

Regenerative Endodontic Procedure Done Using Platelet-Rich Fibrin and Mineral Trioxide Aggregate in Traumatized Central Incisor – Case Report

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Abstract

The primary objective of vital pulp therapy is to preserve and maintain pulpal health in teeth exposed to caries, trauma, and restorative procedures. This kind of therapy is critical in immature permanent teeth that have not yet matured and have thin-walled roots with wide-open apices. This case shows the management of a young permanent maxillary central incisor with Ellis class IV fracture. The regenerative procedure was performed by endodontic treatment with mineral trioxide aggregate (MTA) and platelet-rich fibrin, and the tooth was restored using glass ionomer cement and composite. The patient was followed up on for a year.

Key words: Mineral trioxide aggregate, Open apex, Regenerative endodontics

INTRODUCTION

Treating necrotic immature teeth is difficult due to their thin dentinal walls and short roots, which render them more prone to fracture. Apexification is the preferred therapy, which involves promoting apical closure with calcium hydroxide or mineral trioxide aggregate (MTA).^[1,2] While apexification treats apical periodontitis and induces apical closure, allowing final root canal therapy to be conducted, it does not thicken the root walls or let the root continue to grow, leaving the tooth vulnerable to fracture.^[3] Regenerative treatments are now being resurrected as a new paradigm in conservative therapy. It was originally considered that rebuilding the necrotic pulp of an immature tooth with periapical periodontitis was impossible;

however, we now know that this may be accomplished in an appropriate medium using the technique described variously as “revascularization” or “revitalization”.^[4-6] Proper canal cleaning, a suitable matrix for new tissue ingrowth, and an effective seal for coronal access are critical for a satisfying outcome, not to mention the need for a supply of dental stem cells to effectively complete revascularization.^[7]

CASE REPORT

A 15-year-old girl reported to the department of conservative dentistry and endodontics with the chief complaint of pain in the upper left front tooth area for 20–25 days. The patient described a trauma that occurred because of an accident that led to a fracture of the tooth 8–9 years ago. On clinical examination, the pain was moderate, dull, localized, lasted minutes, was eased by medications, and there was slight discoloration in relation to 21. There was generalized fluorosis with a grade 5 score. Ellis class IV fracture in relation to 21 was the tentative diagnosis. An intraoral periapical (IOPA) radiograph was obtained, and in relation

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to 21, the cold test and electric pulp test revealed a negative response whereas 11 revealed a positive response. A pre-operative picture was taken [Figure 1]. On the radiograph [Figure 2], the pulp space was greater and the root dentin thickness and the crown root ratio were lesser than the neighboring central incisor; the diameter of the apex was around 1.5 mm which was measured with the help of vernier caliper. Pulp necrosis with symptomatic apical periodontitis and immature root apex in relation to 21 was the final diagnosis. There are several therapy methods accessible such as MTA apexification followed by endodontic treatment and prosthetic rehabilitation with all ceramic crown, MTA apexification followed by endodontic treatment and all ceramic veneers, MTA apexification followed by endodontic treatment and esthetic build-up with composite resin, apexogenesis with platelet-rich fibrin (PRF) and MTA followed by temporization and prosthetic rehabilitation with all ceramic crown, apexogenesis with PRF and MTA followed by all-ceramic veneers, and apexogenesis with PRF and MTA followed by esthetic build-up with composite resin. As a result, we chose the conservative therapy option which was apexogenesis with MTA employing PRF followed by esthetic build-up with composite resin in relation to 21.

Access opening of the tooth was done [Figure 3] under rubber dam isolation using an Endo-access bur (Dentsply, Tulsa Dental) and lignocaine with adrenaline (1:80000) (Aquacaine Plus, Aqua Fine Injecta Pvt. Ltd., Pune, India) was used. After that, working length determination was performed with the J hook technique, followed by chemo-mechanical preparation using a circumferential filing method until fresh dentinal shavings were obtained. Irrigation was done with 3% NaOCl (Mahavir Enterprise, Vadodara, India) followed by 17% EDTA (RC Help, Prime Dental Products Pvt. Ltd., Maharashtra, India) using a 23 G needle, and calcium hydroxide (RC Cal, Prime Dental Products Pvt. Ltd., Maharashtra, India) dressing was administered as an inter-appointment medicament, according to the American Association of Endodontists guidelines.^[8] The canal was extensively cleansed with 0.9% normal saline (Otsuka Pharmaceutical India Pvt. Ltd., India) in conjunction with ultrasonic agitation after 14 days. As a result, calcium hydroxide dressings were applied 3 times for 21 days. On the next appointment, the patient's blood was drawn and centrifuged to make PRF [Figure 4]. After



Figure 1: Pre-operative clinical photograph



Figure 3: Access opening



Figure 2: Pre-operative radiograph

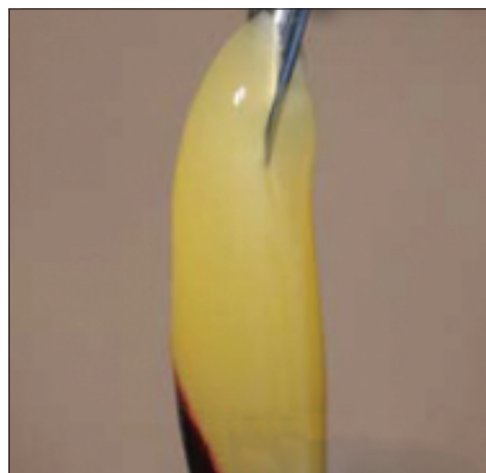


Figure 4: Platelet-rich fibrin membrane

that, bleeding was produced inside the canal using a K-file and halted. Following that, PRF was condensed to the level of the middle one-third of the canal, and a 3–4 mm layer of MTA (ProRootMTA, Dentsply, Tulsa Dental) was applied on top, followed by final repair using RMGIC (GC, GC America) and Composite (GC SolareX, GC America) [Figure 5]. The entire process was performed with a rubber dam isolation and a dental operating microscope^[3] (PRIMA, Labomed World).

