



ORIGINAL RESEARCH PAPER

Dental Science

EVALUATING THE CLINICAL IMPLICATIONS OF USE OF PRF AS AN ADJUNCT IN TWO CASES OF REIMPLANTATION UNDERGOING ORTHODONTIC TREATMENT

KEY WORDS:

Reimplantation, Plasma concentrates, PRF, Orthodontic tooth movement

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ABSTRACT

Platelet concentrates are widely used as bioactive surgical additives in promoting wound healing and regenerative procedure. The cost effectiveness of its preparation has added to versatility of its use in various fields of Medicine and Dentistry. The present case report highlights the scope of use of Platelet rich fibrin (PRF) in reimplantation cases for regeneration of periodontal ligament (PDL) cells. Such regeneration offers an added advantage to the patients undergoing orthodontic treatment since it prevents ankylosis of tooth and allows uninterrupted tooth movements.

INTRODUCTION

Reimplantation is widely accepted as an efficient treatment modality in avulsions and failing root canal treatment. However, long term success depends on extra-oral time, storage media and vitality of periodontal tissues¹. The vitality of PDL on the surface of root increases the probability of reinsertion of dental fibers into alveolar fibers².

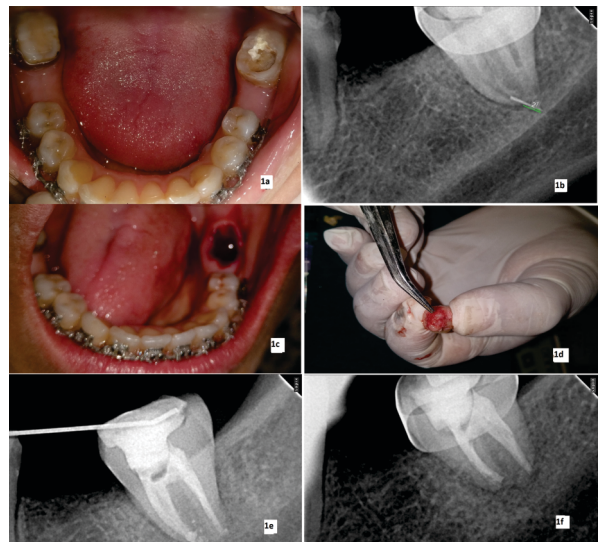
Platelet concentrates release alpha granules which contain a cascade of growth factors thus, promoting proliferation, chemotaxis and differentiation of cells essential in osteogenesis. Various forms of platelet concentrate are presently available for use in Dentistry eg.- Platelet rich plasma, concentrated growth factor, sticky bone, platelet rich fibrin (PRF), i-PRF, T-PRF.

Choukroun et al³ in 2006 introduced PRF which was prepared without the use of anticoagulant. Hence, a new category of 'second generation' platelet concentrates evolved. Its unique property of strong fibrin gel polymerization and formation into membrane like structure enables its use as bioactive surgical additive.

The present article highlights the successful use of PRF to promote predictable PDL cell regeneration in two cases of reimplantation undergoing orthodontic treatment. The first case involved intentional reimplantation of tooth #37 with fractured instrument in the mesial root. The second case involved reimplantation of tooth #33 that was extracted accidentally by an undergraduate student in the Department of Oral and Maxillofacial Surgery of the institute.

Case report 1

A 21 year old female was referred by a private practitioner to the Department of Conservative Dentistry and Endodontics with complaint of pain in the lower left back tooth region. On clinical examination tooth # 37 showed large carious cavity and was tender on percussion. Probing depth was within normal limits with grade II mobility. Other clinical findings included partially edentulous space present w.r.t 36 and 46, numbness on left side of lip and was undergoing fixed Orthodontic Treatment since two years for class II malocclusion (Figure- 1a).



Radiographic examination (RVG - Kodak Carestream Digital Radiography System RVG 6100) revealed instrument separation(4mm) in apical third with PDL widening and proximity of the mandibular canal (Figure- 1b). Diagnosis Acute Apical periodontitis with instrument separation w.r.t tooth #37 and transient lower lip paresthesia was made.

Treatment was initiated by modification in access opening with Endo access bur (Dentsply) and attempt to retrieve instrument was made with the help of Stieglitz plier⁴ and Grossman's method⁵ (gutta percha softened by chloroform placed in the canal which is then removed by file or barbed broach). Due to presence of curvature only 2mm file could be retrieved back into the canal with failure to remove the instrument from the canal.

The patient was presented with different treatment modalities like apical surgery, intentional replantation, tooth extraction followed by implant placement. After risk and benefits were discussed, the patient decided to have intentional replantation.

All the canals were prepared using Protaper Gold (Dentsply .U.S.A) till size F2. Mesio-buccal canal was prepared till the

site of separated instrument with F2.

