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Management of traumatised tooth with open apex using Biodentine as an apical matrix: a case report

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INTRODUCTION:

The completion of root development & closure of root apex occurs 3 years following the eruption of the tooth[1]

During tooth development pulpal necrosis can occur due to caries, trauma, pulpal pathosis which can interupt radicular dentin formation & an incomplete root formation resulting into short root with wide canal and open apex.

Although the root canal therapy is the choice of treatment for the non vital tooth, an immature tooth with pulpal necrosis imposes a challenge.

Mainly because it is difficult to achieve a good apical seal due to lack of apical constriction & good lateral seal due to abnormal width and the shape of the canal[2]

Apical root closure may result from apexification or apical bridge formation.[3]

Endodontic treatment options for such teeth consist of conventional apexification procedure with and without apical barriers.

Biodentine™ is new calcium silicate based cement that exhibits physical and chemical properties similar to those described for certain Portland cement derivatives.

The present case reports the successful closure of root apex in a pulpless permanent maxillary central incisor with open apex using Biodentine as an apical matrix.

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HISTORY:

A 28 year, male patient presented with a complaint of fractured & discoloured upper front tooth with the history of trauma 10 years back due to fall & discoloration noticed 5-6 years back, no relevant medical history was reported.

Clinical examination revealed

- ✓ Discolouration with 21
- ✓ Elli's class IV fracture with 21
- ✓ No tenderness on percussion
- ✓ Thermal test (Heat) negative response
- ✓ Electric pulp testing- involved tooth gave no response whereas response was obtained on the adjacent tooth
- ✓ Periodontal probing: within normal limits & tooth was not mobile
- ✓ No signs of extraoral or intraoral swelling was observed

PREOPERATIVE ASSESSMENT

Preoperative Radiograph

Preoperative clinical photographs

DIAGNOSIS & TREATMENT PLAN:

Based on clinical and radiographic examination diagnosis of immature open apex with Elli's class IV fracture was made with 21

Treatment of apexification using biodentine followed by endodontic treatment and full coverage restoration was planed

CASE DESCRIPTION

Consent was obtained from the patient, following rubber dam isolation conventional endodontic access was gained.

The working length was established 1 mm short of the radiographic apex using # 30 k file.

The canal was gently instrumented till #80 H file using circumferential filing motion with copious irrigation with 3% sodium hypochlorite.

The canal was thoroughly dried with paper points.

Calcium hydroxide was placed as an intracanal medicament and the access cavity was sealed.

The tooth was isolated under rubber dam, calcium hydroxide was removed with H file to working length, while rinsing after alternating solutions of Sodium Hypochlorite & EDTA.A final rinse of normal saline was performed.

After drying the with paper points Biodentine was mixed following manufacturers instructions.

The MTA carrier was used to carry the mixed material to the canal apex using a pre-fitted stopper 3 mm short of working length & condensed using the but end of paper points.

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Biodentine

Following the placement a radiograph was taken before the material did set to ensure the correct placement of the material

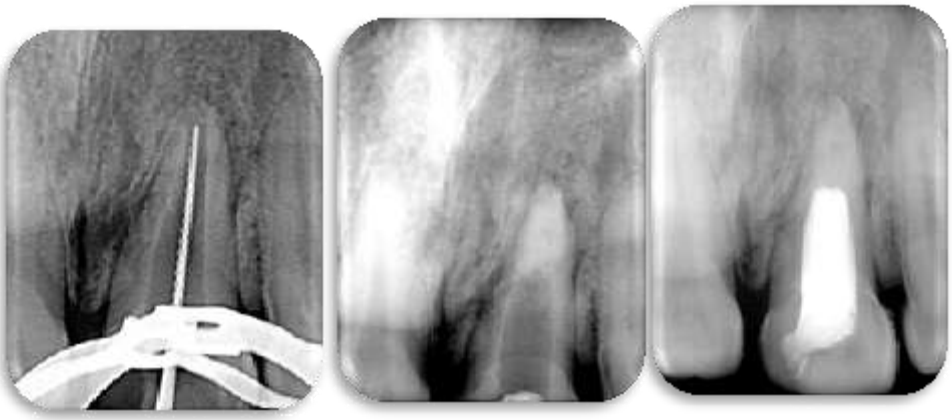
The but end of the paper points were used to clear the walls.

The hardness of biodentine was examined with the plugger to confirm the set.

The canal was obturated using Gutta percha with cold lateral condensation technique & Sealapex root canal sealer.

The access cavity was sealed with GIC.

Full coverage restoration was given.



Working length determination Placement of apical biomatrix Obturation

Preoperative & immediate post operative Clinical photograph and radiographs

6 MONTH FOLLOW UP: CLINICAL & RADIOGRAPHIC IMAGES

DISCUSSION

Immature permanent teeth pose a special challenge during Endodontic procedures not only because of wide open apex but also because of thin dentinal walls[4]

In the conventional procedure the apical induction of barrier takes long time and require multiple visits,

Patient compliance may be poor in such regimen & many fail to return on scheduled visits

Morse et al define one visit apexification as the non surgical condensation of biocompatible material into apical end of the root canal[5]

The rationale is to establish apical stop that would enable the root canal to be filled immediately.

The advantages of using an apical plug includes decreased number of patient visits, more predictable apical barrier formation and reduced need for follow up appointments & reduced risk of bacterial contamination due to loss of coronal seal between the appointments.

Mineral trioxide aggregate (MTA) was the first material to be used to induce apical third barrier in single visit apexification procedures.

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 & strength, whereas MTA has setting time over several hours.

1-Short setting time

2-Greater push out bond strength over MTA (Agarwal et al 2013)

3-Blood contamination has no effect on push out bond strength of Biodentine (Agarwal et al 2013)

4-Biodentine shows a considerable performance even after contamination with the endodontic irrigants like sodium hypochlorite, chlorhexidine or saline (Gunesar et al 2013)

5-No risk of coronal tooth discoloration

CONCLUSION:

Apexification in one step - using an apical plug of biologically active cement - Biodentine can be considered a predictable treatment and can prove efficient alternative to traditional ($CaOH_2$)method and mineral trioxide aggregate apexification

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