Now that the patient desired cosmetic repair, an alginate impression was obtained and a cast was made. After that, the wax build-up and rubber base index were made. The following visit included composite build-up, finishing, and polishing [Figure 6]. Photographs and radiographs were obtained after treatment. The patient was recalled for additional follow-ups after 6 months [Figure 7] and 1 year [Figure 8].

DISCUSSION

The therapy for necrotic immature permanent teeth revascularization is not structured, and there is still

controversy about it. Following local anesthesia, the tooth is separated, accessible through a rubber dam, and disinfected with NaOCl and EDTA. Trevino *et al.* discovered that 17% EDTA improves SCAP survivability and helps them link to the root canal dentinal wall, allowing it to be employed in a revascularization irrigation approach.^[8]

Because the lesion was chronic due to a prolonged history of trauma, endodontic therapy on this incisor required multiple visits with calcium hydroxide dressing, resulting in better healing due to the bactericidal characteristics.^[9]

Because PRF possesses various scaffolding qualities, it is used as a scaffolding material in an immature tooth for pulpal regeneration and revitalization. Its advantages include ease of preparation and the absence of biochemical blood processing, making it autologous. For wound healing, PRF has a large slow sustained release of different important growth factors



Figure 5: Post-operative radiograph after mineral trioxide aggregate and composite



Figure 7: Post-operative radiograph after 6 months



Figure 6: Post-operative (after esthetic build-up)



Figure 8: Post-operative radiograph after 1 year

such as PDGF and TGF for at least 1 week and up to 28 days.^[10]

The primary goal of irritating the apex with a file is to cause a blood clot in the canal space, which then acts as a scaffold for the three-dimensional ingrowth of new tissue.^[8]

The subsequent radiographs indicated that many canal breaches had been filled. The particular mechanism for the calcification has not been established, and one of the issues of revascularization in necrotic young teeth is partial or entire obliteration of the pulp canal. The use of MTA, which has osteo-inductive qualities, may aid in the construction of bridges.^[8]

Based on the remaining sound tooth structure, an indirect ceramic crown would have been desired in this scenario, but owing to financial constraints, composite resin with 3D layering is the most suggested direct restorative treatment for the preservation of intact tooth structure.^[9]

CONCLUSION

Revascularization is more effective and conservative than apexification in the treatment of necrotic immature permanent teeth.

REFERENCES

1. Mendoza-Mendoza A, Biedma-Perea M, Iglesias-Linares A, Abalos-Labruzzi C, Solano-Mendoza B. Effect of mineral trioxide aggregate (MTA) pulpotomies in primary molars on their permanent tooth successors. *Am J Dent* 2014;27:268-72.
2. Kim DS, Park HJ, Yeom JH, Seo JS, Ryu GJ, Park KH, *et al.* Long-term follow-ups of revascularized immature necrotic teeth: Three case reports. *Int J Oral Sci* 2012;4:109-13.
3. Anamika T, Sathyanarayanan R. Endodontic management of tooth with open apex using MTA as apical barrier and platelet rich fibrin membrane as internal matrix: A case report. *J Sci Dent* 2014;4:46-52.
4. Ding RY, Cheung GS, Chen J, Yin XZ, Wang QQ, Zhang CF. Pulp revascularization of immature teeth with apical periodontitis: A clinical study. *J Endod* 2009;35:745-9.
5. Chen MH, Chen KL, Chen CA, Tayebaty F, Rosenberg PA, Lin LM. Responses of immature permanent teeth with infected necrotic pulp tissue and apical periodontitis/abscess to revascularization procedures. *Int Endod J* 2012;45:294-305.
6. Carmen L, Asunción M, Beatriz S, Rosa YV. Revascularization in immature permanent teeth with necrotic pulp and apical pathology: Case series. *Case Rep Dent* 2017;2017:3540159.
7. Gupta S, Sharma DK, Kaushik S, Agarwal V, Behera SS. Diagnosis, treatment planning and management of a patient undergoing orthodontic therapy with blunderbuss canals about multiple teeth by an endo-ortho interdisciplinary approach using PRF and MTA. *IP Indian J Conserv Endod* 2021;6:124-9.
8. American Association of Endodontists Clinical Consideration for a Regenerative Procedure. Available from: <https://f3f142zs0k2w1kg84k5p9i1o-wpengine.netdna-ssl.com/specialty/wp-content/uploads/sites/2/2021/08/clinicalconsiderationsapprovedbyrec062921.pdf> [Last accessed on 2021 Aug 15].
9. Dedania M, Shah N, Arora A, Bhadra D. Aesthetic remodelling of fractured tooth with supernumerary neighbours in midst of fluorosis-a case report. *Int J Adv Res Dev* 2018;3:267-70.
10. Shivashankar VY, Johns DA, Vidyath S, Kumar MR. Platelet-rich fibrin in the revitalization of the tooth with necrotic pulp and open apex. *J Conserv Dent* 2012;15:395.

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