Management of non vital open apex case using Biodentine as novel apical matrix. A 18 month follow up case report.

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INTRODUCTION

The completion of root development and closure of the apex occurs up to 3 years following eruption of the tooth.[1]During tooth development pulpal necrosis can occur due to trauma, caries or other pulpal pathosis, which lead to interruption in dentin formation and incomplete root formation.[2] Results in a short root with a wide canal that can be either divergent or parallel. Although the root canal therapy is the choice of treatment for a nonvital tooth, the above mentioned abnormal root anatomy does not permit a predictable outcome. Mainly, it is not feasible to achieve a good apical seal due to lack of constriction in the open apex and a good lateral seal due to an abnormal width and shape of the root canal.[3]

Apical root closure may results from apexification or apical bridge formation and is indicated when pulp of young permanent teeth has become necrotic.[4] Apexification is defined as 'a method to induce a calcified barrier in a root with an open apex or the continued apical development of an incomplete root in teeth with necrotic pulp'.[5]

In conventional apexification procedures, the most advocated medicament is calcium hydroxide. Kaiser first introduced the use of calcium hydroxide in 1964 and proposed that this material mixed with camphorated parachlorophenol induced the formation of a calcified barrier across the apex. Calcium hydroxide can be mixed with different substances such as camphorated mono chlorophenol, distilled water, saline, anesthetic solutions, chlorhexidene and cresatin to induce apical closure.[6] This apexification uses long-term calcium hydroxide dressings to promote the formation of a calcified barrier that an obturation material can be placed against.

In recent times, synthetic apical barriers have popularized as alternatives to the traditional calcium hydroxide apexification method.[7] A novel material biodentine was announced in September of 2010 and made available in January of 2011. Biodentine is similar to MTA in basic composition and can serve as its substitute.[8] The following two clinical cases reported successful apexification by a conventional approach of using calcium hydroxide induced apical barrier formation and a contemporary approach of artificial apical barrier by an apical plug of biodentine.[9]

The aim of the present article is to report the successful closure of root apex in a pulpless permanent maxillary central incisor with wide open apex using Biodentine as apical matrix.

CASE REPORT

A 17 Yrs. old female patient reported to department of conservative dentistry and endodontics, SDM College of Dental sciences ,Dharwad ,Karnataka, India with the chief complaint of fracture and discoloration in upper front teeth region.

HISTORY: There was history of trauma 8 yrs.back and discoloration since 4 yrs.

No other significant dental or medical history was found and no known drug allergies were noted.

CLINICAL EXAMINATION

- Elli's class IV fracture with 21(fig.1)
- Discoloration with 21
- Mild tenderness on percussion.
- Thermal testing (cold test) -Negative response.
- Electric pulp testing (Parkell Electronics Division, Farmingdale, NY, USA) of the involved tooth gave no response, whereas response was obtained on adjacent teeth.
- The tooth was not mobile and periodontal probing around the tooth was within physiological limits.

PRE OP RADIOGRAPH Reveals…wide open apex and periapical radiolucency with 21(fig.2)

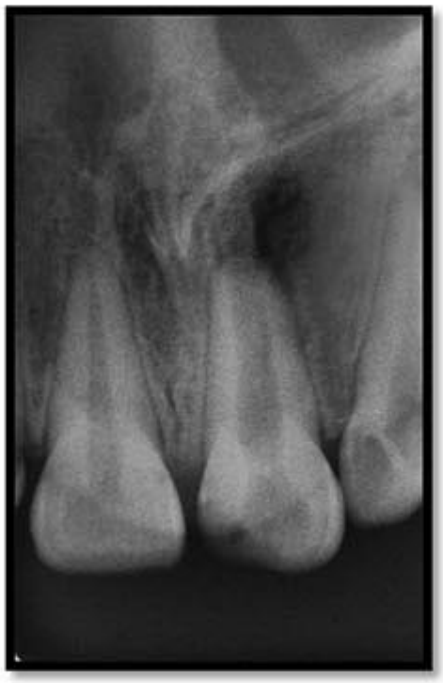

Fig. 1 Pre Op Radiograph

Fig. 2. Pre Op clinical photograph frontal view

DIAGNOSIS AND TREATMENT PLAN: Based on clinical and radiographic examination diagnosis of immature open apex with Elli's class IV fracture was made with 21.

