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Three Years Outcome of Single Visit Orthograde Retreatment Using Platelet Concentrate: A Case Report

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Abstract

Endodontic therapy requires a three-dimensional obturation of the root canal system following shaping and cleansing. Overfillings, inadequate fillings, missing canals, inability to deliver an adequate apical plug, and coronal leakage are all factors that contribute to root canal treatment failure. The purpose of this publication was to offer a case report of permanent teeth number 11 and 12 with closed apexes and periapical lesions that were treated endodontically with injectable-PRF. The root canals were mechanically cleaned and shaped with NiTi files and irrigated with 5.25% NaOCl and 20% EDTA. Before obturating the canal systems, i-PRF was employed as a scaffold and was injected beyond the cement dentinal junction with an end-vented needle. Cone beam computerized tomography (CBCT) was used to evaluate the resolutions of periapical radiolucency. The measures of periapical lesions for two teeth were dramatically decreased after three years of follow-up. Efficient chemo-mechanical debridement of the root canal system with hermetic filling of it, have a major impact on the clinical success of RCT. It appears hard to claim that i-PRF played a significant influence in the healing of the periapical lesions exhibited. More research is needed to determine whether RCT of mature teeth with an additional i-PRF application is superior to RCT performed alone.

Keywords: *Cone beam C.T, Endodontic Retreatment, Injectable-PRF, Single visit, Periapical healing.*

Introduction

When compared to teeth without periapical lesions, RCT of teeth with endodontic periapical lesions is associated with 49% lower odds of success [1]. The most difficult aspect of secondary RCT is gaining access to the apical infection. As a result, it becomes necessary to seek out novel treatment strategies that can assist dentists in achieving better outcomes in challenging clinical situations. Orthograde or non-surgical endodontic retreatment, surgical endodontics, or extraction with implant replacement are all options for re-treatment. The root canal and periapex should react to orthograde therapy, especially if the canal system has been improperly or incorrectly sealed. The treatment technique should be chosen based on the clinical status and preference of the patient, the operator's expertise and competence, the risk of complications, and the technical feasibility and cost [2]. Regenerative

endodontic treatments (REPs) are biology-based operations that attempt to repair damaged tooth tissues such as dentin, pulp-dentin complex, and root structures. Growth factors, stem cells, tissue engineering materials, and cell, tissue, are the principal domains that influence regenerative endodontic [3]. Platelet Rich Fibrin (PRF), a second generation platelet concentrate that is completely autologous in origin, comprises platelets, growth factors, and cytokines that improve the healing potential of both soft and hard tissues [4]. The PRF approach is simple to use, affordable, and does not require biochemical modification, allowing for the rapid creation of natural fibrin membranes loaded with platelets and leukocytes [5].

The PRF can be utilized as a membrane or a liquid or injectable form (i-PRF) and applied either in standalone therapies (plug, filler or barrier); additive therapies (added or mixed to bone substitutes) or used in combination therapies with other biomaterials (protective barrier in GBR procedures) [6]. When compared to PRP, i-PRF has demonstrated the ability to release higher concentrations of various growth factors for up to 10 days [7].

Case Report

A 37-years-old male patient was referred to my clinic with a chief complaint of intermittent dull pain in the upper front region and soft swelling that appears buccally. He gave a history of trauma to the upper anterior teeth in an accident 15 years ago, and he had undergone endodontic therapy for tooth no. 11, followed by a full coverage prosthesis, but he remained asymptomatic until the buccal swelling reappeared, which prompted his visit to my clinic.

A 2 cm diameter soft enlargement of the buccal mucosa was seen intraorally. Percussion of the maxillary central and lateral incisors revealed tenderness. Root canal therapy was conducted in the maxillary right central (teeth number 11, according to the Federation Dentaire Internationale (FDI) dental numbering system) (Figure 1) and the obturation quality in maxillary central was inadequate. There was also a significant periapical lesion at the apical region of tooth no. 11 and a smaller one at tooth no. 12. In regards to tooth no. 12, it elicited a negative response with cold vitality test. There was no pus in the periodontal pocket, according to the examination. The pocket depth (PD) was PD max = 3 mm. After being briefed about the treatment procedure, the patient opted to give these teeth another opportunity through orthograde retreatment because it is also the most minimally invasive technique.

