International Journal of Oral Health Dentistry 2020;6(3):214–215

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International Journal of Oral Health Dentistry

Journal homepage: www.ipinnovative.com

Case Report

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

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ARTICLE INFO

Article history:
Received 18-07-2020
Accepted 29-07-2020
Available online 10-10-2020

Keywords:
Apexification
Apical barrier
Biodentine
Periradicular healing

ABSTRACT

An immature tooth with pulpal necrosis and periapical pathology imposes a great difficulty to the endodontist. 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. This article demonstrates the use of the newer material, Biodentine as an apical matrix barrier in root end apexification procedure. This case report presents apexification and successful healing with the use of Biodentine as an apical barrier matrix.

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 iscalcium 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 reinfection 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 continous, dull throbbing pain since 4 days.
3. Tooth was tender on percussion.
4. Treatment procedure: After giving local anaesthesia with 2% lidocaine and 1:2,00,000 adrenaline.

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https://doi.org/10.18231/j.ijohd.2020.044

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 pluggers.
8. Final placement of Biodentine apical plug was assessed radiographically. After checking the setting of Biodentine, the canals were obturated with guttapercha 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].[5] MTA as an apexification 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].[6]

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 biocompatibilityand 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 apexification, shorter setting time eliminates the need for two step obturation as in MTA and also minimizes the risk of bacterial recontamination.[Bachoo IK, 2013].[7]

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 invitro 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 Biodentione when used as a root end filling material. [Sulthan IR, 2012][8]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].[9]

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 Biodentineas a newer endodontic biomaterial has advantages over MTA in the management of teeth with open apex.

5. Source of Funding

None.

6. Conflict of Interest

None.

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Cite this article: Aggarwal N, Bansal K, Bansal BP. Biodentine for apical barrier for immature necrotic permanent teeth: A case report. *Int J Oral Health Dent* 2020;6(3):214-215.