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RESEARCH ARTICLE

PRF PULPOTOMY

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ABSTRACT

To discuss about success of PRF pulpotomy in young permananet tooth with mature apex. This case report tries to throw some light on PRF pulpotomy.

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INTRODUCTION

Preserving the pulp is important in the treatment of carious exposures in young permanent teeth or in the complex root canal systems of primary molars. Exposures may result from caries, iatrogenic mishaps or traumatic injuries (Bakland 2002). Pulpotomy is a vital pulp therapy in which a portion of coronal pulp tissue is removed surgically, and the remaining radicular tissue is covered with a suitable material that protects the pulp from further injury and permits and promotes healing (Bakland 2002).[1-5] Several materials have been advocated to induce dentine bridge formation via the dentinogenic potential of pulpal cells (Schroeder 1985). In 1929, Hess reported a technique of pulpotomy using calcium hydroxide (CH; Hess 1929). Stanley (1989) strongly advocated CH for vital pulp therapy, and this material has been used for the protection of exposed dental pulps up to the present time.[5] It is traditionally recommended to use pulpotomy only in primary teeth or young permanent molars with immature apices. Nevertheless, many recent studies have reported clinically acceptable success rates with pulpotomy in mature permanent teeth as well. As early as 1995, Caliskan reported the successful management of 26 vital teeth with periapical involvement using calcium hydroxide (CH) pulpotomy.[5-10] Various materials have been advocated for use in pulpotomy procedures based on their biocompatibility, sealing ability, and antimicrobial efficacy when placed in contact with the inflamed pulp. MTA is one of the most commonly used and researched material for such purposes with successful clinical outcomes. However, due to certain inherent drawbacks of MTA, there is a need for the development of newer materials that addresses the requirements of pulpotomy therapies and that can overcome the challenges associated with MTA.[6-8] Various biomaterials have been introduced with the aim of safeguarding the vitality of the pulp. The prognosis of the treatment depends on the biocompatibility and the ability of the material to provide a good biological seal. However, one has to bear in mind that the ability of the pulp to respond to the injury also plays a significant role.[7]

Condition of Pulp: The status of pulp before vital pulp therapy is also a key factor in determining the success rate of this technique. Although the ability to control bleeding is generally used as an indicator to assess the extent of pulpal inflammation, it may, however, not accurately correlate with the extent of inflammation in all the cases. Thus, many cases having pulpal inflammation at advanced stages may have been included in the study and might have affected the results. Availability of better diagnostic techniques in future may help in the better selection of the cases and hence increased success rate of this technique.[9] Pulpotomy is a universally accepted treatment for teeth with incompletely formed roots involving pulpal exposure (Camp & Fuks 2006, Witherspoon et al. 2006). In permanent teeth, it has been postulated that extirpating pulpal tissue and undertaking

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root canal treatment in many cases is not cost-effective as it is time-consuming and difficult for both patient and clinician. In addition, failure of a vital pulp therapy would not reduce the outcome of future root canal treatment for the tooth (Camp & Fuks 2006).[9-12] Platelet rich fibrin is a second generation platelet concentrate introduced by Choukroun et al. It is strictly autologous and helps to release the growth factors necessary for the regeneration of dentin pulp complex thereby accelerating the healing process. Second generation blood matrices (PRF) which was used in the present case series is superior to platelet rich plasma (PRP) in various ways. Unlike PRP, the procedure for the preparation is simple and economical and the addition of bovine thrombin anticoagulants or the biomechanical handling of the blood is not required. By allowing slow polymerization, it helps in efficient migration, attachment, proliferation, and differentiation of the cells. It also provides support to the immune system and promotes hemostasis. PRF has a potential to support pulpal healing by moderating pulpal inflammation by the release of healing cytokines such as interleukin (IL)-4 and inhibiting the stimulation of matrix metalloproteinase-1 (MMP-1) and 3 by IL-1b. Hiremath *et al*. first reported the successful management of a mature molar with irreversible pulpitis using PRF as pulpotomy agent. However, no long-term study or clinical trial has evaluated the effectiveness of this protocol.[5-8]

