Case Report

Biodentine for apical barrier for immature necrotic permanent teeth: A case report

Neha Aggarwal¹, Karan Bansal²,*, B P Bansal¹

¹Bansal Family Dentals, Bathinda, Punjab, India
²Dept. of Conservative Dentistry and Endodontics, Adesh Institute of Dental Sciences and Research, Bathinda, Punjab

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1. Introduction

Traumatic injury to an immature permanent tooth often leads to loss of pulpal vitality and retarded root formation. Therefore, management of such teeth endodontically in young children poses a great challenge. These type of teeth with divergent walls and broad open apex make biomechanical debridement and obturation difficult [Felippe W, 2006].¹ In such cases, the root apex can be closed either by apexification or dentin bridge formation. Apexification is a method to induce a calcified barrier in a root with incomplete formation or open apex of a tooth with necrotic pulp.[American Association of Endodontists 2003].² Various techniques and materials are available for the apexification process. The most commonly advocated medicament is calcium hydroxide. The approximate time to form the hard tissue barrier is about 6 to 24 months. Although the technique is popular and efficient due to certain limitations like delayed treatment time, chances of re-infection and potential risk of tooth fracture, [Ghaeth HY, 2012]³ a newer material, Mineral Trioxide Aggregate (MTA) was introduced.

MTA, through the formation of an artificial apical barrier technique is used for the apexification process. According to the Literature MTA is biocompatible with cementogenic properties and superior sealing ability. But it also has certain drawbacks like questionable antimicrobial activity, difficulty to handle, potential for tooth discoloration.[Torabinejad M, 2010]⁴ To overcome the drawbacks associated with MTA, most recently a novel calcium silicate based material, Biodentine (Septodont, Saint–Maur– Des-Fosses, France) was introduced in 2010. The material hoped to present a bioactive and biocompatible replacement for dentine.

2. Case Report

1. An 8-year old male patient reported with a grossly carious left mandibular first molar tooth.
2. Patient gave a history of continuous, dull throbbing pain since 4 days.
3. Tooth was tender on percussion.
4. Treatment procedure: After giving local anaesthesia with 2% lidocaine and 1:200,000 adrenaline.

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¹Corresponding author.
E-mail address: bansalfamilydentals@gmail.com (K. Bansal).

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Endodontic access opening was done using endo-access bur.

5. Biomechanical Preparation was done with alternate irrigation of 5.25% sodium hypochlorite and saline and gently filing with size 30K file. Then, the root canals were dried with size 30 paper points.

6. Apical plug placement and obturation: The Biodentine capsule was gently tapped on a hard surface (for diffusing powder) and five drops of liquid were poured in the capsule, which was then placed in a triturator for 30 seconds.

7. The Biodentine mixture prepared was then inserted into the canals using a sterile amalgam carrier and gently adapted to the apical portion of the canals using hand placers.

8. Final placement of Biodentine apical plug was assessed radiographically. After checking the setting of Biodentine, the canals were obturated with gutta-percha and sealer Apexit Plus. Six months follow up showed healing periapical lesion and an asymptomatic patient. Periapical radiolucency was seen to be reduced at six months follow up.

3. Discussion

The goal of apexification is to obtain an apical barrier to prevent the passage of toxins and bacteria into periapical tissues from the root canal. Technically, this barrier is required to allow compaction of root filling material,[Komabayashi T, 2008].

MTA as an apexitification material has the ability to induce hard tissue formation with a higher degree of structural integrity when used as a apical plug. Studies have shown higher clinical and radiographic success rates.[Parirokh M, 2010].

Recently, Biodentine with Active Biosilicate Technology, was introduced by Septodont in 2010, as “a new class of dental material which could conciliate high mechanical properties with excellent biocompatibility and bioactivity.

Usually calcium silicate based cements have longer setting times (i.e., in hours). But Biodentine requires significantly less time (setting time of 12 min) as compared to MTA (2 hours and 45 min). For the apexification process, this can be ascribed to higher specific surface size of particles adding calcium chloride as an accelerator to liquid phase and decrease in liquid content. In apexitification, shorter setting time eliminates the need for two step obturation as in MTA and also minimizes the risk of bacterial recontamination.[Bachoo IK, 2013].

Studies suggest that high alkaline pH and release of calcium ions are required for a material to stimulate mineralization in the process of hard tissue healing. Further an in vitro study was done to evaluate pH and calcium ion release of materials and it had found the results to be similar for both MTA and Biodentine when used as a root end filling material. [Sulthan IR, 2012] In another study, the uptake of calcium and silicon released into root canal dentine was found to be higher for Biodentine as compared to MTA.[Han L, 2011].

4. Conclusion

Biodentine has bioactive and mechanical properties similar to that of natural dentine. The material has greater stability, less soluble, hydrophilic, needs much less time for setting and more overcreates a tighter seal. Thus Biodentine a newer endodontic biomaterial has advantages over MTA in the management of teeth with open apex.

5. Source of Funding

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6. Conflict of Interest

None.

References


Author biography

Neha Aggarwal Private Practitioner

Karan Bansal Senior Lecturer

B P Bansal Private Practitioner