Bioactive Closure of Non Vital Immature Tooth with Open Apices - A Contemporary Approach

Shikha Jaiswal, Sachin Gupta, Shefali Sawani, Jatin Gupta
Department of Conservative Dentistry & Endodontics, Subharti Dental College, Meerut (UP)

(Received: October, 2013)  (Accepted: June, 2014)

ABSTRACT:
Non vital immature teeth with open apex and thin dentinal walls are difficult to treat via conventional endodontic therapy. Calcium hydroxide has been conventionally used in such cases for a long time. However, due to its various shortcomings, MTA (Mineral Trioxide Aggregate) became the material of choice. A new bioactive dentin replacement material, Biodentine, can act as an ideal dentin substitute in such cases. This case report presents the use of Biodentine as an obturating, reinforcing and apexification material to restore traumatized teeth and re-establish patient’s aesthetics.

KEY WORDS: Apexification, bioactive material, open apex.

INTRODUCTION:
Trauma to the permanent teeth is common with crown fracture presenting almost 92% of all traumatic injuries of the permanent teeth and the anterior incisors are most often affected because of the anterior position of the maxilla and tooth protrusion.[1] Trauma to the tooth during the stage of root development not only results in loss of aesthetics but also causes incomplete closure of apex leading to loss of apical constriction. A further challenge in such cases is flared root canals and thin dentinal walls compromising fracture strength of tooth. Calcium hydroxide and MTA have long been used as material for apexification in such cases.[2] However, the newly introduced bioactive dentin substitute commercially available as Biodentine (Septodont, St. Maur-des-Fossés, France) is a promising material which acts as a dentin substitute thus achieving root canal reinforcement as well. It is an interesting alternative to conventional calcium hydroxide-based materials. It is a cement for stimulating hard tissue formation, i.e the formation of reactive or reparative (tertiary) dentin.[3] This case report presents the use of Biodentine as an obturating, reinforcing and apexification material to restore traumatized teeth and re-establish patient’s esthetics.

CASE REPORT:
A 25 years old male patient reported to the Department of Conservative dentistry and Endodontics of Subharti Dental College, Meerut (Uttar Pradesh) with the chief complaint of severe pus discharge and pain in upper front teeth region since two months. The patient gave the history of previous dental treatment at a local clinic in the upper teeth two years back, subsequent to which he had developed a gingival swelling [Figure 1]. On clinical examination, it was found that there was fibromatous enlargement of gingival tissues due to faulty prosthesis in 11, 21 region which was retained with a faulty splint. Further, radiographic examination revealed a large blunderbuss canal with periapical radiolucency in relation to maxillary left and right central incisors [Figure 2].

A diagnosis of fibromatous and inflamed gingival tissue due to faulty prosthesis in 11, 21 region and pulp necrosis in 11, 12, 21 and 22 was established. Considering the amount of surgical trauma, age and apprehensiveness of the patient, nonsurgical treatment was decided. The treatment plan was decided and explained to the patient. Removal of faulty prosthesis would be followed by root canal treatment of 11, 12,
21 and 22 and Biodentine would be used to achieve apexification and complete obturation of the canals in 11 and 21.

Faulty restorations in maxillary right and left central incisors were removed in the first appointment after which gingival swelling subsided [Figure 3]. The patient was recalled after one week and caries and undermined enamel was removed with round diamond bur. Access cavity preparation was done with the help of Endo access bur (DENTSPLY Maillefer Ballaigues, Switzerland) and working length was determined with ISO size # 80 K-file (DENTSPLY Maillefer Ballaigues, Switzerland) (Figure 4). Canal dedridement and cleaning was performed using circumferential filing technique with ISO # 90 K-file with copious irrigation using 5.25 % sodium hypochlorite and saline simultaneously. Canal was dried using sterile paper points (DENTSPLY Maillefer Ballaigues, Switzerland) and calcium hydroxide dressing was placed. On recall, after one week, healing of sinus tract could be seen. At this appointment, gingivoplasty was carried out to contour the fibromatous gingival tissues. Calcium hydroxide was placed for subsequent visits scheduled at one week interval. On re-accessing, the canal was dry with no evidence of exudate.