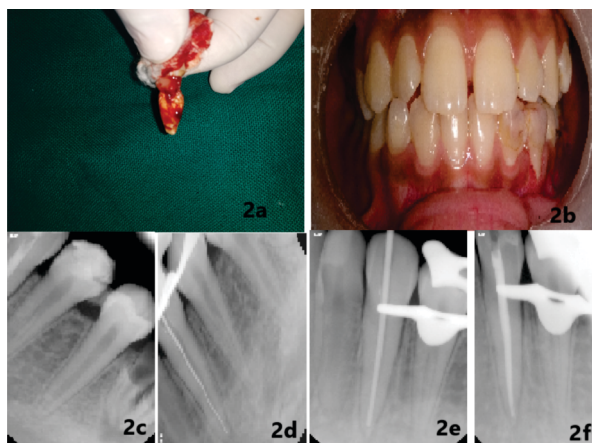
PROCEDURE FOR REIMPLANTATION

Local anesthesia was administered. Atraumatic extraction of tooth was done with every attempt made to preserve the vitality of PDL cells. The extracted tooth was stored in Hank's balanced salt solution to preserve the vitality of the cells. Obturation was done with Sealapex (Kerr) sealer using lateral condensation technique. The socket was gently curetted to remove the granulation tissue and irrigated with normal saline. Root was inspected and broken instrument was clearly seen extruding out of the apex. Root end resection using high speed hand piece followed by a retrograde cavity preparation with a depth of 3 mm. The file was retrieved at this point (Figure 1c and d). Retrograde filling was done using Biodentine (Septodont). The material was condensed properly using finger pluggers (MANI).

PRF was placed deep into the socket. The tooth was properly oriented and gently replanted into the socket using light pressure. Patient was instructed to bite on a gauze piece for 10 mins. Stability of the tooth was assessed in the socket. Splinting was done with 019x025 inch stainless steel rectangular wire (Orthodontic stabilization) to provide additional stability. The entire procedure was completed in 10 minutes. Patient was dismissed with post operative medications and instructions. Patient was recalled every week for a month. On 7th day patient had no signs and symptoms of pain and but grade II mobility. After 3 weeks mobility of tooth was within normal limits hence, splint was removed (Figure 1e). Quarterly follow up was done till one year with no signs of ankylosis due to regeneration of PDL by PRF (Figure 1f). The patient was further sent to undergo orthodontic treatment (retentive phase). 18 months radiograph shows normal PDL around the tooth. No ankylosis was seen in the tooth even after Orthodontic treatment.

Case report-2

16 year old female patient reported to the Department of Conservative Dentistry and Endodontics with complain of accidental extraction of tooth #33 ten minutes back i.e. 33 in Oral Surgery Department. The patient was scheduled for extraction of tooth #34 as a part of Orthodontic treatment. The patient blood was immediately collected for PRF preparation. In the meanwhile, tooth was held form the crown portion with a gauze piece, cleaned, inspected and stored in Hank's balanced salt solution to preserve the vitality of remaining PDL cells (Figure- 2a). Tooth was immediately placed back into socket with PRF scaffold around it to prevent ankylosis of tooth as the patient had to further undergo orthodontic treatment. Tooth was splinted with the help of Interlig (Angelus) (Figure-2b). A week later, root canal treatment was initiated and calcium hydroxide as medicament was placed into the canal with splint in place (Figure- 2c, d, e, f). After 14 day, the tooth was stable in socket with no apical root resorption and pain. Thus, canal was obturated followed by splint removal (figure- 2g) and follow up taken at 3, 6 and 12 months.



After 12 months of follow up tooth was within normal limits of mobility, occlusion without pain and appropriate to undergo Orthodontic treatment. On Orthodontic treatment the tooth is showing normal movements w.r.t. other teeth in the arch.

DISCUSSION

Regeneration of the PDL cells to restore the PDL space and prevent ankylosis was the main aim of the surgical procedures. PRF being reservoir of growth factors and cytokines (vascular endothelial growth factor, insulin like growth factor, transforming growth factor b1 and b2) and its sustained release for upto four weeks stimulates an environment of tissue regeneration. PRF has a strong positive effect on the proliferation of gingival fibroblasts, PDL fibroblasts, and osteoblasts.

Intentional reimplantation is a relatively fast and simple procedure with minimal discomfort, better visualization, cost effective and has fewer complications⁵. It has also been demonstrated as an useful modality in vertical root fractures⁷, close proximity of anatomical structures (mental foramen, mandibular canal) and failed retreatment cases.

The modern intentional replantation procedure has come a long way by using state-of-the-art equipment, instruments, and materials and has been shown to have a very good success rate⁸. The success is likely dependent on a proper case selection, minimally traumatic extraction (minimal damage to the surrounding tissues and bone), understanding of the apical anatomy, short extraoral time with adequate vision and illumination (microscope), copious irrigation, and meticulous instrumentation as well as carefully controlled postoperative patient instruction adherence^{9,10}. The biocompatibility of the filling material will also affect the healing process.

In these cases, HBSS was used as a root hydration media to restrict 'dry time' as it prevents resorptive processes such as replacement resorption, ankylosis, internal, and external root resorptions¹¹.

Studies have shown that splinting is not mandatory and should be performed only if necessary like the above case reports where teeth were single rooted with excessive mobility¹² (fused roots of 37 with absence of 36,38; 33 single rooted), short roots or lack of interseptal bone¹³. Semirigid splinting is preferred as it allows physiologic mobility of the tooth which result in functional arrangement of the PDL fibers.

Ankylosis lead to infraocclusion and vertical discrepancy of alveolar bone which is more intense and progresses faster in growing subjects due to vertical bone growth and teeth eruption¹⁴. Thus every attempt should be made to prevent ankylosis of reimplanted tooth especially if patient has to undergo orthodontic treatment as tooth movement by fixed orthodontic appliance may be impossible further leading to supra- eruption of the antagonist. Hence worsening the results orthodontic treatment. The above mentioned case reports have used PRF to prevent ankylosis and assist orthodontic treatment

CONCLUSION

Intentional reimplantation should no longer be considered the last treatment resort as when done in conjugation with

platelet concentrates (PRF) give predictable results in healing of periapex by its antimicrobial and regenerative capability.

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