



## Use of fibrin-rich plasma in bone-repair endodontic procedures. Report of two clinical cases

### *Uso del plasma rico en fibrina en endodoncia para regeneración ósea. Reporte de dos casos clínicos*

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#### ABSTRACT

**Introduction:** Chronic periapical lesions cause bone defects in the apical area of compromised teeth. Standard therapy requires osteotomy, apex removal and profuse curettage to remove granulomatous and infected tissue, thus leaving a bone defect in its wake. **Report of two cases:** Two patients with periapical lesions were subjected to apicoectomy procedure where fibrin-rich plasma was placed as bone filling. Treatment was effective, since after 30 days a radio opaque area was radiographically observed, suggesting bone formation. **Conclusion:** Use of fibrin-rich plasma as bone filling after paraendodontic surgeries could represent a suitable alternative to commercial bone fillings, due to its bone induction properties.

**Key words:** Fibrin, apicoectomy, periapical disease.

**Palabras clave:** Fibrina, apicectomía, enfermedad periapical.

#### RESUMEN

**Introducción:** Las lesiones periapicales crónicas producen defectos óseos en la zona apical del diente comprometido. La terapia estándar requiere de una osteotomía, remoción del ápice, un profuso curetaje para remover el tejido infectado y granulomatoso, dejando un defecto óseo. **Reporte de casos:** Dos pacientes con lesiones periapicales fueron sometidos a una apicectomía donde se les colocó como relleno óseo plasma rico en fibrina. El tratamiento fue efectivo, ya que en 30 días se observó radiográficamente una zona radiopaca sugiriendo una formación ósea. **Conclusión:** La utilización de plasma rico en fibrina para rellenos óseos después de cirugías paraendodónticas podría ser una buena alternativa a los rellenos óseos comerciales por tener propiedades óseo-inductoras.

#### INTRODUCTION

Root canal treatment targets removal of the greater possible amount of microorganisms immersed within the root complex in order to prevent reinfection.<sup>1</sup> Nevertheless, this procedure does not effectively remove all present microorganisms; a reinfection can take place which would cause a chronic lesion and promote bone disorganization around the compromised root. This bone destruction is called apical lesion,<sup>1</sup> it can be radiographically evidenced as a radiolucent area surrounding the compromised root.<sup>2</sup>

Clinical operators usually treat this periapical lesion with an apicoectomy procedure, where compromised apical section is removed, and compromised tissue curettage and debridement is performed.<sup>2</sup> Nevertheless, this technique causes a large bone defect, requiring use of bone materials to fill the

bone cavity and thus provide rapid healing. Many of these bone substitutes are bovine-origin, commercial bone particles, hydroxyapatite which only possesses the characteristic of being osteoconductive, thus delaying healing.<sup>3</sup>

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Autologous bone is the only material possessing osteogenic, osteoconductive and osteoinductive properties.<sup>4</sup> Nevertheless, for the patient, use of this bone means a surgical process to remove donor bone from the chin, external oblique line or other sites, causing pain, stress and delays in the apicoectomy surgical treatment,<sup>5</sup> thus platelet rich fibrin (PRF) is an optimal matrix of autologous bio-inductors which offer several growth factors at the lesion's site, causing fast bone regeneration and repair.<sup>6</sup>

The purpose of the present article was to report two clinical cases where periapical lesion was diagnosed and apicoectomy procedure was undertaken using platelet rich fibrin as bone filling material.

### CASE REPORT

Two patients aged 25 and 20 years exhibited a radiolucent area in the right upper lateral incisor and left upper lateral incisor respectively, which were compatible with a periapical lesion (*Figures 1A and 2A*). Intended procedure was explained to both patients and informed consent was obtained. Pharmacological preparation of patients included ketocorolac (90 mg), dexamethasone (4 mg) and antibiotic prophylaxis with amoxicillin (2 g) one hour before surgical treatment.