The canal was irrigated and dried using sterile absorbent points. A 4 mm diameter of absorbable gelatine sponge (Abgel) was inserted in the canal with
the help of pluggers to serve as an apical barrier. A slight discomfort shown by the patient revealed that it had reached the periapical tissues [Figure 5].

Subsequently, Biodentine (Septodont, St. Maur-des-Fossés, France) was mixed to a paste like consistency in a triturator and delivered to the canal using amalgam carrier and condensed with Schilder’s pluggers. An post operative radiograph was taken and the access cavity was closed with temporary filling material IRM (Caulk/DENTSPLY, Milford, DE, USA).

On recall after 24 hours, the patient reported having no pain or discomfort in the treated tooth. The temporary filling was removed and the set of Biodentine (Septodont, St. Maur-des-Fossés, France) was evaluated. Root canal treatment of maxillary right and left lateral incisors were also carried out simultaneously.

Further steps of crown build–up and tooth preparation were carried out which was followed by impression making, fabrication and luting of metal ceramic crowns thus restoring back the esthetics of the patient [Figure 6 & Figure 7]. A six month recall showed an asymptomatic tooth and a healed periapical lesion [Figure 8].

**DISCUSSION:**
Calcium hydroxide has been used in the conventional apexification technique to create an environment conducive to the formation of an apical barrier formed by osteo-cementum tissue at the end of the root canal in teeth with open apices. However, it has certain drawbacks like the long duration of therapy (3 to 21 months), susceptibility of the tooth to fracture.
during treatment, and susceptibility of the root canal to reinfection due to a temporary seal in the tooth.\[4\]

With the introduction of MTA, a more convenient and less time taking technique by placing a plug of MTA in apical 4 mm of the root canal was conceptualized\[5\]. But, the question of root canal reinforcement still lingered, since the rest of the canal was obturated by root canal filling material. With the introduction of Biodentine (Septodont, St. Maur-des-Fossés, France), a dentin replacement material, apexification and root canal reinforcement could be achieved simultaneously. Biodentine (Septodont, St. Maur-des-Fossés, France) is an innovative bioactive and a biocompatible material which provides a good biological seal and excellent marginal adaptation, a high degree of biocompatibility with a reasonable setting time (about 12 min) which is less than MTA (4 hrs.)\[6\]. It has an elastic modulus of 22GPa which is very close to that of dentin 18.5GPa.\[7\]

Biodentine consists of powder mainly containing tricalcium and dicalcium silicate, the principal component of Portland cement, as well as calcium carbonate with zirconium dioxide serving as a contrast medium.\[8\] The liquid consists of calcium chloride in aqueous solution with an admixture of polycarboxylate. The components are mixed in a triturator for 30 seconds and can be used for 12 minutes.\[9\] During the setting of Biodentine, the released calcium ions get incorporated into the adjacent dentin thus forming an integrated apatite layer. This Biodentine - dentin interaction (bio-mineralization) leads to active chemical bonding without any interphase thus acting like a monoblock.\[10\]

Biodentine has varied applications in the field of endodontics. It has a place in managing perforations of root canals, pulp floor, internal and external resorption and in serving as a retrograde root canal filling material\[11\]. Many studies have been performed to demonstrate the bioactivity of Biodentine in clinical situations because it was able to stimulate initiation and development of mineralization.\[3\] Studies have been done in which Biodentine has been used as an endodontic repair material.\[12\] Studies on management of large periapical lesion using Biodentine as retrograde restoration showed positive response in treatment outcome.\[13\]

The only limitation of Biodentine is that it cannot be used in the presence of moisture. Hence, proper isolation is mandatory while using Biodentine. In the present case, the use of Abgel as apical matrix not only served in limiting the Biodentine to root canal but also provided an isolated environment for setting of Biodentine.\[11\]

CONCLUSION:

Biodentine, a bioactive – biomimetic material, shows promising use for apexification, obturation and reinforcement in management of immature teeth with open apex while serving as a monoblock. However, in such cases, long term follow up is necessary to ensure and evaluate success.

REFERENCES:

11. Wongkornchaowalit N, Lertchirakarn V. Setting time and flowability of accelerated Portland cement mixed


Cite this article as: Jaiswal S, Gupta S, Sawani S, Gupta J. Bioactive Closure of Non Vital Immature Tooth with Open Apices. PJSR 2014:7(2):70-74.

Source of Support: Nil. Conflict of Interest: None declared.