance will appear on the enamel after the etching procedure. Dentin bonding agent (Multilink, Ivoclar Vivadent) was applied to the tooth surface and light cured for 20 seconds. The PFZ crown was cemented using dual cured resin cement. The remnants of excess cement at the edges of the restoration were cleaned and in the interproximal area using diamond coated abrasive strips, then light cured for 20 seconds. Check for occlusion in protrusion and lateral positions. Patients are satisfied with the treatment results (Figures 7). [3, 4]

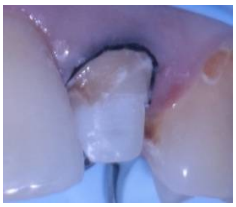

Figure 5. gingival retraction cord

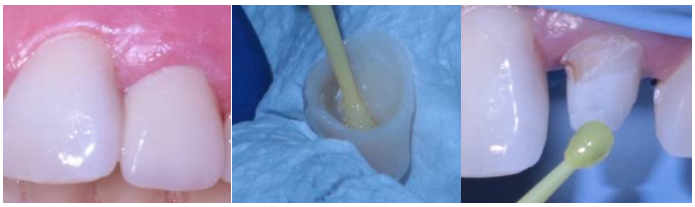

Figure 6. Try in crown, silane, and bonding procedure

Figure 7. Result after cementation

DISCUSSION

Single-visit endodontic therapy is defined as 'the conservative non-surgical treatment of an endodontically involved tooth con- sisting of complete biomechanical cleansing, shaping and obturation of the root canal system during one visit'. Single-visit endodontic therapy has become a common practice. In 1982, only 12.8% of dentists queried thought that necrotic teeth would be successfully treated in one appointment.[5,6] The main goal of root canal treatment is the prevention or treatment of apical periodontitis, which leads to the preservation of natural teeth. The presence of bacteria in the root canal system results in the development of periapical lesions. Traditionally, root canal treatment is carried out in a number of visits, using extra disinfecting agents (intracanal dressing) in addition to irrigant used during cleaning and shaping procedures that primarily aim to reduce or eliminate microorganisms and their by products. from the root canal system before it is obtained.[7-10]

According to guidelines by European Society of Endodontology, the assessment of root canal filling should be checked with a radiograph and this radiograph should show the root apex with at least 2–3 mm of the periapical region. Adequate density of root canal filling is an important factor for long term success of endodontic treatment.

In this case, using bioceramic sealer for root canal filling. Bioceramic sealer contain zirconium oxide, calsium silicate, single base calsium phosphate, calcium hydroxide, fillers and thickeners. Bioceramic sealers are hydrophilic, insoluble, radiopaque, aluminum free, high pH, and require humidity for setting.[11]

Bioceramic sealers can induce dental stem cells to differentiate into odontoblast-like cells, which is thought to promote periapical healing. Bioceramic sealers can also induce biomineralization as demonstrated by expression of mineralization-associated genes and proteins, as well as hard tissue deposition.[12-14] The nanoparticle size of this sealer allows it to flow easily into the lateral canals, ramifications and dentinal tubules.[15] If extruded through the apex, the bioactive properties of this sealer will encourage healing in the periapical area. In the case that the hard tissue barrier formed by apexification using calcium hydroxide still leaves the pore, the bioceramic sealer is expected to fill the pore and be non-toxic and even promote periapical healing when extruded.[16] On the other hand, the use of this sealer strengthens the resistance to root fracture.[17]

In this sealer there is no shrinkage during setting, even slightly expands, thus making no gaps between gutta percha, sealer, and dentin. The insertion of the sealer into the ramifications and dentinal tubules also increases the resistance to fracture.[11] In the setting process there will be a reaction for the formation of hydroxyapatite. This apatite layer can form a chemical bond between the sealer and the dentinal wall.[18]

Fiber posts which have a modulus of elasticity close to dentin will provide a lower risk of root fracture than metal posts. Passive post retention can be increased if the entire post fills the root canal and is assisted by a thin and homogeneous layer of resin cement. PFZ restoration is one of the restoration options for improving the aesthetic and structural integrity of teeth that are discolored, fractured or worn. The excellent aesthetic properties of porcelain and zirconia make PFZ replace PFM combination crowns in use in recent years. The combination of zirconia as a coping gives better strength than all porcelain crowns which tend to be brittle.[19] Porcelain fused to zirconia has the advantage of being more economical than all porcelain. The mechanical properties of zirconia are almost the same as metals and their color is similar to teeth, making zirconia a restorative material for aesthetic repair.[20]

CONCLUSION

Single visit endodontic can successfully eliminate patient complaints and restore tooth function. Obturation using a bioceramic sealer can be performed to strengthen the root from the risk of fracture, continue to stimulate tissue formation and fill the cavity that is not covered with apexification. Bioceramic sealers form a strong bond with dentin, can flow into the dentinal tubules and other anatomical structures of the root canal, are biocompatible when extruded, do not cause discoloration, do not shrink and expand slightly when hardened and have good antibacterial properties obtained from the calcium hydroxide contained in the composition. PFZ crown restoration material is one of the restoration options for improving the esthetics, strength, and structural integrity of discolored teeth. PFZ restoration can correct all porcelain and PFM deficiencies.

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