Local anesthesia was applied for the patient comfort. Rubber dam isolation was added. The old fixed prosthesis was removed using crown remover and ultrasonic tip to break the bond of cement between the tooth structure and the crown. Then the access cavity was opened using round carbide bur #008

(Luster Dent, France). In maxillary central #11, gutta-percha was removed from the coronal area with a gates glidden size #2 (VDW, Munich). The previous canal filling in the middle third was eliminated by moving H files up and down in ISO #30 (FKG Dentaire, Switzerland). Between the files, copius irrigation with sodium hypochlorite (%5.25) was conducted. The H file was utilized once again for the apical section with gutta-percha solvent (Eucaliptol, Maquira Industry of Dental Products, Brazil). A radiograph was performed to confirm the removal of the gutta-percha. Working lengths for two teeth have been determined electronically and radiographically, (Figure 2). The canals were mechanically prepared utilizing rotary instruments (A3 Azure, endostar Ni-Ti rotary files taper 0.04, Poland). The working length (WL) was 20 mm for central and 23mm for lateral, which was validated both by apex locator (Geosoft, Russia) and radiologically. Apical gauging was performed for tooth no. 11 with a 0.02 hand K-file NiTi ISO 70, yielding a diameter of 0.70 mm for the apical foramen. The irrigant (2.5% sodium hypochlorite) was delivered slowly and carefully, using side vented needle. Prior to the final flush with saline, the smear layer was removed using EDTA gel 19% (META MD Chelcream, Korea) for one minute. The depth of the irrigation needle was always 2 mm from the apex. Following chemo mechanical preparation and drying of the root canal system, 10 mL of blood was collected from the median cubital vein in 10ml glass-coated plastic tubes (Vacutainer; Allschwil, Switzerland) and immediately centrifuged at 400g (700 rpm) and at room temperature for 3 minutes using a centrifuge (Boca-Raton, FL, EUA). The top yellow fluid (i-PRF) liquid phase was pulled through a plastic syringe as close to the red cells as feasible immediately after centrifugation[8]. This yellow fluid was injected into the apex of the tooth, just below the cemento-dentinal junction. Finally, the root canal was filled by MTA apical plug (Well Root, Premixed Root Canal Filling Material, Vericom, Korea), and applied to the apex with a 5 mm thickness using hand plugger size 25; then, it was verified radiographically using a periapical radiograph. Completing the obturation using fiber post and composite core was done. In regard to tooth no. 12, the obturation was done using bioceramic sealer (Well Root, Vericom, Korea) with single cone technique size 35 taper 4 (Meta Biomed, Korea).

Follow-up appointments were scheduled after one week, six months, a year, and three years. The last visit was scheduled three years after the root canal procedure was completed. After one week, an intraoral check confirmed that healing had progressed. On palpation, the gingiva was smooth, pink, and humid, with no discomfort. The tooth's movement was within physiological limitations (Grade 1 Miller mobility index). The treated teeth reacted negatively to vertical and horizontal percussion. PD max = 2 mm, (Figure 3).