PRF preparation: protocol was conducted according to Obando-Pereda: 10 mL of blood was obtained and placed in 15 mL test tubes without anticoagulant; they were immediately centrifuged using a bench centrifuge (GREETMED CENTRIFUGE mod GT119-100T, China) at 3,000 rpm for 10 minutes. With no anticoagulant present, blood begins to clot (coagulate) immediately when exposed to the glass surface of the test tube, so that at centrifugation completion a gelatinous plasma is obtained (*Figures 1B and 2B*).<sup>6</sup>

After surgical isolation of surgical field, surgical site was anesthetized using 72 mg of lidocaine with epinephrine (1:80,000). A linear incision was performed along gingival grooves and a mucoperiosteal flap was lifted. An osteotomy was performed in order to reach the apical portion of the compromised tooth after which amputation of said apex, lesion debridement, curettage and granulation tissue removal were performed (*Figures 1C and 2C*). After this MTA VitalCem (Arequipa, Peru) was used to conduct retro-filling, and PRF clot was placed in the bone defect. An autologous barrier was produced from the PRF clot, and was set in

position in order to close the bone defect caused by the osteotomy (*Figures 1D and 2D*). Soft tissues were approximated and sutured so as to elicit fist intention healing. A periapical X ray was taken immediately after completion of surgical procedure (*Figures 1E and 2E*), to be followed by another X ray taken 30 days after completion of surgical procedures (*Figures 1F and 2F*).

In both patients, no post-operative complications were observed, healing was satisfactory; X ray control suggested bone matrix formation in the bone defect after 30 days.

### DISCUSSION

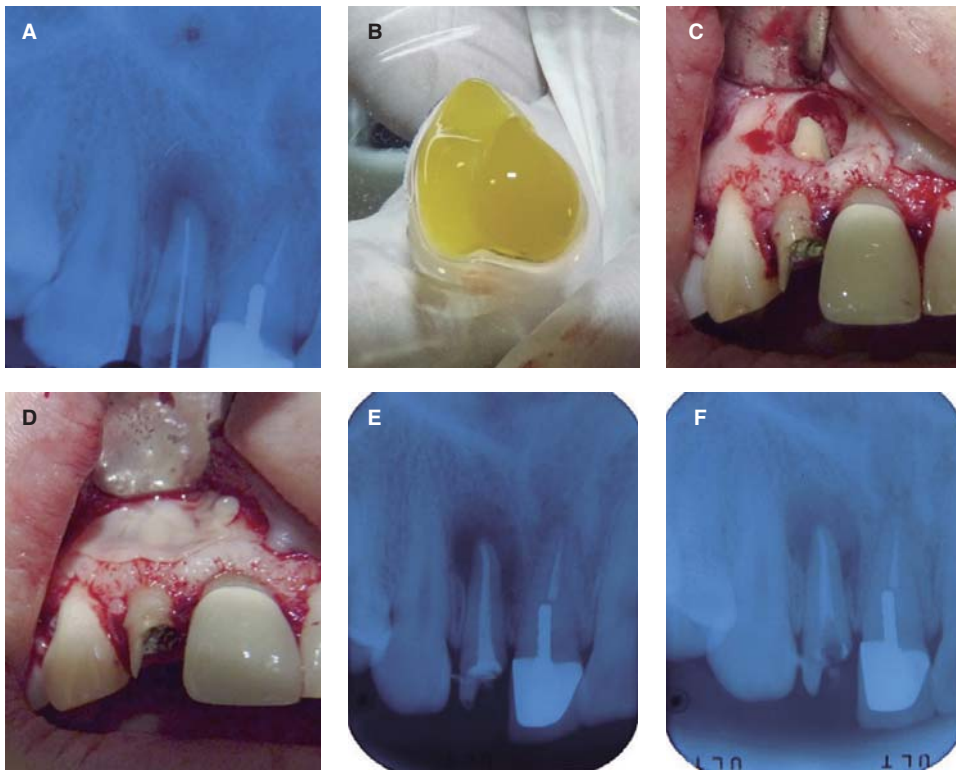
Specialists in dental clinics frequently use PRF protocol with favorable results for regeneration of hard and soft tissues.<sup>6-9</sup> PRF protocol is not frequently used in endodontic therapy, nevertheless, it is used for revascularization of root compounds showing controversial results.<sup>10</sup> In many dental surgery procedures, PRF has shown to cause suitable results for bone regeneration in small or large defects, either by itself<sup>10</sup> or combined with other materials.<sup>3</sup>

