Case report

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Long-term outcome of endo-surgical treatment of chronic apical periodontitis – case reports

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Abstract

Background. Improvement in the biological qualities of blood products (change of centrifugation protocols, type of apparatus, type of test tubes) and surgical techniques might enhance endodontic surgery's outcome and the healing process. The local application of plasma-rich fibrin has been advocated to enforce bone regeneration and soft tissue healing after oral surgery.

Purpose. This article aims to monitor the long-term effect of combined endodontic and surgical treatment of chronic apical periodontitis in two patients and to assess the potential benefits of using platelet-rich fibrin (PRF) as a treatment modality in modern endodontic surgical procedures.

Material and methods. Two patients with chronic apical periodontitis were presented. Root canals of affected teeth were treated and filled with Thermafil (Dentsply, Maillefer) and sealer epoxy sealer (AH plus JET, Dentsply, Sirona, Germany). During the surgery in postoperative defect was administered platelet concentrate A-PRF according to the Schoukroun protocol.

Results. The long-term follow-up indicates full recovery of periapical changes and excellent functional outcomes. In addition, radiographic healing was detectable earlier in the cases and as complete healing after six months.

Conclusion. The adjunctive use of A- PRF in the endo-surgical treatment of chronic periapical lesions might promote the acceleration of healing and excellent long-term result.

Keywords: advanced platelet-rich fibrin, endodontic surgery, chronic apical periodontitis

Introduction

Treatment of periapical periodontitis is complex and could be prolonged in time. In many clinical cases, combining endodontic treatment with surgical is necessary. Surgery is associated with pain, swelling, and discomfort for patients. This makes surgical treatment less popular for patients. With the widespread use of blood products in daily dental practice, the patient's pain, swelling, and discomfort used after surgery and the healing process are enhanced. Apicoectomy, apical surgery, endodontic surgery, and root resection could be used to treat the apical infection.

It is the cutting off the apical portion of the root and curettage of periapical necrotic, granulomatous, inflammatory, or cystic lesions. Despite adequate endodontic treatment, if periapical lesions are not resolved, then apical surgery is considered [1, 2]. Likewise, if periapical lesions are not resolved with time after good endodontic treatment, then apical surgery is considered.

Improving the biological qualities of blood products (change of centrifugation protocols, type of apparatus, and type of test tubes) affects and encourages the healing process [2, 3]. However, the literature data concerning the action of platelet concentrates in treating chronic apical periodontitis are contradictory [4].

Aim

This article aims to monitor the long-term effect of combined endodontic and surgical treatment of chronic apical periodontitis in two patients and to assess the potential benefits of using platelet-rich fibrin (PRF) as a treatment modality in modern endodontic surgical procedures.

Clinical cases

Case 1. Patient EP was referred to treatment with a diagnosis of chronic apical periodontitis with a fistula of tooth 15 and chronic apical periodontitis of tooth 16 – (Figure 1A). The patient's complaints date from 10 months. X-ray and CBCT examination revealed significant periapical changes in the area of 15 and 16 teeth (Figure 1A, B). The same was rated with PAI 4.

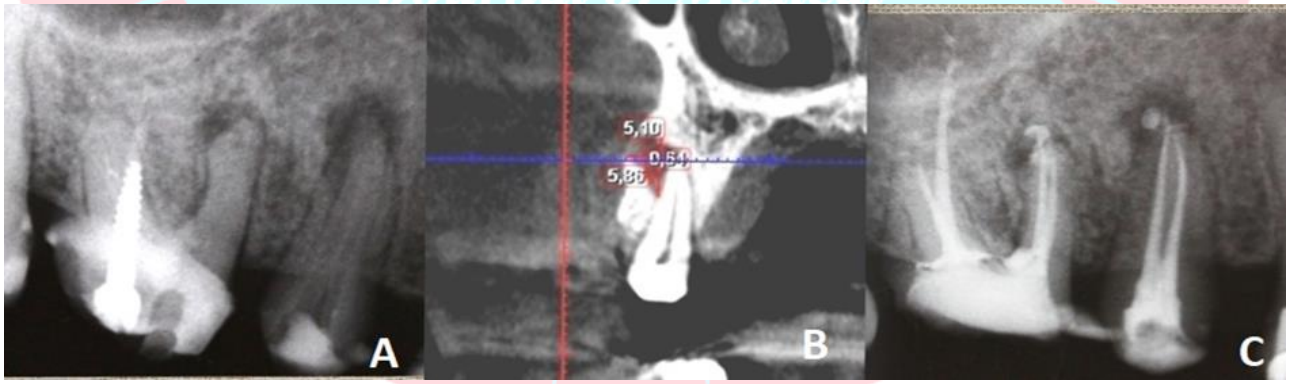


Figure 1. (A) diagnostic X-ray; (B) CBCT examination of tooth 15 with lesion' sizes 5.10 by 5.8 mm; (C); X-ray after filling the root canals.

