Case Report

Intentional replantation of a hopeless tooth with the combination of platelet rich plasma, bioactive glass graft material and non-resorbable membrane: a case report

Demir B, Demiralp B, Güncü GN, Uyanik MÖ, Çağlayan F. Intentional replantation of a hopeless tooth with the combination of platelet rich plasma, bioactive glass graft material and non-resorbable membrane: a case report.

Abstract – Intentional replantation can be an alternative choice for periodontally involved hopeless tooth at least for a period of time. This technique may help to restore an original tooth to function in the mouth instead of replacing it with prosthesis. The combination of one or more techniques currently available for periodontal therapy may have the potential to enhance clinical results as compared to any of the techniques used alone. In this case report, intentional replantation was combined with regenerative techniques. A very popular agent, platelet rich plasma was used in combination with bioactive glass graft material and non-resorbable PTFE membrane. The technique and one year results of treatment were discussed radiographically and clinically.

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Intentional replantation is defined as intentional removal of tooth and reinsertion into the extraction socket before or after proper endodontic treatment (1). Sometimes for the patients with severe periodontal diseases who have advanced bone destruction both surgical and non-surgical methods may not be successful with extraction being the only alternative. In these cases replantation may be an alternative choice at least for a period of time, which will help to restore an original tooth to function in the mouth instead of replacing it with prosthesis. It is generally agreed that intentional replantation is contraindicated in teeth exhibiting moderate to severe periodontal disease and for a long-term success a healthy periodontal status is a prerequisite (2). However there are several successful reports in the literature for periodontally involved teeth, which were treated by intentional replantation (3–5).

Destruction of the osseous support of the dentition is a hallmark of periodontal diseases. This bone resorptive process has been the target of therapeutic intervention and preventive strategies (6). Regeneration is defined as a reproduction or reconstitution of a lost or injured part (7). The use of bone grafts and bone substitutes, guided tissue regeneration (GTR) and the application of growth factors (GFs) to the surgical area some of the commonly used techniques used to promote periodontal regeneration. Platelet rich plasma (PRP) is a component of blood in which the platelets are concentrated in a limited volume of plasma (8–11). Literature provides evidence that platelets contain many GFs such as,

platelet-derived growth factor (PDGF), insulin growth factor (IGF) and transforming growth factor (TGF-β) that enhance wound healing and help to induce regeneration of the tissues (12, 13).

The combination of one or more techniques currently available for periodontal therapy may have the potential to enhance clinical results as compared to any of the techniques used alone. In this case report, intentional replantation was combined with regenerative techniques. A very popular agent, PRP was used in combination with bioactive glass graft material and non-resorbable PTFE membrane. The technique and 1 year results of treatment were discussed radiographically and clinically.

Case report

A 45-year-old male patient was referred to Hacettepe University, Faculty of Dentistry Department of Periodontology with severe destruction on mandibular left central incisor tooth. Radiographically there was a huge radiolusent area with a serious bone loss at the related tooth (Fig. 1) and the rest of the dentition was healthy. Clinically, gingiva has lost its contour and was hyperemic and edematous (Fig. 2). Periodontal pocket depths on the buccal side were 8-7-10 (distal-median-mesial) and 7-7-9 on the lingual side and tooth had Class III mobility.

Fig. 1. Radiographically there was a huge radiolusent area with a serious bone loss on mandibular left central incisor tooth.

Fig. 2. Clinically, gingiva was hyperemic and edematous.

Patient was informed about the treatment options including intentional replantation, fixed partial denture and implant therapy. He refused the implant therapy due to the financial problems and was willing to maintain the tooth by any means. Intentional replantation, which was combined with PRP and a graft material and non-resorbable membrane, was indicated with the consent of the patient.

The endodontic treatment of the tooth was completed 1 week before the operation. After local anesthesia, intrasulcular incision was made, the tooth was extracted and full thickness mucoperiosteal flap was raised. Granulation tissues around the root were removed, scaling and root planning was performed by ultrasonic and hand instruments extraorally. There was a crater shaped bony defect with no residual buccal and lingual walls (Fig. 3).

PRP was prepared from blood collected in the immediate preoperative period. The color-coded PRP kit (Curasan®, Pharma Gmbh AG, Lindigstrab, Germany) was used for preparing PRP according to the protocol described before (8, 10). Briefly; the blood sample was drawn into a citrated tube. The sample tube is then spun in a standard

Fig. 3. There was a crater shaped bony defect with no residual buccal and lingual walls.