In these clinical reports, therapy to treat periapical lesion was apex and infected tissue removal with suitable curettage, in consequence, a bone defect was selected. Similar observations concur with results obtained by Nagaveni<sup>11</sup> and Obando Perea.<sup>6</sup> This event can be explained by the release of growth factors, mainly cytosine, which are immersed in fibrin and are able to control inflammatory response and regenerative properties of the immune system, thus modulating cell migration, proliferation and acceleration of bone healing.<sup>7,8,10,12</sup>

Rapid bone regeneration is directly related to growth factors such as bone morphogenetic protein (BMPs). Some studies report rapid bone formation when these proteins are used to fill bone defects.<sup>13</sup> Nevertheless, commercial BMPs are costly, and manipulation of these proteins is important to thus avoid denaturalization,<sup>13</sup> then PRF offers similar results, since it exhibits many growth factors including pre-BMPs which promote bone healing acceleration in treatment of bone defects, shortening thus bone regeneration time.<sup>6,13</sup>

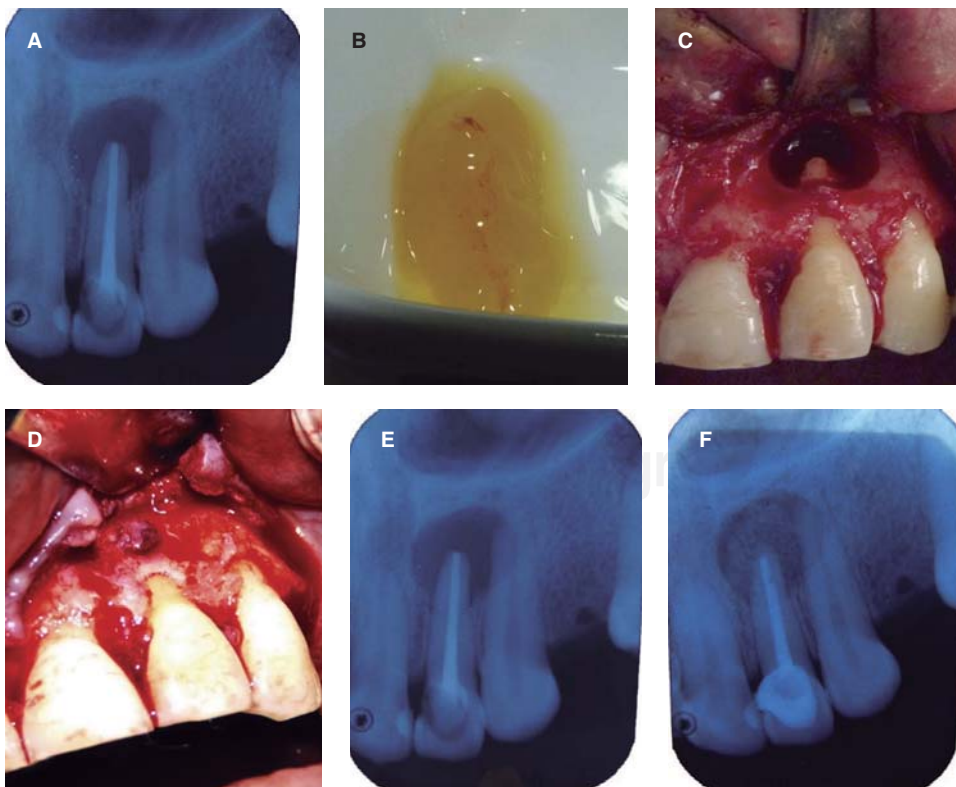
### CONCLUSION

PRF protocol can be used to regenerate large and small bone defects produced by periapical lesions with predictable and favorable clinical results.