Endodontic treatment. During the endodontic treatment, the mesiobuccal root of 16 was empty and had two canals, which ended with respective apexes. For tooth 15, two different root canals were detected but

with independent apexes. Endodontic treatment includes treatment of root canals by crown-down technique with machine files Wave One (Maillefer Instruments, Switzerland) and irrigation of 2% sodium hypochlorite, 2% chlorhexidine solution(PPH Cerkamed, Poland), and 17% ethylenediaminetetraacetic acid (EDTA), with intermediate irrigations between active solutions with saline solution. For the sterilization of root canals, ozone gas was also applied through a solution of 2% sodium hypochlorite for 24 seconds per root canal. The filling of the root canals is with Thermafil (Dentsply, Maillefer) and sealer (AH plus JET, Dentsplay, Sirona, Germany) (Figure 1C).

After finishing endodontic treatment, surgical intervention was appointed the next day. After forming a mucoperiosteal flap, bone resorption fenestration of the cortical bone was found in the area of tooth 15, and a very small fenestration over the mesiobuccal root of tooth 16 (Figure 2A). Therefore, the cortical opening was expanded, and granulation tissue of teeth 15 and 16(Figure 2B, C) was removed by curettage. Apexes of the affected teeth were cut - 3 mm at 120 angulation (Figure 2 D). The patient obtained 18 ml of blood by venipuncture and centrifuged according to Shoukroun's protocol A-PRF (Advanced platelet-rich fibrin with parameters 1300 rpm for 8 minutes) modern/modern fibrin matrix rich in platelets (Duo centrifuge for PRF, Nica, France). Two membranes are made from blood plasma and placed on the operating wound (figure 2 E, white arrow).

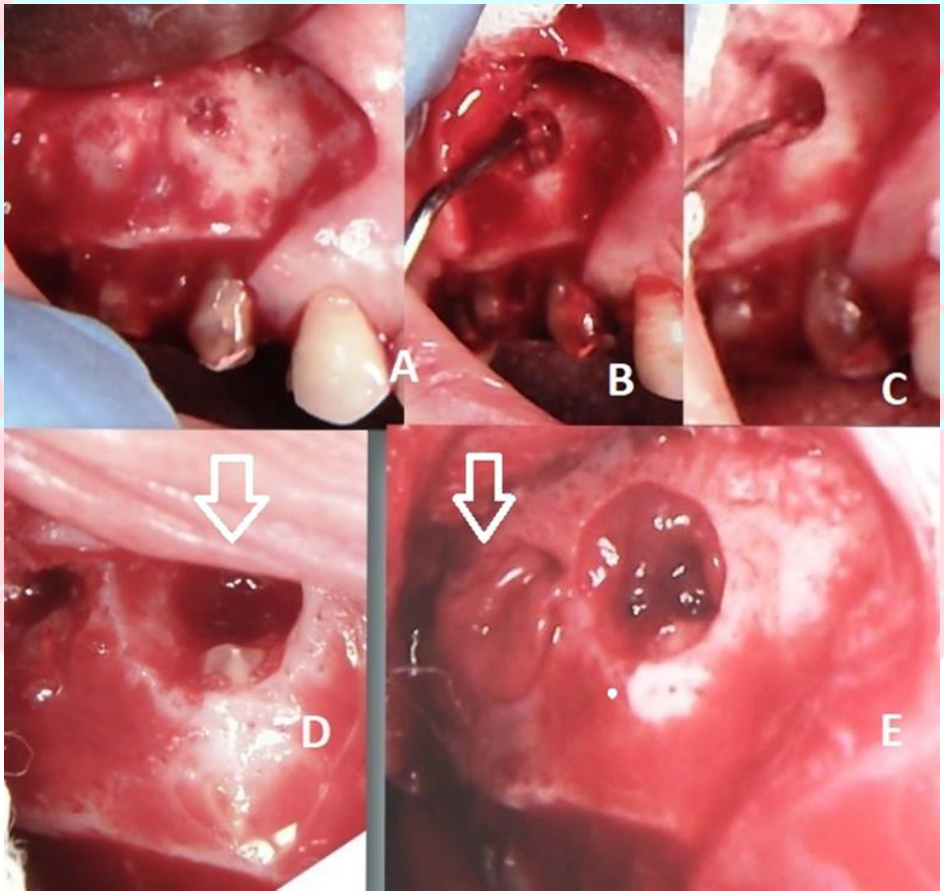


Figure 2. (A) type of operational wound after flap closure; (B) (C) stages of curetting the periapical lesion of tooth 15; (D) resecting the root apex of a tooth the 15-white arrow; (E) insertion of a membrane into the bone wound of the mesiobuccal root of tooth 16 – the white arrow.