Based on above finding present case report highlights the nonsurgical management of symptomatic teeth with immature apex and large periapical radiolucencies using Biodentine as apical matrix to promote periapical healing

PROCEDURE: Following rubber dam isolation, a conventional endodontic access cavity was established. A dental operating microscope (SEILER) was used to facilitate all endodontic procedures for this tooth. Working length was established radiographically 1 mm short of the radiographic apex with a #80 H-file (MANI, INC., Utsunomiya Tochigi, Japan) and was recorded for reference (Fig.3). The canal was gently instrumented till #100 H-files using a circumferential filing motion with copious irrigation with 3% sodium hypochlorite solution (Cmident, Cmident, New Delhi, India). The canal was dried with sterile paper points, and calcium hydroxide paste (Metapex, Meta Biomed Co. Ltd., Chungwon, Korea) was placed as an intracanal medicament and the access cavity was temporized with a cotton pellet and Cavit G (3M ESPE Dental Products, St. Paul, MN, USA) (Fig 4).

After 1 month, the tooth was again isolated under rubber dam and the calcium hydroxide was removed mechanically using hand H-files to the working length, while rinsing with alternating solutions of 3% sodium hypochlorite solution and 17% ethylenediaminetetraacetic acid . A final rinse with sterile saline was performed. After drying the canal with paper points, Biodentine was mixed according to the manufacturer's instructions. It was carried into the canal with the help of plastic carrying instrument and was condensed using pre-fitted hand pluggers. Several increments were required to form an apical plug of 5 mm thickness, which was confirmed radiographically (Fig 5).

Following the placement of Biodentine , butt-end of a paper point was used to clear out any excess material from the walls. After 12 minutes, the hardness of the Biodentine was examined using a plugger to confirm its set. The canal was obturated with conventional gutta-percha using roll cone technique and AH Plus resin sealer (Dentsply DeTrey, Konstanz, Germany).(fig.5)

Following which follow up was done at 3 month (fig.6),9 month(fig 7), 12 month (fig.8),and 18 month.(fig.9)

postoperative follow-up revealed absence of any clinical signs or symptoms of periradicular pathosis, resolution of periapical rarefaction, and a thin layer of calcific tissue formed apical to the Biodentine barrier.

FIG. 3 WORKING LENGTH DETERMINATION

FIG. 4 INTRACANAL MEDICAMENT (METAPEX)