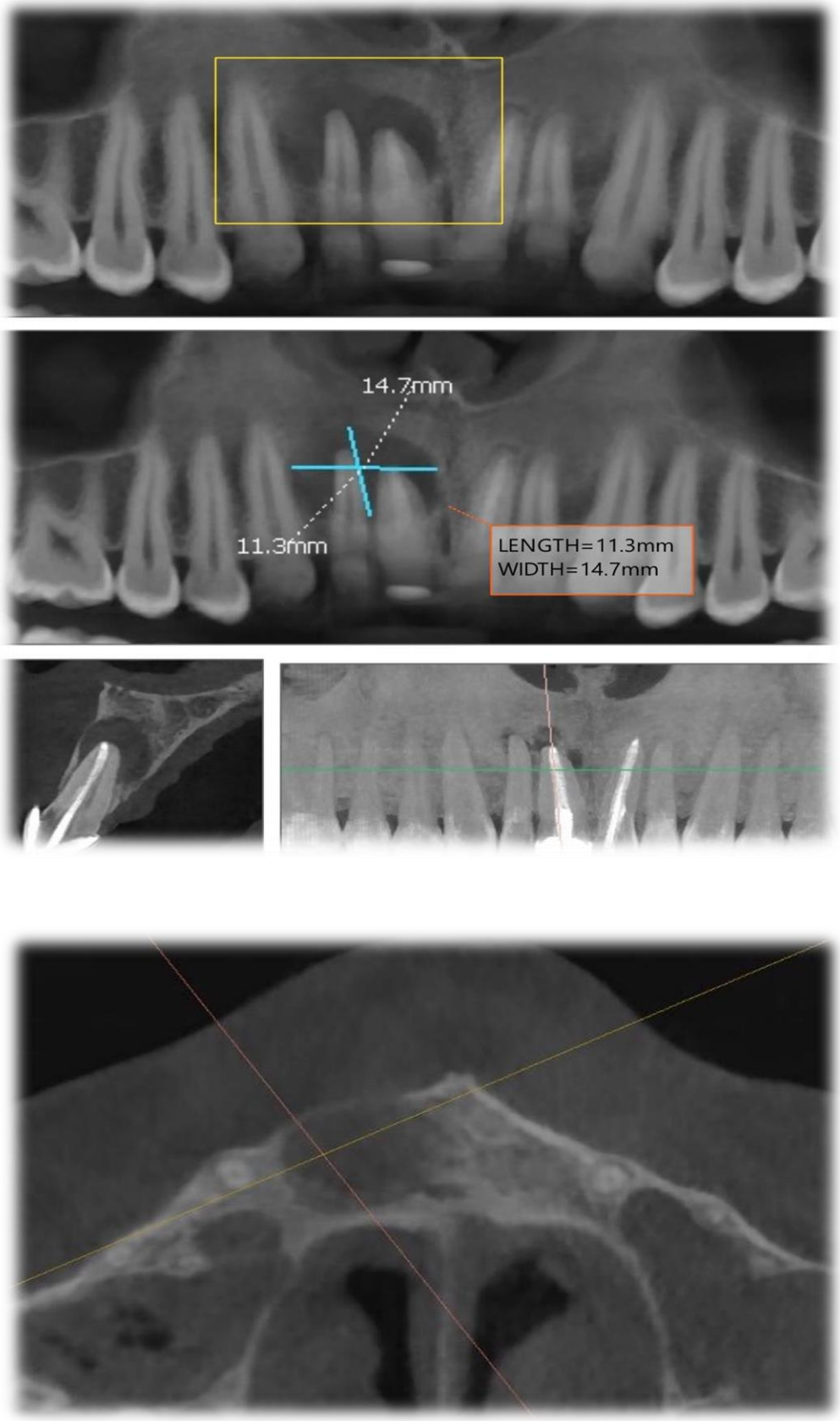

Figure 1: There was a small area of radiolucency around tooth no. 11 with the dimensions of 11.3 _ 14.7 _ 8 mm

