CASE REPORT

A NOVEL APPROACH OF COMBINED VPT AND REP FOR THE TREATMENT OF A MATURE MANDIBULAR MOLAR HAVING SYMPTOMS INDICATIVE OF ACUTE IRREVERSIBLE PULPITIS: REPORT OF A CASE

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ABSTRACT

It has been seen that a multirooted tooth with symptoms indicative of acuteirreversible pulpitis may have different pulp status in individual roots.Vital Pulp Therapy (VPT) can be performed in the root/s with no bacterial invasion whereas pulp tissue may be regenerated in root/s with bacterial contamination or pulpal necrosis through Regenerative Endodontic Procedure (REP). REP alsohelps in elimination of signs and symptoms, healing of apical pathology along with regaining of vitality. Preservation of the remaining vital tissue and regeneration of the rest, which is irreversibly damaged is the ideal mode of treatment.

This case report discusses the management of a mature mandibular molar tooth with acute irreversible pulpitis and symptomatic apical periodontitis, by combined VPT and REP. The tooth was asymptomatic with radiological healing of apical periodontitis and positive response to pulp vitality tests.A followup of 18 month was done. With this combined therapy; proprioception, defense mechanism and hydration of the tooth could be maintained.

KEY WORDS

Acute irreversible pulpitis, VPT, REP

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INTRODUCTION

The most common cause of pulpal disease is dental caries. It has been shown that the bacterial invasion of pulp is limited to about 2mm from the point of exposure, and the entire pulp is not involved[1]. In multirooted tooth, when pulp is affected by caries, it is quite possible that in one root infection may have proceeded deeper even causing pulpal necrosis and the other root/s may remain unaffected. So, in such cases, it is possible to treat the multirooted tooth with a combination of Vital Pulp Therapy (VPT) using different biomaterial in the root/s with vital pulp tissue and Regenerative Endodontic Procedure(REP) in the root/swith infected or necrosed pulp tissue through the principle of tissue engineering[2].With this combination therapy, integrity of the vital pulp tissue will be maintained and new pulp tissue will regenerate in the other root/s, thus maintaining the vitality of the tooth. This case report deals with such combination therapy in a mandibular permanent molar tooth in which distal root was treated with VPT and the mesial root with REP and the tooth was kept under follow up for a period of 18 months.

CASE HISTORY

A 35-year-old male patient reported in the OPD of Conservative Dentistry and Endodontics department of Dr. R Ahmed Dental College and Hospital, Kolkata. The patient presented with pain on the lower left first molar. Pain was recent in origin, spontaneous and radiating in nature. The patient's medical history was noncontributory, and he had no known drug allergy.

Clinical examination revealed deep mesial proximal caries on lower left first molar(Fig.1.A). The tooth exhibited sensitivity to percussion. Periodontal probing and mobility were within normal limits. The tooth gave exaggerated response to cold test [Roeko endo-frost, Coltene, Germany] and electric pulp test (EPT) [Confident dental equipments, India] (Fig.1.B) when compared to contra lateral tooth(same EPT was used throughout the study and gradation of EPT up to 40 is considered normal). Periapical radiograph revealed caries

Fig1 (C).= Contralateral, EXP= Experimental) A. Pre opclinical photograph, B. EPT showing +VE response (Reading-#46 -14, #36 – 27),C. Pre-op IOPAR, D. Pre-op CBCT.

almost involving the mesial horn of pulp and there was widening of apical periodontal ligament space of distal root (Fig.1.C). CBCT was done to further reveal this pathology (Fig.1.D). Based on clinical and radiographic examination the involved tooth was diagnosed with irreversible pulpitis and symptomatic apical periodontitis.

MATERIALS AND METHODS

The tooth was anaesthetised with inferior alveolar nerve block using 2% lidocaine containing 1:100000 epinephrine. Rubber dam was applied, and access cavity was prepared. Coronal pulp was removed with a sharp spoon excavator. Hemostasis was attempted by the application of pressure with a cotton pellet moistened with 2.5% NaOCl (Prime Dental, India) for 2 min and repeated if required ; bleeding time was recorded[3]. It was found that the bleeding from the mesial canal stopped in 3-4 minutes and that from the distal canal was profuse and continued even after 10 minutes of application of pressure (Fig.2.A) indicating the presence of non-infected vital pulp in the mesial canals and deeper bacterial penetration in the distal canal[4]. So we decided to perform VPT on mesial root and REP on distal root.

