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Nonsurgical healing of large periapical lesion with nonsurgical root canal treatment and intracanal medicament of calcium hydroxide and chlorhexidine: a case report

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Abstract: *The present case report demonstrates the use of intracanal medicament of calcium hydroxide and 2% chlorhexidine for the treatment of nonsurgical healing of a large periapical lesion of a patient who was unable to report back for completion of treatment ; but despite of it showed healing of the lesion and tooth remaining largely asymptomatic even after 10 months of initiation of treatment.*

Keywords–*calcium hydroxide, chlorhexidine, healing, non-surgical root canal treatment, periapical lesion,*

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I. Introduction

Successful root canal therapy in cases of symptomatic teeth depends on the effective elimination of the focus of infection, efficacious cleaning shaping procedures, irrigation, intracanal medicament, and sealing of the root canal by three dimensional obturation and permanent restoration. With advances in the procedural and material aspects, use of a single appointment for completion of root canal therapy is preferred in most cases. But some cases still require placement of appropriate intracanal medicament for elimination of the bacteria and the biofilms. The materials that have been used conventionally as intracanal medicament include formocresol, camphorated monochlorophenol, calcium hydroxide, etc.

Calcium hydroxide has since long been used as an effective interappointment medicament due to its effective antimicrobial activity and detoxification of bacterial lipopolysaccharides. [1] Chlorhexidine in its various concentrations and formulations has been used in dentistry as an effective antiplaque agent and its efficacy as a therapeutic adjunct in periodontics is well documented. [2][3][4][5][6][7] Since two decades its use as an endodontic irrigant and an intracanal medicament been proposed. [8][9][10] The present case report describes the effective use of calcium hydroxide with chlorhexidine as an intracanal medicament in the management of large periapical lesion associated with anterior teeth.

II. CASE REPORT

A 27-year-old male patient reported to the Department of Conservative Dentistry & Endodontics, Government Dental College and Hospital, Aurangabad in August 2017, with the chief complaint of pain in the upper front tooth for 4-5 days. The pain was of intermittent dull type and the patient could tolerate the pain, hence did not require any medication. The patient gave a history of trauma in the region of the front teeth in childhood at the age of 14 years. He also gave a contributory history of intraoral swelling associated with two upper front teeth 1 month back for which he had consulted a dental practitioner. He was prescribed medications after which the swelling subsided.

On clinical examination, tooth no #21 & 22 showed brownish discoloration with no loss of coronal structure, suggestive of Ellis Class IV fracture of the tooth. There was no tenderness on vertical or horizontal

percussion with both teeth. On pulp vitality testing with digital electronic pulp tester (Digitest II, Parkell Inc. USA) tooth no #21 did not respond, whereas tooth no #22 showed delayed response as compared to adjacent and contralateral normal teeth suggestive of necrotic pulp with #21 & irreversible pulpitis with #22. An intraoral periapical radiograph and maxillary occlusal radiograph showed well defined non-corticated rounded radiolucency associated with tooth number #21 & 22 suggestive of well-defined periapical granuloma, abscess or a small cystic lesion which had lost its corticated borders due to infection. (Fig. 1 - preoperative IOPAR of tooth no # 21 & 22)

The treatment plan developed for this patient was non-surgical root canal treatment with tooth no # 21 and #22 followed by nonvital bleaching and long term follow up.

Access cavity preparation was completed under rubber dam isolation and after administration of local anesthetic, infraorbital block with 2% lignocaine hydrochloride with adrenaline 1:80000 (Lignox 2%, Warren, Indoco, Bangalore). Working length was determined with apex locator (Root ZX Mini, J Morita Corp. USA) and confirmed with radiograph. The canal configuration being the oval type, crown down technique using 2% hand files (Mani Medical India Private Limited) and circumferential filing for cleaning and shaping procedures was preferred over the contemporary tapered file systems. Copious irrigation with 3% sodium hypochlorite (Prime Dental Pvt. Ltd., Maharashtra, India) using syringe and side vent needle was done in between each instrumentation.

After completion of cleaning and shaping distilled water was used as an intermediate rinse before using 2% Chlorhexidine endodontic irrigant solution (Neelkanth Healthcare, Rajasthan, India) as the last irrigant. The intracanal medicament chosen for this patient was calcium hydroxide with chlorhexidine. Calcium hydroxide powder (Neelkanth Healthcare, Rajasthan, India) was mixed with 2% Chlorhexidine endodontic irrigant solution to form a paste like consistency, the root canals were dried using paper points and the paste was placed in the canal with the help of hand K files. The access cavities of both the teeth were sealed with approximately 3 – 4 mm thickness of the temporary restorative material (Temp Fill, Shivam Industries, India). The patient was prescribed tablet Diclomol (50/500 mg) (Win-Medicare Pvt. Ltd., Mumbai, India) to be taken twice daily for 2 days.

The patient was then discharged with instructions to report back in condition the pain aggravates, or there is swelling, dislodgement of temporary restoration or any other issue. The patient was recalled after 8 days for replacement of the intracanal medicament. After 8 days, the teeth were asymptomatic, and the interappointment period was uneventful. After removal of dressing, copious irrigation was done using sodium hypochlorite, distilled water and chlorhexidine, and the intracanal dressing of calcium hydroxide paste with chlorhexidine was repeated for another 8 days period. The patient was reappointed for obturation after 8 days.
But, due to personal reasons the patient was unable to report back for obturation of teeth. He reported back after 10 months of initiation of treatment that is in June 2018, to the department for continuation of treatment of the said teeth. As per history given by the patient, there were two episodes of mild pain with the teeth, for which he took analgesic prescribed to him at the first appointment, after which the pain subsided. Other than these two episodes of pain the teeth remained mainly asymptomatic. Clinical and radiographic evaluation was done to assess the present status of the teeth. Clinically the teeth were sound with no mobility, or pain on horizontal or vertical percussion. The mucosa with respect to tooth no # 21 & 22 was normal. The dressing given to the teeth had partially dislodged. The intraoral periapical radiograph of tooth no # 21 & 22 revealed appearance of the trabecular pattern of the bone and the decrease in the size of the radiolucency associated with the teeth. (Fig. 2 - IOPAR of tooth no # 21 & 22 taken after 10 months of initiation of treatment)