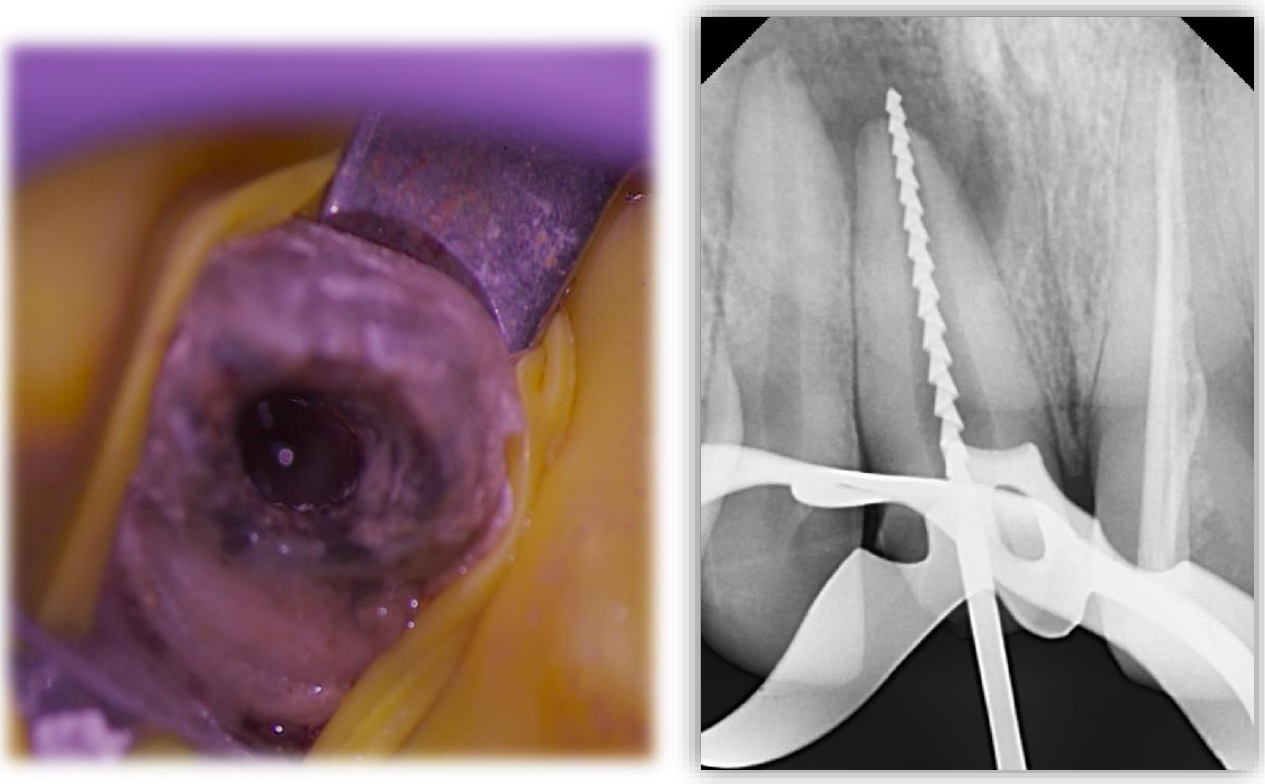

Figure (2): Access Opening and Working Length Determination

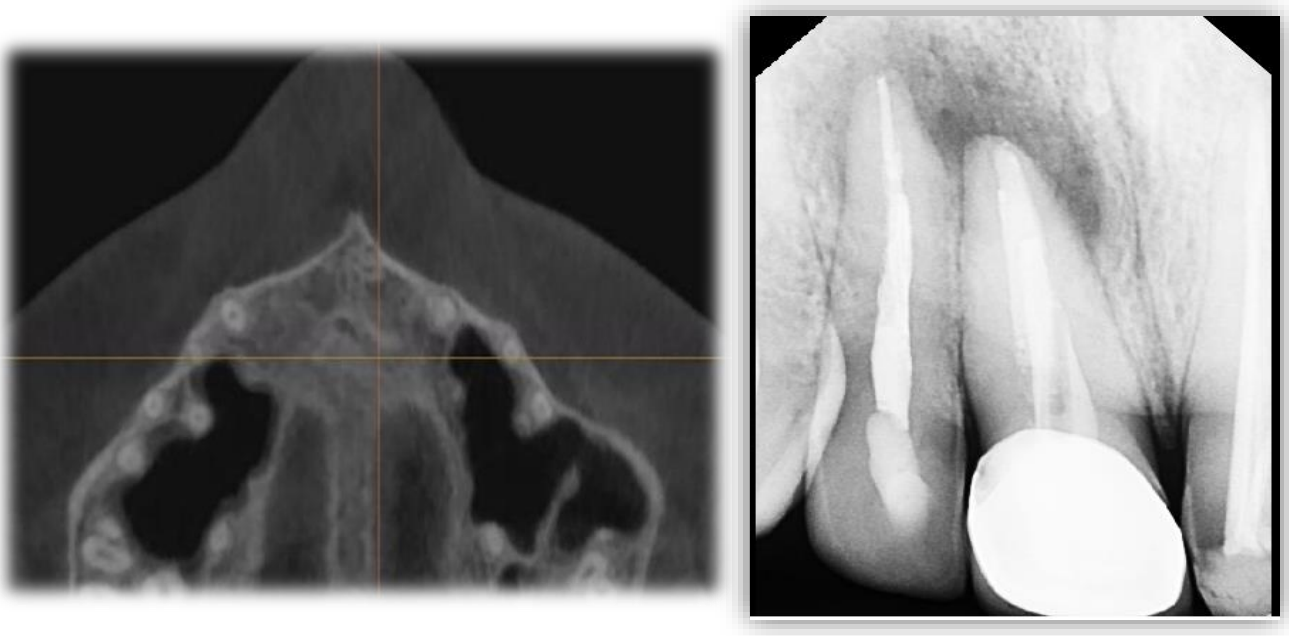

Figure 3: CBCT images of the periapical lesion healing process three years after the root canal retreatment.

Discussion

A root filling is not a single event since it incorporates inherent filling material features such as homogeneity, taper, and apical extension. In this scenario, Zhong et al., Santos et al., and Song et al. confirmed a link between filling quality and the outcomes of the initial non-surgical Endodontic therapy. They support the statement that improved working conditions enhance effective procedures and that preoperative infection is a possible cause of failure. Failure due to infection may be less likely with controlled root canal operations [9].

For tissue regeneration, several platelet-rich concentrates, such as platelet-rich plasma (PRP) and platelet-rich fibrin (PRF), have been applied [10]. However, PRF has many advantages over PRP, such as ease of handling, low cost, and the absence of anticoagulant or bovine thrombin, which results in the elimination of the risks associated with the use of bovine thrombin and biochemical alteration [11]. I-PRF was developed in 2014 by modifying centrifugation force and speed. Blood centrifuged in non-glass centrifuge tubes at lower centrifugation speeds and times yielded i-PRF, a flowable PRF [12]. It contains a large number of leukocytes, which may enhance both soft and hard tissue regeneration [12, 13].