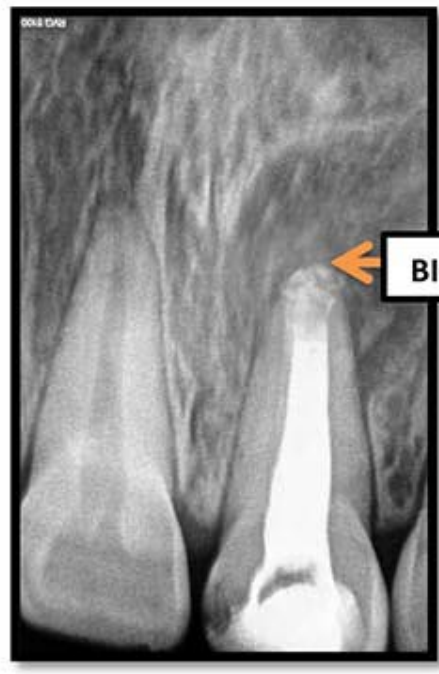

FIG. 5 APICAL PLUG OF BIODENTINE AND ROLL CONE OBTURATION

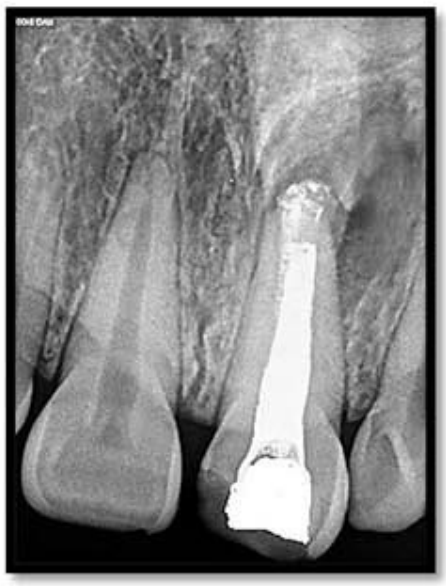

FIG. 6 3rd MONTH FOLLOW UP

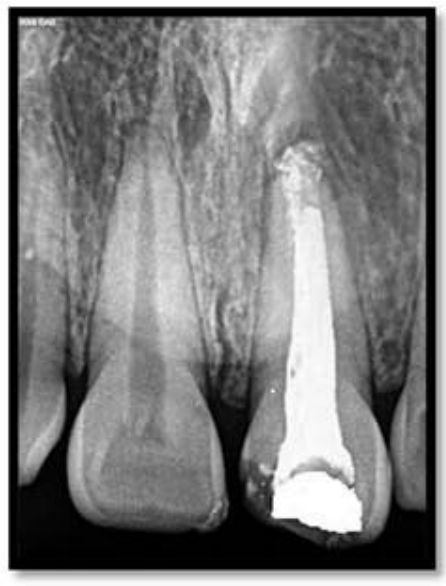

FIG. 7 9th MONTH FOLLOW UP

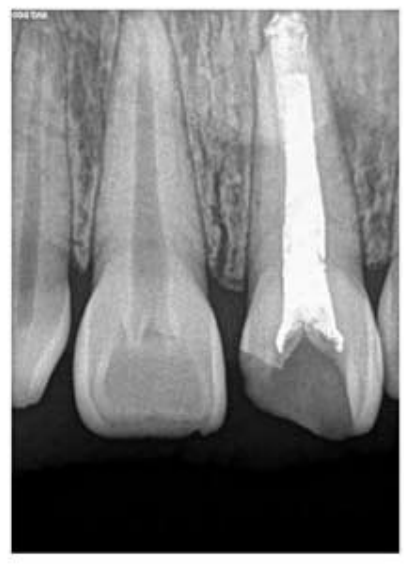

FIG. 8 12 th MONTH FOLLOW UP

After complete periapical healing and root closure, post space was prepared(fig.9) followed by cast post and core using direct wax pattern method.cast post and core was cemented and temporary crown was given.(fig 10 a,b)

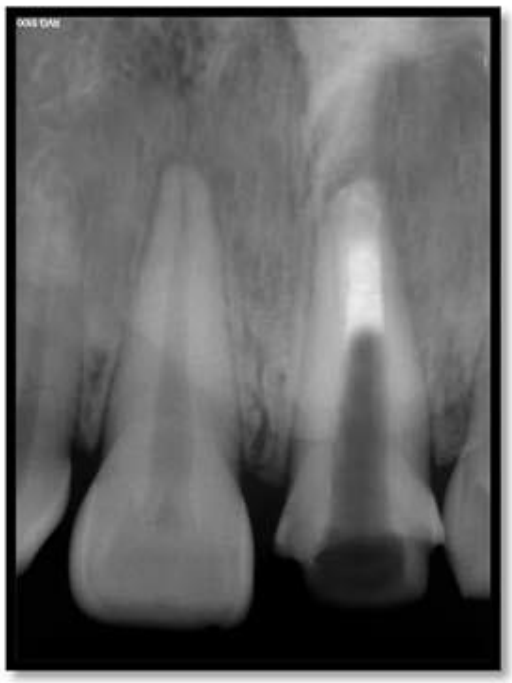

FIG. 9 18 MONTH FOLLOW UP and POST SPACE PREPARATION

FIG. 10 (a) CEMENTATION OF CAST POST AND CORE

FIG. 10 (b) CEMENTATION OF TEMPORARY CROWN

DICCUSSION

Immature permanent teeth pose special challenges during endodontic procedures not only because of the wide-open root apex but also because of the thin dentin walls.[10] Induction of apical healing, regardless of the material used, takes at least 3–4 months and require multiple appointments. [11] Patient compliance with regimen may be poor and many fail to return for scheduled visits. The temporary seal may fail resulting in reinfection and failure of treatment.