Exposed pulp tissue in the mesial root were cleaned with 2.5% NaOCl and isotonic saline solution[2]. MTA [MTA-Angelus, Londrina PR, Brazil] of 2-3 thickness was placed directly on the orifice of the canals[5] (Fig.2.B). After confirming initial setting of MTA, a layer of RMGIC (GC Gold Label 2 LC) was placed over it (Fig.2.C). Distal canal was irrigated with 20ml 1.5% NaOCl for 5 minutes. Working length was estimated by using apex locater (Dentsply Propex Pixi Apex locater)and confirmed by using periapical radiograph (Fig.2.D). Minimal instrumentation was performed using hand files so that biofilm and necrosed pulp tissue (if any) were removed. Canal was dried with paper points. Calcium hydroxide (Ultracal XS of Ultradent, USA) was placed inside the canal. A sterile sponge was placed, and access cavity was sealed with Cavit (3M ESPE, Germany) (Fig.2.E)

On second appointment after 3 weeks, underlocal anaesthesia with 2% lidocaine and rubber dam isolation, Calcium hydroxide in the distal canal was removed by rinsing with isotonic saline. Irrigation

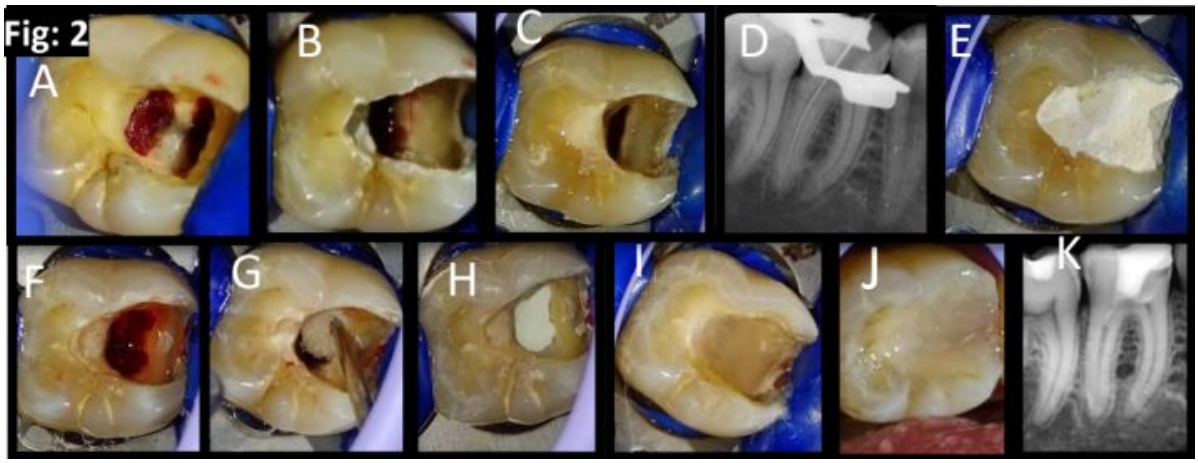

Fig.2. A. Bleeding arrested in mesial canals and persisted in distal canal, B. MTA placed over mesial canals, C. RMGIC over MTA, D. IOPAR -Working length-distal canal, E. Temporary restoration after first appointment, F. Bleeding induced from distal canal, G. collagen plug placed over blood clot, H. MTA placed over collagen plug, I. RMGIC liner placed above the MTA, J. Tooth restored with composite restoration, K. Post-op radiograph

	EPT		COLD TEST	PERI APICAL RADIOLUCENCY	
	# 36	#46		Area ($mm^{2)}$	HU
Pre-OP	14	27	Positive	3	498
1 month follow up	14	25	Positive	2	651
6 month follow up	14	23	Positive	2	738
9 month follow up	14	20	Positive	1	948
12 month follow up	14	19	Positive	1	1082
18 month follow up	14	17	Positive	0	1350

Table:1 Depicts a. The gradual shifting of EPT reading of Experimental tooth (#46) towards that of contralateral same tooth (#36), b. Healing of periapical lesion through reduction of periapical radiolucency and increase in bone density (HU).