Since i-PRF remains liquid for approximately 15 minutes [14], it will provide dental practitioners with an additional practical form of PRF. Following injection, the human liquid fibrinogen in i-PRF is gradually transformed into a growth factor-rich clot that releases growth factors continuously for 10-14 days [15]. Several in vitro and in vivo studies have been conducted to date on the role of i-PRF in wound healing and the regeneration of bone, periodontal, and pulpal tissues [16-23].

I-PRF can boost the capacity of intrinsic tissue regeneration by promoting human mesenchymal stem cell (MSC) proliferation and migration, as well as initiating osteogenic differentiation of MSCs [23]. It has also been proven to have stronger anti-inflammatory and anti-microbial action against a variety of infections, which can aid in more rapid tissue regeneration [23, 24].

I-PRF, on the other hand, is widely employed in regenerative dentistry as an injectable biomaterial, a carrier for various biomolecules, or in combination with other biomaterials for a range of clinical applications [25, 26].

Conclusion

Adequate biomechanical preparation and obturation of the root canal system, combined with an additional application of i-PRF to the periapical area in permanent mature teeth diagnosed with periapical lesions, resulted in a significant decrease in the size of the periapical lesions over a three-year follow-up period. However, more research with a larger sample size is needed to investigate the effect of i-PRF on apical lesion.

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