The other membrane was placed to cover the bone defect (Figure 3A). And the operating wound was sutured (Figure 3B).

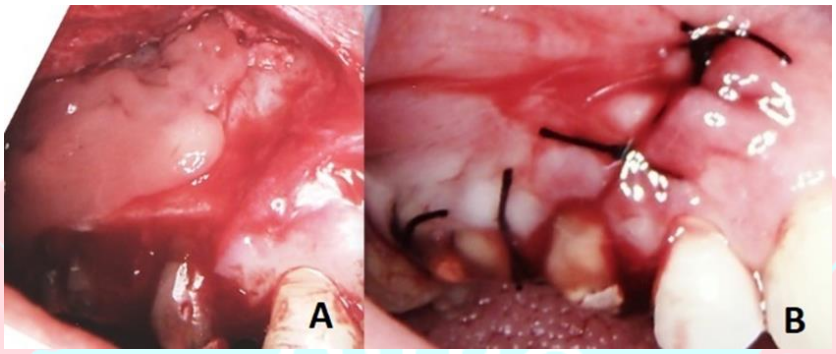


Figure 3. (A) placing the made membrane on the bone wound; (B) sutured of the operating wound.

The patient was administered Augmentin 2x1 (for seven days), Ibuprofen 2x0,400 for two days, and 0,12% chlorhexidine solution for mouthwash. After the operating period, with minor pain and edema, the sutures were removed on the 10th day after the operation. After five months, a control X-ray (figure 4) was taken. The case was followed up over six years.

Figure 4. Five months after completion of treatment.

Case 2. Patient MM was referred for treatment with a diagnosis of chronic granulating apical periodontitis on tooth 46. On the diagnostic X-ray, we established a periapical lesion with resorptive changes on the mesiobuccal root on tooth 46 (figure 5A).

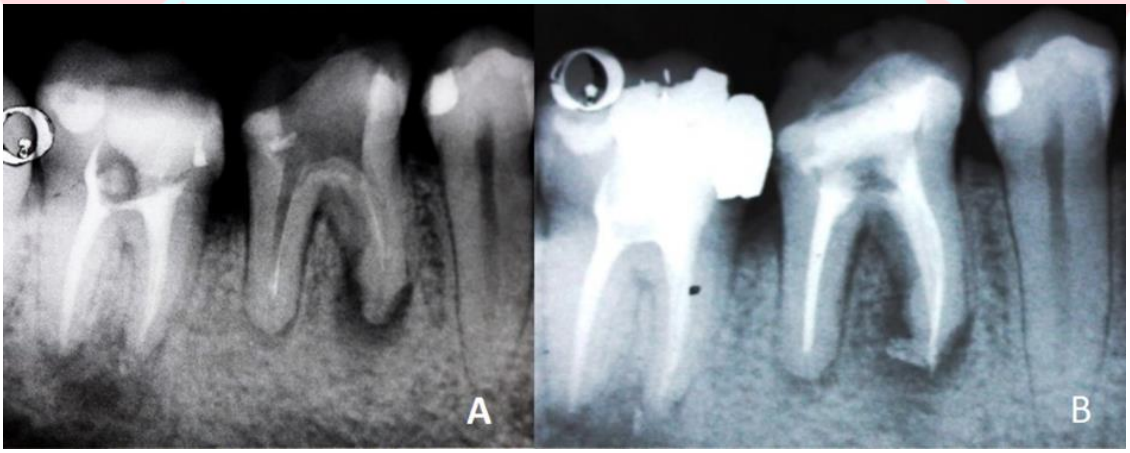


Figure 5. (A) diagnostic X-ray; (B); X-ray after filling the root canals.

Endodontic and surgical treatment follow the same protocol as in case 1. The difference is that surgical treatment was delayed by about a month, as there was an exacerbation of the periapical lesion (figure 6).