was done with 20 mL 17% EDTA (Desmear, Anabond, India) for a period of 5 minutes followed by isotonic saline solution. Bleeding was induced by lacerating the apical tissues with a #20 precurved K-file to just below the level of the CEJ (Fig.2.F). Formation of blood clot was confirmed after 15 minutes. Collagen plug (Collacote, Integra Life Sciences) was placed on the top of the blood clot below the CEJ (Fig.2.G). 3 mm MTA was placed over collagen plug[6] (Fig 2.H). After verifying its setting, RMGIC was placed above it (Fig.2.I). The access cavity was restored with composite resin (Te-Econom Plus composite, Ivoclar, Vivadent, Liechtenstein) (Fig.2.J).Immediate post op IOPAR was taken (Fig 2.K). The patient was called for follow up visits at 1^{st}, 3^{rd},6^{th},12^{th} & 18^{th} month.

RESULT

In follow up visits, patient was assessed clinically and radiographically. There was no complaint of pain, swelling, discharging sinus, sensitivity due to cold or hot food substances. Tooth was not tender to percussion or palpation also. Pulp sensitivity test was positive to cold. EPT was showing readings- which were gradually shifting to that of contralateral same tooth (Table 1 and Figs-3A,4A,5A,6A7A). Radiograph revealed the gradual healing of peri apical radiolucency as evident through gradual elimination of radiolucency and increase in bone density (HU) with appearance of intact laminadura around distal root (Table 1 and Fig 3B & 3C, 4B & 4C,5B &5C,6B & 6C,7B & 7C).

DISCUSSION

The dental pulp is the most sensitive portion of the tooth which is protected from the oral environment by enamel and dentine. Apart from forming the tooth during childhood, an intact dental pulp could provide several defense mechanisms possibly preventing bacterial invasion, hence it is important to sustain an exposed pulp rather than meticulously replacing it with a synthetic root filling material. Selection of the precise treatment procedure primarily depends on diagnosis. Accurate diagnosis of pulpal pathology is only possible with histopathological examination[7].

Dummer et al stated that there is poor correlation between clinical symptoms and actual histologic status of the inflamed pulp and its healing potential. Based on only pulp test and symptoms, there is no cut off between what is actually reversible and what is not reversible[8].

According to Walid Lejri et al[9], color of bleeding on in-situ observation after access opening indicates the stage of pulp inflammation to some extent. A bright red bleeding that stops within 5 minutes indicates reversible pulpitis. Very abundant cherry red bleeding indicates irreversible symptomatic pulpitis while low cherry red bleeding and/or fibrous white aspect of the pulp indicates irreversible asymptomatic pulpitis.

Degree of pulpal bleeding upon pulp exposure also reflects the severity of pulpal inflammation. Profuse bleeding that is difficult to stop indicates that the pulp tissue is severely inflamed. Also, the "time to stop bleeding" parameter as a cutoff point can be used to discriminate between the reversible and irreversible condition of the pulp. If the bleeding could not be stopped within 5 to 10 minutes, the pulp was considered severely inflamed, and pulpectomy was recommended [10,11].

Inflammation of the pulp depends on the degree of caries exposure. In cases of carious pulp exposure, it is not uncommon to find healthy pulpal architecture further away from the carious exposure in the pulp chamber. It is not possible to determine the point at which pulpal inflammation become irreversible using available diagnostic tools or patient's symptoms[12].In a multirooted tooth radicular pulp tissue condition may vary between different roots. In such cases different endodontic procedure can be employed to treat individual roots based on insitu diagnosis[13]. One such conservative approach is a combination therapy involving vital pulp therapy and regenerative endodontic procedure. In this combined approach, VPT helps to preserve the healthy, reversibly inflamed pulp tissue, while REP helps to regenerate the lost vital tissues thus regaining functionality.