centrifuge for 10 min at 2400 ***g*** to produce platelet poor plasma (PPP). The PPP was taken up into a syringe with a long cannula and an additional air-intake cannula. A second centrifugation (15 min at 3600 ***g***) was performed to concentrate the platelets. The second supernatant was also taken up by a long cannula and an air-intake cannula. For each 10 ml of blood, the volume of supernatant was about 0.6–0.7 ml: this was the PRP, to be used for the surgical procedure. At the time of application, the PRP was combined with an equal volume of a sterile saline solution containing 10% calcium chloride (a citrate inhibitor that allows the plasma to coagulate) and 0.1 ml of blood that was obtained from the surgical area included thrombin which is an activator that allows polymerization of the fibrin into an insoluble gel, and causes the platelets to degranulate and release the indicated mediators and cytokines. The result was a sticky gel that can be applied easily to the surgical defects. Then PRP gel was mixed with graft particles (Unigraft®, Unicare Biomedical Inc., Laguna Hills, CA, USA). The tooth was placed and attached to the adjacent tooth with composite filling material at the desired position. PRP including graft material was placed into the defect, both the lingual and buccal sides of the tooth (Fig. 4). A PTFE membrane (Cytoflex®, Unicare Biomedical Inc., Laguna Hills, CA, USA), which was secured with 4.0 vicryl suture was placed at both the buccal and the lingual side between the mucoperiosteal flap and the defect (Fig. 5). The flap was sutured with 4.0 Vicryl sutures. The patient was prescribed 500 mg. Amoxicillin t.i.d for a week, 275 mg. Naproxyn sodium b.i.d for three days and Chlorhexidine gluconate 0.12% for 2 weeks. Sutures were removed after 2 weeks. The surgical site healed uneventfully. There was a barrier exposure at the interproximal area 4 weeks after surgery. The patient was seen in every 2 weeks. Six weeks after the replantation second surgery was performed in order to remove the barrier membranes (Fig. 6). The radiolucent area around the root was remarkably reduced at sixth month and bone fill was seen especially at the apical and distal side of the root, which was detected radiographically (Fig. 7). Periodontal pocket depths (distal-median-mesial) on the buccal side were 3-3-4 and 3-3-4 mm on the lingual side. At the end of 12 months radiographically radiolusent area around the tooth was completely disappeared and the bone fill was detectable on apical, distal and also on the mesial side of the root (Fig. 8). Periodontal pocket depths (distal-median-mesial) on the buccal side were 3-3-4 and 3-3-3 on the lingual side. Clinically, the gingiva was firm and pink and there was no bleeding on probing at the time of examination. Patient was very satisfied with the outcomes of the treatment and was able to use the tooth.

Fig. 4. PRP including graft material was placed into the defect, both the lingual and buccal sides of the tooth.

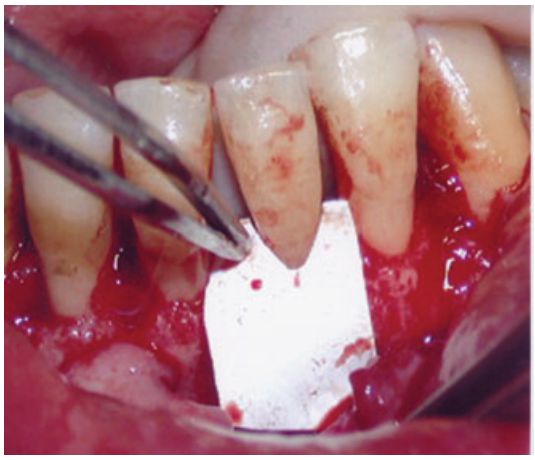

Fig. 5. A PTFE membrane, which was secured with 4.0 vicryl suture was placed at both the buccal and the lingual side between the mucoperiosteal flap and the defect.

Fig. 6. Six weeks after the replantation second surgery was performed in order to remove the barrier membranes.

Discussion

Although there is a general consensus that intentional replantation is contraindicated in periodontally

Fig. 7. The radiolucent area around the root was remarkably reduced at sixth month and bone fill was seen especially at the apical and distal side of the root, which was detected radiographically.

Fig. 8. At the end of 12 months radiographically radiolusent area around the tooth was completely disappeared and the bone fill was detectable on apical, distal and also on the mesial side of the root.

involved teeth, there are reports suggesting that it can be a successful treatment alternative for periodontally involved hopeless teeth as a last resort (3–5). In our previous study we have replanted periodontaly involved hopeless teeth with class III mobility, more than 50% bone loss and deep pockets after tetracycline-HCl treatment which was resulted in bone gain and a reduction in pocket depth at the end of 6 months (5).

GFs are a class of natural biologic mediators that regulate key cellular events in tissue regeneration including cell proliferation, chemotaxis, differentiation and matrix synthesis (14). PRP is a new and potentially useful adjunct in periodontal and maxillofacial bone reconstructive surgery. PRP is, frequently used for bone tissue replacements such as bone augmentation/regeneration procedures or sometimes in conjuction with biomaterials, treatment of bone defects around natural teeth and/or implants, promotion of osseointegration, and also sinus lift procedures (8–11, 15–22). The first clinical dental results with PRP were reported by Marx et al. (11). Their data strongly suggested that adding PRP to bone grafts accelerated the rate and the degree of bone formation (11). Platelets are very important in the wound healing process. They arrive quickly at the wound site and take an important role in coagulation. They release multiple wound-healing GFs and cytokines, including PDGF, TGFs/β1 and β2, vascular endothelial growth factor, platelet-derived endothelial cell growth factor, interleukin-1, basic fibroblast growth factor, and platelet activating factor-4 (23). These GFs are thought to contribute to bone regeneration and increased vascularity, vital features of healing bone graft (24, 25). The supplementation of GFs by adding PRP into bone leads to significant increase in bone regeneration rate and density around implants, as the concentration of PDGF and TGF-β increases up to 338% (11).

The tooth treated in this case had no chance with any periodontal therapy and was bound to be extracted. Following the tooth extraction a 25% decrease in bone volume was seen during the first year and a 40–60% decrease in width within the first 3 years after tooth loss was reported (26, 27). Since the patient was willing to maintain the tooth by any means intentional replantation with the combination of PRP and regenerative approach has been performed. The replanted teeth must demonstrate healthy gingiva, significant decrease in pocket depth and the evidence of new bone formation to be considered successful. In this case tooth had all the signs of successful treatment of a replanted tooth at the end of 12 months. The soft tissue healing was much better than usual. A stable clot is very important in wound healing process (28). The PRP gel is a very stable and adhesive clot, which may have affected especially the soft tissue healing of the replanted tooth. Also the biological mediators

that PRP have might have a positive effect on the healing process and the outcomes of the treatment.

Intentional replantation may be used for the teeth, which have no chance other than extraction. Although it is very difficult to make a conclusion with only one case we can suggest that combined regenerative techniques can be used with intentional replantation in order to have better and more predictable results.

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