CASE REPORT

A 19-year-old male patient reported to the Department of Conservative Dentistry and Endodontics, with pain in the lower right posterior region of jaw. Pain was spontaneous, intense & lingering to cold stimulus with no history of swelling & night pain. On clinical examination deep occlusal caries were seen on left mandibular second molar. Tooth was mildly tender to percussion. An IOPA x-ray revealed deep occlusal caries invading the pulp with mature roots & thin root dentinal walls. The diagnosis of pulpitis was determined on the basis of clinical and radiographical assessment. The patient was informed about the treatment modality i.e. coronal pulpotomy using PRF. After obtaining written consent from the patient, PRF was prepared by drawing the required amount of blood into a 10-mL test tube without an anticoagulant and centrifuged immediately using a table top centrifuge for 12 min at 571.54 g. The resultant product consisted of the following three layers: Acellular platelet poor plasma at the top of the tube; Fibrin clot (PRF) in the middle of the tube; and red blood corpuscles at the bottom of the tube.

Because of the absence of an anticoagulant, blood begins to coagulate as soon as it comes in contact with the glass surface. Therefore, for successful preparation of PRF, rapid blood collection and immediate centrifugation, before the clotting cascade is initiated, are absolutely essential. PRF was obtained in the form of a membrane by squeezing out the fluids in the fibrin clot. Tooth 47 was first anaesthetized with Lidocaine 2% and adrenaline 1/80 and isolated with a rubber dam. Pulpotomy was performed with a round bur in a high-speed handpiece with copious irrigation; coronal pulp tissue was removed to the level of pulp chamber floor. Haemostasis was achieved by irrigating the cavity with sterile saline and cotton pellets. The blood clot free pulpal wound was covered with a small piece of PRF. An approximately 2 mm thick layer of MTA (ProRoot; Dentsply