**Figure 1.**

**A)** Periapical X-ray of right lateral incisor showing periapical lesion. **B)** Obtained fibrin clot divided into two. **C)** Osteotomy and visualization of the apical portion and apicoectomy. **D)** PRF placed within the bone defect and another clot used as autologous barrier. **E)** Periapical X ray after procedure completion. **F)** Periapical X ray 30 days after procedure completion showing presence of a bone matrix.



**Figure 2.**

**A)** Periapical X-ray of left upper lateral incisor showing periapical lesion. **B)** Obtained fibrin clot divided into two. **C)** Osteotomy and visualization of apical portion and apicoectomy. **D)** PRF placed within the defect and additional clot used as autologous barrier. **E)** Periapical X-ray after procedure completion. **F)** Periapical X ray 30 days after procedure completion showing presence of bone matrix.

## REFERENCES

1. Del Fabbro M, Corbella S, Sequeira-Byron P, Tsesis I, Rosen E, Lolato A, et al. Endodontic procedures for retreatment of periapical lesions. *Cochrane Database Syst Rev.* 2016; 10: CD005511.
2. Del Fabbro M, Samaranayake LP, Lolato A, Weinstein T, Taschieri S. Analysis of the secondary endodontic lesions focusing on the extraradicular microorganisms: an overview. *J Investig Clin Dent.* 2014; 5 (4): 245-254.
3. Vaishnavi C, Mohan B, Narayanan LL. Treatment of endodontically induced periapical lesions using hydroxyapatite, platelet-rich plasma, and a combination of both: An *in vivo* study. *J Conserv Dent.* 2011; 14 (2): 140-146.
4. Albrektsson T, Johansson C. Osteoinduction, osteoconduction and osseointegration. *Eur Spine J.* 2001; 10 Suppl 2: S96-S101.
5. Zizzari VL, Zara S, Tetè G, Vinci R, Gherlone E, Cataldi A. Biologic and clinical aspects of integration of different bone substitutes in oral surgery: a literature review. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2016; 122 (4): 392-402.
6. Obando-Pereda GA. Autologous barriers, fillers and growing factors: using the secondary pathway of haemostasis in dental clinics-report of four clinical cases. *J Dental Sci.* 2016, 1 (2): 000107.
7. Dohan-Ehrenfest DM, Doglioli P, de Peppo GM, Del Corso M, Charrier JB. Choukroun's platelet-rich fibrin (PRF) stimulates *in vitro* proliferation and differentiation of human oral bone mesenchymal stem cell in a dose-dependent way. *Arch Oral Biol.* 2010; 55 (3): 185-194.
8. Karunakar P, Prasanna JS, Jayadev M, Shravani GS. Platelet-rich fibrin, "a faster healing aid" in the treatment of combined lesions: a report of two cases. *J Indian Soc Periodontol.* 2014; 18 (5): 651-655.
9. Pradeep AR, Nagpal K, Karvekar S, Patnaik K, Naik SB, Guruprasad CN. Platelet-rich fibrin with 1% metformin for the treatment of intrabony defects in chronic periodontitis: a randomized controlled clinical trial. *J Periodontol.* 2015; 86 (6): 729-737.
10. Jadhav GR, Shah D, Raghvendra SS. Autologous platelet rich fibrin aided revascularization of an immature, non-vital permanent tooth with apical periodontitis: a case report. *J Nat Sci Biol Med.* 2015; 6 (1): 224-225.
11. Nagaveni NB, Kumari KN, Poornima P, Reddy V. Management of an endo-perio lesion in an immature tooth using autologous platelet-rich fibrin: a case report. *J Indian Soc Pedod Prev Dent.* 2015; 33 (1): 69-73.
12. Gupta SJ, Jhingran R, Gupta V, Bains VK, Madan R, Rizvi I. Efficacy of platelet-rich fibrin vs. enamel matrix derivative in the treatment of periodontal intrabony defects: a clinical and cone beam computed tomography study. *J Int Acad Periodontol.* 2014; 16 (3): 86-96.
13. Herford AS, Boyne PJ. Reconstruction of mandibular continuity defects with bone morphogenetic protein-2 (rhBMP-2). *J Oral Maxillofac Surg.* 2008; 66 (4): 616-624.

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