FOLLOW UP VISITS

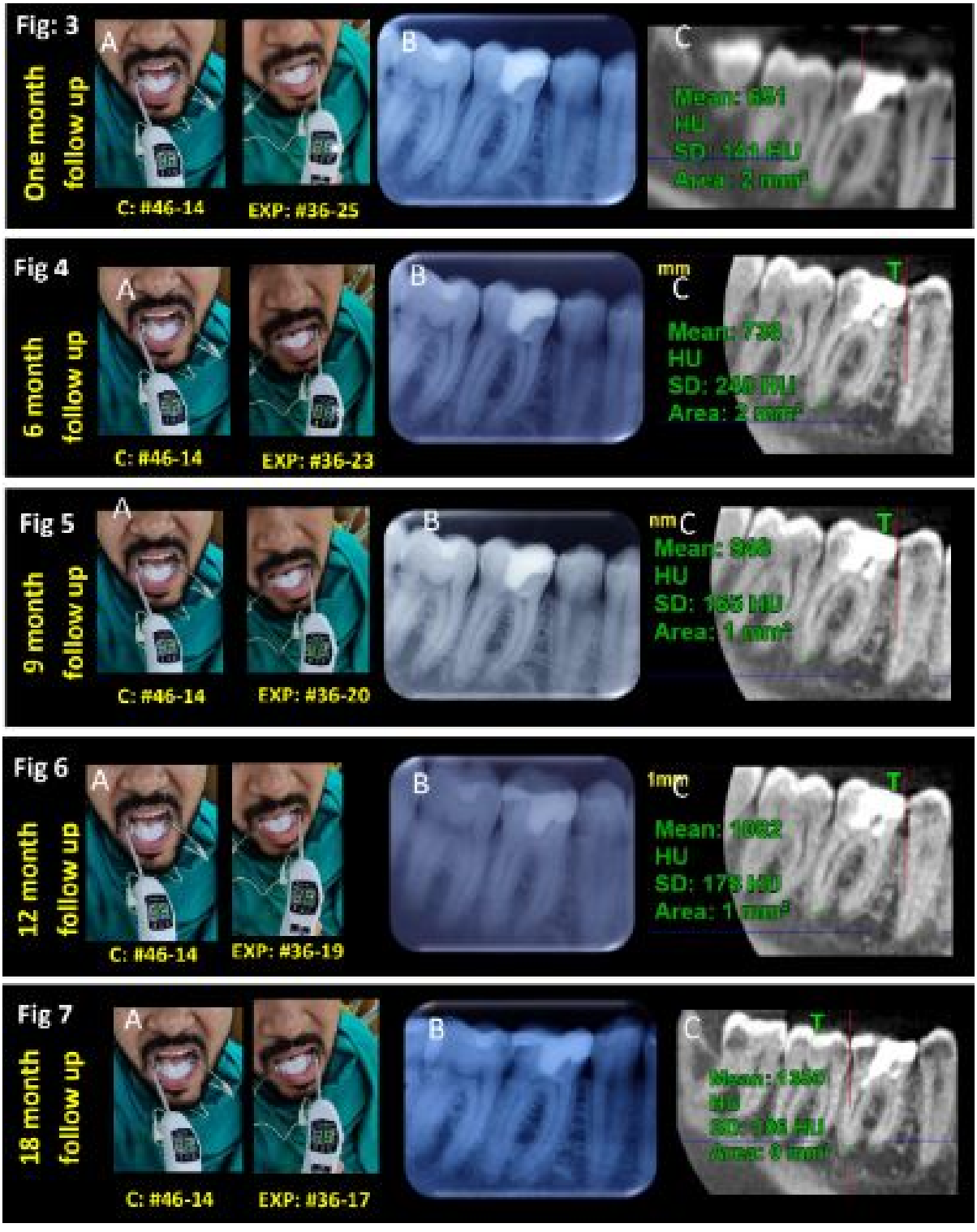

Fig: A - EPT readings,B-IOPAR, C-CBCT

There are few studies in literature which support the success of combination therapy for a multirooted tooth based on the inflammatory status of pulp in individual roots. In mature permanent mandibular molar teeth with symptomatic irreversible pulpitis linked with apical periodontitis in either of the roots, a combination of Non-Surgical Endodontic Therapy (NSET) and VPT appears to have a high success rate in young adults. As a result, this combination therapy could be a viable alternative to NSET in such situations[5].

A recent case report used a combination of revascularization and VPT to treat an immature permanent lower molar with pulp necrosis and chronic apical abscess. Based on insitu clinical diagnosis, VPT was performed in mesial root and REP in distal root. The tooth responded to cold test and EPT from 1st month follow up visit and continued root development was seen at 18-month follow-up[2].

In this case report we explored the possibility of combining REP and VPT for the treatment of a mature permanent mandibular molar tooth with different inflammatory status in the pulp of the individual roots, thereby maintaining vitality of the tooth.

CONCLUSION

A combined treatment procedure of VPT and REP may be considered in lower molar tooth with two roots depending on pulpal status in individual roots. However, a number of studies in greater number of teeth with longer follow up period will be required for a definite conclusion.

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