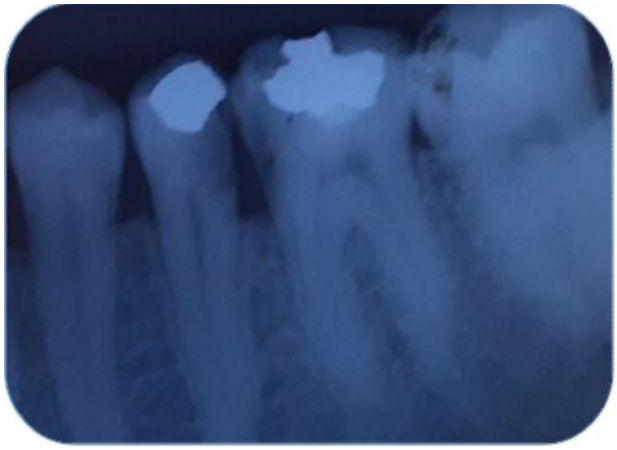

Fig 1. Pre operative radiograph

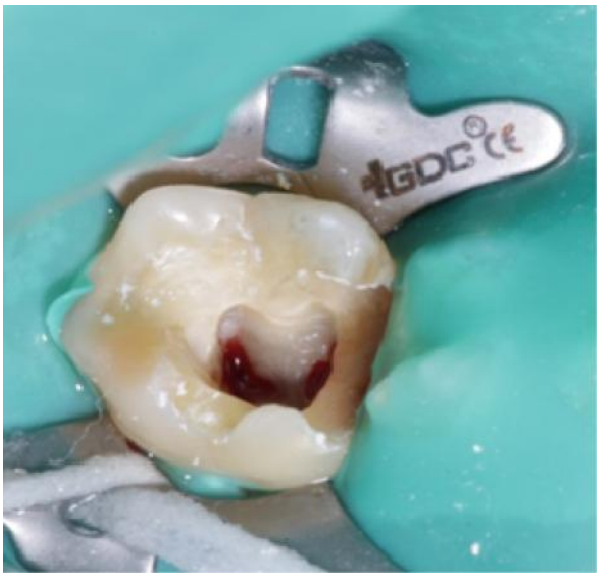

Fig 2. Access Opening Done

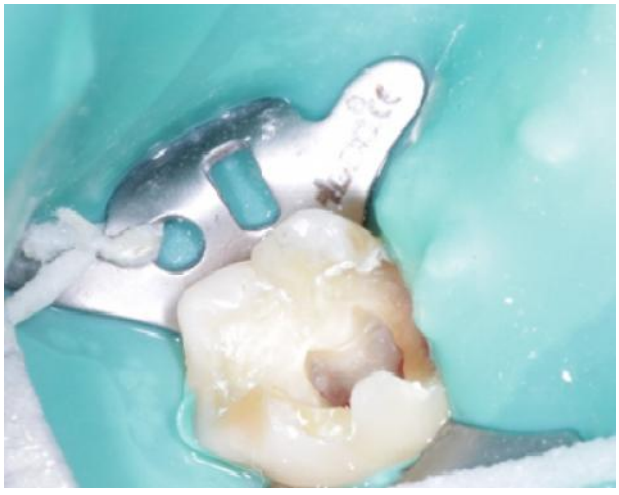

Fig 3: Bleeding Controlled

Tulsa Dental Specialty, Tulsa, OK, USA) was placed over the PRF and a 4mm temporary restoration was placed. An immediate postoperative radiograph was obtained. The patient was recalled next day for evaluation of postoperative pain if any. The patient had no pain or discomfort. At one week recall temporary restoration was replaced with composite.

Fig 4. PRF placed

Fig 5: MTA placed over PRF

Fig 6. Temporary Restoration placed

Fig 7. Composite Restoration

And at 6 months recall, the tooth responded positively to pulp tests, and radiographic examination revealed normal periodontal ligament space and trabecular bone pattern approaching normal. Tooth might be totally asymptomatic as patient has not reported for further follow up.

DISCUSSION

The aim behind pulpotomy procedures is based on the ability of the remaining radicular pulp to recover following the removal of the infected coronal pulp tissue and placement of a suitable medicament. Pulpotomy with PRF could be an alternate treatment to mineral trioxide aggregate or other materials in mature permanent teeth with pulpitis.[8] Platelet-rich fibrin (PRF) has been reported to be a promising agent for this purpose. Being strictly autologous which incorporating leukocytes, platelets, and has wide range of healing proteins in a dense fibrin matrix. PRF has three dimensional architecture which is used as an immune concentrate with a specific composition. [9]It also has a variety of growth factors such as platelet derived growth factor, transforming growth factor β1, and insulin like growth factor which exhibits variety of local properties such as cell migration, cell attachment, cell proliferation and cell differentiation.

CH and MTA have been the most commonly utilized pulpotomy agents for vital pulp therapy. However, owing to disadvantages such as degradation over time, like formation of tunnel defects beneath dentinal bridges, and poor sealing, CH is slowly losing its popularity as a first choice agent for pulpotomy. Recent publications reveal an acceptable clinical success rate of MTA pulpotomy. Issues have also been raised about the initial cytotoxicity and reduction in the size of pulp chamber due to the formation of reparative dentin deeper to CH or MTA. Pulpotomy with PRF could be an alternate treatment to mineral trioxide aggregate or other materials in mature permanent teeth with pulpitis.[8-12] The idea behind the pulpotomy therapy was to provide a good biological seal, because if further entry of bacteria is prevented into the exposed pulp tissue, it has an ability to heal with the formation of new dentinal bridge and the periapical tissues undergo regeneration. The success of the pulpotomy procedure depends on the right choice of the biomaterial in terms of its biocompatibility, sealing ability, ability to stimulate reparative dentin formation, and regenerative potential of the pulp.[12-15]

During the treatment procedure, the pulp should be free from bacteria and its toxins and preventing the invasion of bacteria into the pulp is the vital factor for favourable prognosis of this procedure. It can be achieved using rubber dam isolation which prevents the invasion of bacteria from the oral cavity and saliva. Provision of the double seal also prevents the bacterial leakage.[9] During the treatment procedure, the pulp should be free from bacteria and its toxins and preventing the invasion of bacteria into the pulp is the vital factor for favourable prognosis of this procedure. It can be achieved using rubber dam isolation which prevents the invasion of bacteria from the oral cavity and saliva. Provision of the double seal also prevents the bacterial leakage. [16]

Conclusion

The slow polymerizing potential of PRF and the fibrin technology accounts for a favourable physiologic structure to support healing. Growth factors can help in providing a blue print for tissue regeneration within tooth, thus helps in dental tissue repair. It can be concluded that there is a reasonable biological argument to carry out pulpotomy as a possible alternative treatment in mature permanent teeth with pulpitis. Further studies (histological and clinical) can add significant weight to this argument.

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