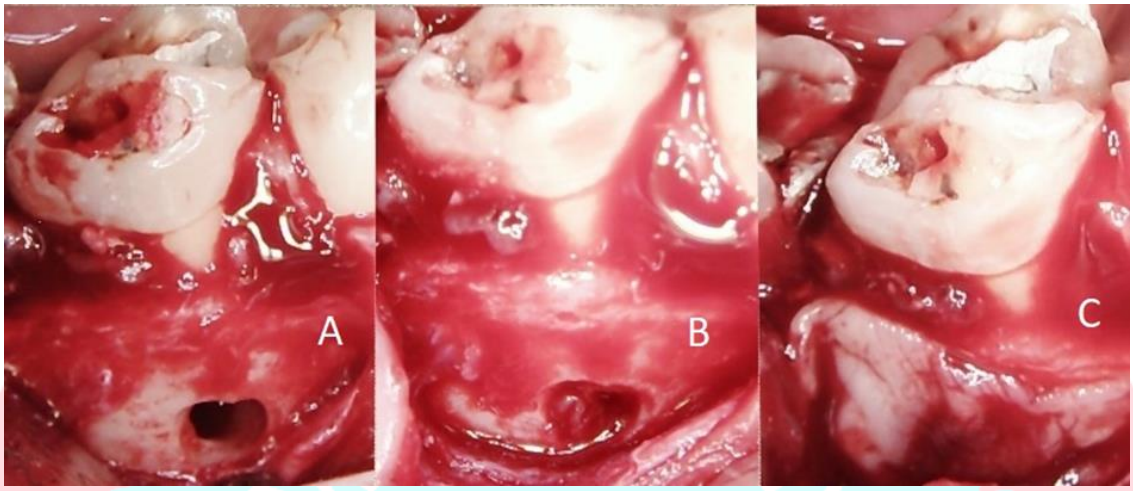
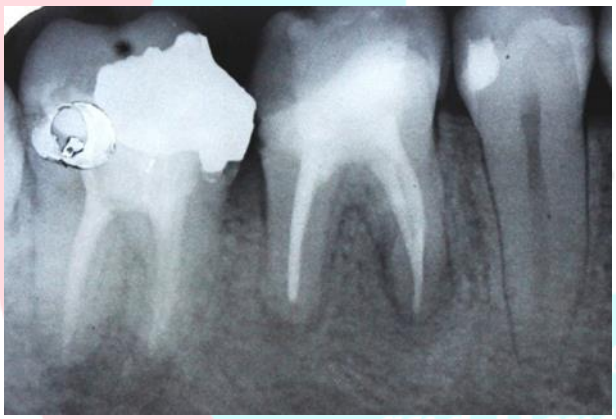


Figure 6. (A) curetting the periapical lesion and resecting the root apex of tooth 46; (B, C) inserting a membrane into the bone wound of the mesiobuccal root of tooth 46 and to the operation.



Both cases were followed up over six years.

Figure 7. Five months after completion of treatment.

Discussion

Plasma therapy is a tissue-engineered method, and the literature emphasizes that it significantly relieves pain[1,5]. In addition, it is used to improve the healing of various surgical wounds by stimulating the healing potential. Plasma therapy products are obtained after centrifugation of venous blood by the patient[6]. Centrifugation aims at separating the formed elements of the blood, of the erythrocytes, from the blood plasma. Plasma is rich in leukocytes (granulocytes and neutrophils), macrophages, plasmocytes, and platelets, from which growth factors and cytokines are locally released by degranulation. After centrifugation, these cells remain in a three-dimensional fibrin matrix. Placed in a surgical wound, it significantly improves the angiogenesis of tissues and accelerates the healing process[1,2,6,7].

Our research with the next-generation platelet aggregate found that the healing process at six months is significantly faster in bone repair [8]. These results have been proven by CBCT testing. The differences in the treatment thus followed, and the randomized study shows that the application of newer protocols such

as A-PRF+ gives a faster healing result. In long-term follow-up, as in the case we described, the results are stable and favorable.

The postoperative defect was filled and covered by platelet concentrate A-PRF according to the Schoukroun protocol. The current treatment results indicate a rapid recovery of periapical changes and durability of the result. Long-term follow-up reveals an excellent healing outcome and prognosis for the treated teeth.

Advanced PRF provides a rich source of growth factors, including platelet-derived growth factors (PDGFs), transforming growth factors (TGFs), vascular endothelial growth factors (VEGF), and insulin-like growth factors (IGF). The growth factors are slowly released during the course of the healing process. Because of the unique character of A-PRF, it is used as a tissue-engineering material with a wide range of dental applications. Advanced PRF is currently recommended as a scaffold material for regenerative endodontics.

Conclusion

The excellent outcome and successful long-term treatment of chronic periapical lesions include good end meticulous endodontic treatment followed by precise surgical technique and potential regeneration stimulation by A- PRF.

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