AUTOLOGUS PLATELET RICH FIBRIN AIDED REVASCULARIZATION OF AN IMMATURE, NON-VITAL PERMANENT TOOTH: A CASE REPORT

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INTRODUCTION:

Regenerative endodontic procedures are biologically based procedures which deals with the regeneration of pulp like tissue, more idealistically the pulp-dentin complex, damaged coronal dentin such as that following a carious exposure or trauma; and regenerate resorbed root, cervical or apical dentin.[1] The mechanics behind the revitalization endodontic procedure is that, despite the tooth being necrotic, some pulp tissue can survive apically which under favorable conditions proliferate to aid in the process of regeneration. revascularization results in lengthening and also strengthens the thin root walls. In revascularization various biomaterials such as collagen, platelet rich plasma (PRP) can be used as a scaffold in addition to blood clot. [2] Use of second generation platelet concentrate {platelet rich fibrin (PRF)} as an additional scaffold is a step ahead in the field of revascularization. This case report highlights the use of PRF as an additional scaffold in the revascularization to enhance therapeutic outcome.

CASE REPORT:

An 18-year-old boy reported to the department with the chief complaint of swelling and broken upper front tooth along with discoloration [Figure 1]. The dental history revealed trauma to his upper front tooth. Patient reported with history of treatment initiated 6 months back which was further discontinued. The medical history of the patient was noncontributory. Intraoral examination of his teeth revealed the presence swelling with sinus tract opening on the labial

mucosa of 21. The tooth was discolored w.r.t 21 along with Ellis class III fracture with temporary restoration seen. Tooth 11, 12 and 22 was sensitive to both percussion and periapical palpation tests. Both 21 did not respond to CO2 ice and electric pulp test. Periodontal probing depth of the tooth 21 was within normal limit. Intraoral periapical radiographic examination of tooth revealed an immature root and an open apex associated with periapical radiolucency [Figure 2]. Further, radiographic examination of the tooth revealed a 3 mm open apex along with thin dentinal walls that appeared prone to fracture. Hence, a clinical decision of performing a regenerative endodontic treatment using Choukroun's PRF was decided. A written informed consent was obtained. Local anesthesia was achieved using lignocaine. Initially temporary restoration was removed w.r.t 21. Working length and sinus tracing was done [figure 3]. The canal was thoroughly irrigated with 20 ml of 5.25% sodium hypochlorite solution and nuetralized with saline. Following this, irrigation was done using 10 ml of 0.2% chlorhexidine solution and dried with paper points. In the next appointment when swelling was subsided, canal was thoroughly irrigated and a mixture of ciprofloxacin, metronidazole, and minocycline paste was prepared into a creamy consistency and introduced into the canal using a lentulo spiral w.r.t 21 [Figure 4]. A cotton pellet was placed, and the cavity was temporarily sealed with cavit (Dental Products of India, India). The patient returned after 21 days to the clinic and was asymptomatic. Local anesthesia was given, followed by rubber dam isolation; then the access cavity was reopened and thoroughly irrigated with sterile saline solution and dried with paper points. A 10 ml sample of whole blood was drawn intravenously from the patient's right antecubital vein and centrifuged under 3000 rpm for 10 min to obtain the PRF which was jelly-like in consistency [Figures 5,6,7]. The PRF was condensed into the canal using a hand plugger until the level the cementoenamel junction. Gray MTA was placed directly over the PRF to a thickness of 3 mm followed by a wet cotton pellet and cavit [figure 8,9]. The

patient was recalled after 3 days, and the setting of MTA was confirmed. The access cavity was then double sealed with glass ionomer cement and composite restoration [Figure 10]. The patient returned to the clinic after 3 months, 6 months for review and was asymptomatic; the tooth 21 showed negative response to percussion and palpation tests. The radiograph revealed regression of periapical lesion and initiation of root end closure. Cone beam computed tomography (CBCT) evaluation is also carried out in order to confirm the results [Figures 11]. The patient is still under review.

Figure 1: Pre-operative clinical photograph of 21 with intra oral swelling and fractured tooth

Figure 2: Pre-operative radiovisuography of 21

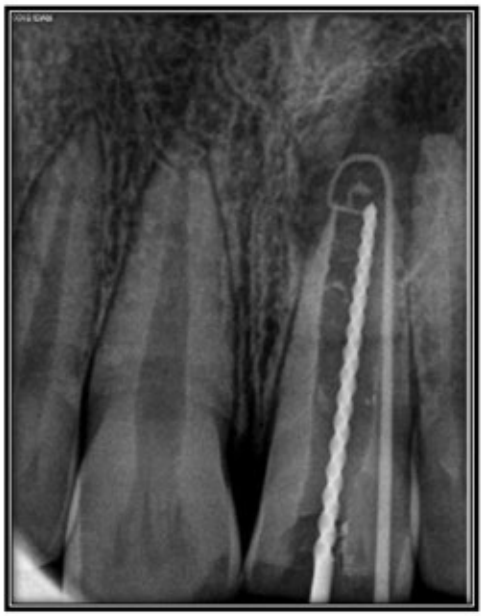

Figure 3: Working length established and GP tracing done

Figure 4: mixing and placement of triple antibiotic paste with lentulospiral

Figure 5: Withdrawal of 10 ml of blood from left median cubital vein

Figure 6: After centrifugation, blood segregated into three layers. Bottom being RBC, middle PRF, and top acellular plasma