Since the dressing of both the teeth had partially dislodged, both the teeth were re-instrumented to one size larger than the cleaning & shaping done with the previous instrument size, irrigated copiously with sodium hypochlorite, distilled water and chlorhexidine, and the intracanal dressing of calcium hydroxide paste with chlorhexidine was given for 8 days period. In the subsequent appointment, evaluation of teeth was done to decide whether to obturate the teeth or no. Teeth were isolated, removal of dressing, copious irrigation and drying of canals was done using paper points (Dentsply Maillefer, United Kingdom). Obturation was done using Guttapercha points (Dentsply Maillefer, UK) no #45 as master gutta-percha point in tooth no #21 & no #30 as master gutta-percha point in tooth no #22. The remaining canal was filled with accessory points using the lateral condensation technique. The root canal sealer used was Sealapex (SybronEndo, United States of America).

The teeth were temporized instead of an immediate permanent restoration because the teeth were to be treated with bleaching procedures subsequently for treatment of discoloration. A postoperative radiograph was taken and showed acceptable obturation with both the teeth. (Fig. 3 - Post obturation IOPAR of tooth no # 21 & 22)

III. Discussion

Success of the root canal treatment largely depends on effectively debriding the root canal system with the help use of precise cleaning and shaping procedures, efficient and appropriate use of irrigants, use of intracanal medicament whenever required and lastly a 3-dimensional obturation of the root canal system to obtain a fluid tight seal followed by a permanent restoration. It has been proven time and again that all of these steps are equally important. After elimination of the focus of the infection, it is expected that the patient's immune system will respond favorably and initiate a healing process of the periapical lesion.

In the present case the patient was unable to report back for completion of obturation of teeth and subsequent permanent restoration. It has been documented that even the root filled teeth left open to the oral cavity without a proper sealing restoration can lead to recontamination of the root canal system within 30 days [11]. Hence, in the present case it was expected that the periapical lesion would not show any favorable healing in the absence of any intracanal medicament to prevent growth of the microbes. In spite of this, the patient responded favorably. The cleaning and shaping procedures play an important role in reducing the bacterial load in the canals, create a canal shape that is conducive for irrigation and in receiving the obturation material. But, it has also been known that the root canal system is an intricate system with many complexities not evident on conventional radiography. Hence supplementing the cleaning and shaping procedure with irrigation has become the protocol of root canal therapy.

The choice of irrigants and intracanal medicament in this particular patient was decided by the patient's clinical condition that is partially necrotic pulp tissue and presence of periapical infection. In recent times use of Chlorhexidine as an endodontic irrigant is favored because of its bacteriostatic/bactericidal, antifungal activity and property of substantivity. It has also been documented that its use as an irrigant delays the recontamination of the root canal system. However, it lacks tissue dissolving activity, and its activity on the biofilms is substantially less than that of sodium hypochlorite. [12] Hence, both these irrigant solutions were used in combination. When used together an orange-brown precipitate of parachloroaniline is formed in the canals. This precipitate has been found to be possibly carcinogenic, toxic, may hamper radicular sealing during obturation, and may result in tooth discoloration. [13] [14] To avoid this an intermediate rinse with distilled water is used. [15]

The intracanal medicament used in this case is a freshly prepared paste of calcium hydroxide and chlorhexidine. Calcium hydroxide, introduced to dentistry by Hermann in 1920 is a time-tested material in endodontics used for direct and indirect pulp capping, root resorptions, trauma cases, apexification procedures, weeping canals, perforations etc. It is a white odorless powder, with the chemical formula $Ca(OH)_2$, molecular weight of 74.08 and the approximate pH of pure powder is 12.5 – 12.8. Its antibacterial effect is because of release of the hydroxyl ions in an aqueous environment. Though it has been found to be an effective antibacterial and the only proven medicament having anti endotoxin effect, it has also been known that it is a poor antifungal agent and its activity against the biofilms is uncertain. Hence, it has been used with the combination of chlorhexidine to benefit from the effects of both the agents. [16]

The dentist can efficiently clean and disinfect the root canal but it is also important to note that the patient's response towards the procedure will determine the outcome of the treatment.

IV. Conclusion

Based on this case report it can be concluded that, a favorable response can be expected from the patient if efficient procedures are employed to eradicate the microbes from the root canal system. It also needs to be emphasized that increasing the patient awareness towards the dental treatment needs to be increased and imbibing that the reporting back to the dentist for completion of procedure even after the pain subsides is equally important for the long-time survival of the tooth.

V. FIGURES

Figure 1 – preoperative IOPAR of tooth no # 21 & 22

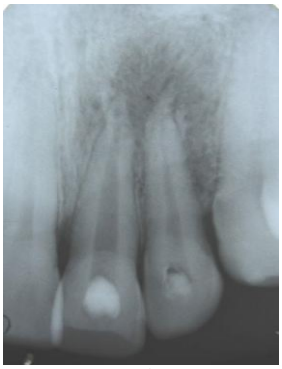

Figure 2 – IOPAR of tooth no # 21 & 22 taken after 10 months of initiation of treatment

Figure 3 – Post obturation IOPAR of tooth no # 21 & 22

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