Morse et al define one-visit apexification as the non-surgical condensation of a biocompatible material into the apical end of the root canal.[12] The rationale is to establish an apical stop that would enable the root canal to be filled immediately. There is no attempt at root end closure. Rather an artificial apical stop is created. The advantages of using an apical plug include decreased number of patients visit, more predictable apical barrier formation, and reduced need for follow-up appointments. Biodentine with Active Biosilicate Technology was introduced by Septodont in September of 2010, as "a new class of dental material which could conciliate high mechanical properties with excellent biocompatibility, as well as bioactive behaviour" [13]

Biodentine is similar to MTA in its basic composition with the addition of setting accelerators which is calcium chloride not only results in fast setting but also improves the handling properties and strength. Calcium silicate cements have setting times in the range of several hours. Decreasing the setting time was achieved by a combination of different effects. First particle size greatly influences the setting time, since the higher the specific surface, the shorter the setting. Also, adding calcium chloride to the liquid component accelerates the system. Finally, the decrease of the liquid content in the system decreases the setting time to harden within 9-12 min. Biodentine is superior to MTA like its consistency is better suited to the clinical use, ensures a better handling and safety, does not require a two-step obturation and as the setting is faster, there is a lower risk of bacterial contamination.[8]

CONCLUSION

Single visit apexification with a novel biocompatible material like Biodentine is a new boon in effective management of teeth with open apex.[2] The positive clinical outcome in this case is encouraging for the use of Biodentine in immature teeth with necrotic pulp and wide-open apices.

REFERENCES:

1. Bhasker SN. Orban's oral histology and embryology. 11th ed. St. Louis: Mosby-Year Book; 1991. p382.
2. Nayak G and Hasan MF.Single visit apexification with Biodentine. *Restor Dent Endod* 2014;39(2):120-125)
3. P. Jain, C. Rita, R.S. Agarwal. SingleVisit Apexification Technique for Inducing Root-End Barrier Formation in Apical Closures: Report of Two Cases. People's Journal of Scientific Research.2014; Vol. 7(1), Jan.
4. Deepti A, Shifa S et. al.Apical closure of immature tooth:A rare case report.Ind. J Clin Pediatr dent.2008;1(1):54-57.
5. American Association of Endodontists: Glossary of endodontic terms. Available from: http://www.aae.org/glossary(updated 2013 Nov 6).
6. Shikha D, Mukunda KS, Arun A, Rao SM. Apexification: A review.J Dent Sci Res 2012;3:41-4.
7. Holden DT, Schwartz SA, Kirkpatrick TC, Schindler WG. Clinical outcomes of artificial root-end barriers with mineral trioxide aggregate in teeth with immature apices. J Endod 2008;34:812-7.
8. Pawar AM, Kokate SR, Shah RA. Management of a large periapical lesion using Biodentine TM as retrograde restoration with eighteen months evident follow up. J Conserv Dent 2013;16:573-5.
9. Pawar AM, Kokate SR, Pawar MG, Hegde VR. Apexification of non-vital central incisors with wide open apices using conventional approach of calcium hydroxide dressings and contemporary approach of artificial apical barrier by apical plug of biodentine: Report of two cases. Univ Res J Dent 2013;3:79-82.
10. Apexification: a review. Dent Traumatology 2005; 21: 1–8.
11. Treatment Options: Apexogenesis and Apexification; J Endod 2013;39:S26–S29
12. Morse DR, O"Larnic J, Yesilsoy C. Apexification: review of the literature. Quintessence Int 1990;21:589–98
13. Septodont Biodentine™ scientific file, 2010)