Figure 7: Carrying of platelet rich fibrin gel for placement into the canal

Figure 8: *Intra operative after PRF placement & MTA*

Figure 9: *immediate post op RVG with temporary restoration*

Figure 10: After double coronal seal

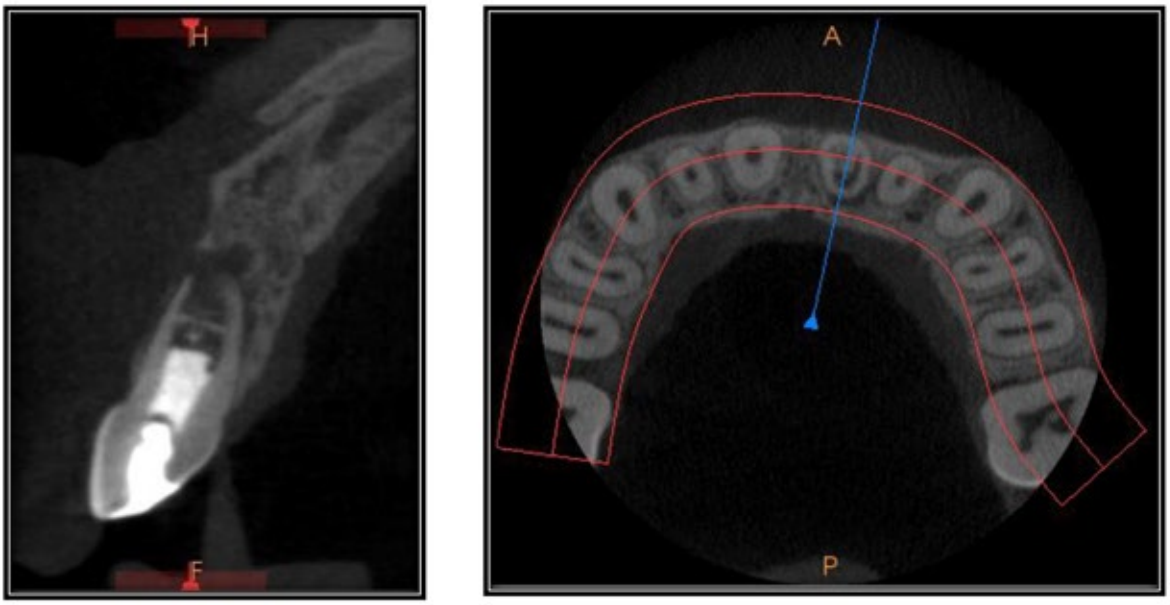

Figure 11: Cone beam computed tomography image after 6 months follow-up

DISCUSSION:

Immature non-vital permanent teeth with thin fragile radicular walls are difficult to manage with the conventional root canal procedure. In such cases, revascularization is a viable treatment option. The success of revascularization depends upon methodical disinfection, use of a suitable scaffold and a good coronal seal. In the presented case, a double seal of RMGI and MTA was used. MTA placed directly over the PRF clot had two-fold benefits; moisture from PRF helped in the setting of MTA and MTA provided signalling molecules for the growth of the stem cells.[3]

In the revascularization, scaffold is essential to support the in-growth of new tissue from the periapical area and to provide an environment for cell growth and differentiation. Platelet rich fibrin, an autologous leukocyte and platelet rich fibrin biomaterial, is aninnovative advancement in the field of regenerative medicine. Use of PRF as a scaffold in revascularization has several advantages. It can be easily prepared, avoids the biochemical handling of blood andrequires only

single centrifugation cycle. It forms an organized fibrin network where the platelets and leukocytes are concentrated leading to sustained release of various growth factors like platelet-derived growth factor-AB, transforming growth factor-1, and vascular endothelial growth factors over a prolonged period of time. [4] These growth factors can stimulate scaffold remodelling, proliferation of undifferentiated mesenchymal stem cells like dental pulp stem cells (DPSC) and promote angiogenesis. [5] Moreover, the natural fibrin of PRF also protects the growth factors from proteolysis. PRF clot traps all important circulating immune cells and different cytokines that act againstinfection.[4]

CONCLUSION:

Thus supplementation of revascularization with PRF improves its regenerative outcome. However, randomized long term prospective clinical studies are needed to establish PRF supplements in revascularization as a routine protocol.

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