

A Case Report

Better outcome in pulpotomy on primary molar with Biodentine

*Asma sultana^a, Fahd A.A Karim^b, (Major) Md. Abdul Hannan Sheikh^c, Mohammad Wahiduzzaman^d, Md.Shamsul Alam^e, Mahabubul Hossain^f,

a. Assistant professor and Head, Department of Science of Dental Materials, Update Dental College & Hospital.

b. Assistant Professor Dept of Conservative dentistry & Endodontics, Update Dental College & Hospital.

c. Graded Specialist in Conservative Dentistry & Endodontics, CMH, Savar Cantt.

d. FCPS trainee, Department of Conservative Dentistry & Endodontics, BSMMU, Dhaka.

e. Professor & Chairman, Dept of Conservative Dentistry & Endodontics, Dean faculty of Dentistry, BSMMU, Dhaka.

f. Lecturer, Department of Conservative Dentistry & Endodontics, Update Dental College & Hospital.

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ABSTRACT

Aim: The primary objective of any pulp therapy is to maintain the integrity and health of a tooth and its supporting tissue as well as to maintain arch length and space maintenance. The aim of this case is to a probate and popularizes the technique of vital pulpotomy in primary teeth with biodentin.

Introduction:

Preservation of primary teeth before the eruption of permanent teeth is desirable since they help to determine the shape of dental arches, maintain the space between teeth, prevent detrimental tongue, speech habits, preserve aesthetics and maintain chewing function. However there are varying opinions about how to manage primary teeth when the pulp has been exposed by caries or through mechanical procedures.¹ The possible choices for conservative pulp therapy are direct pulp capping, pulpotomy, pulpectomy. A pulpotomy is based on the hypothesis that the inflammation and reduced vascularization, caused by bacterial invasion, are confined to the coronal pulp, while the root pulp remains vital.²

Correspondence to:

Dr. Asma Sultana BDS, DDS

Assistant Professor & Head
Dept. of Science of Dental materials
Update Dental College and Hospital, Dhaka
Mobile: 01817515508
Email:asmakarim08@gmail.com

CASE:

A 6 years old girl came to BSMMU with complaints of pain for 2 days on her right lower jaw. Clinical examination illustrated extensive deep caries in the mandibular right deciduous molar. The tooth was sensitive to cold. No visible swelling and sinus tract was found. Radiological examination revealed that the tooth has no periapical pathology. The case was diagnosed as a case of acute reversible pulpitis due to caries. Treatment procedure was planned pulpotomy on lower right 2nd primary molar.



Fig1: Deep caries on 2nd primary molar .



Fig2: Pre operative X-ray showing carious lesion mesially involving the pulp.

The methodology is one visit and was performed following this clinical protocol. Disinfection of the operative field and proper sterilization of instruments was ensured. After proper isolation of teeth and with the use of saliva ejector inferior alveolar nerve block (2% lidocaine) as local anesthesia was administration for effective pain control. Firstly , surrounding caries was removed and the pulp chamber was accessed with bur No 330 high speed hand piece with water spray. Following removal of the coronal pulp with an sterile excavator, pulp chamber rinsed with normal saline, homeostasis was obtained by slightly moistened sterile cotton pellets soaked in saline solution for 2-3 minutes. Mix biodentine according to manufacturer's directions to a paste-like consistency, fill the chamber and packing was done gently over amputated pulp orifice. The material applied deep within the cavity with amalgam carrier and compacted using cotton pellets. Finally the tooth was restored with glassionomer base and composite filling. Post operative radiograph will be taken.



Fig3: Access to pulp chamber with High speed hand piece no 330 bur.



Fig4:Removal of coronal pulp and Homeo stasis obtained using moistened cotton pellet



Fig5: Mixed biodentine to a paste like consistency of biodentine



Fig6: Aapplication



Fig7: Fill the chamber with biodentine.



Fig8:Application of GIC base over biodentine.



Fig:9 Acid etching of the tooth surface.



Fig:10 Composite application to restore the cavity.



Fig:UV light curing of composite resin.



Fig: After curing of composite



Fig:10 Final polishing and finishing of composite restoration.



Fig: Post operative radiograph showing radiopacity (due to biodentine , GIC and Composite) on the crown area .

Patient was recalled every 1 months, 3 months, 6 months, 9 months and 12 months interval. After 1 year tooth was functional with no signs and symptoms both clinically and radiologically.



Fig: 1 month follow up.



Fig: 3months follow up



Fig : 6 months follow



Fig: 1 year follow up

Discussion:

Pulpotomy technique basically consists of removing the coronal pulp and fixing the radicular pulp with a medicament. It is the most widely accepted clinical procedure for treating primary teeth with coronal pulp inflammation caused by caries with no involvement of the radicular pulp. Over the years, many different medicaments, pulp dressings, and techniques have been used in pulp therapy procedures. Formocresol, ferric sulfate, calcium hydroxide, glutaraldehyde, mineral trioxide aggregate, laser therapy, and electro surgery have all been used with varying degrees of success.³ The most widely used medicament in North America and the United Kingdom is formocresol.^{4,5} It has been described as the gold standard of pulp therapy.⁶ However, there have been significant concerns for the past 25 years surrounding the use of formocresol as a pulpotomy medicament.⁷ More insistently, the current studies present information and guidelines for limitation on formocresol technique for vital amputation because of the evidence gained from animal testing that mutagenic, carcinogenic, immunogenic and toxicity potential of formaldehyde.^{8, 9, 10,11} and the World Health Organization classified formocresol as a known carcinogen.¹² As the debate continues, it would behoove dental professionals to search out a reliable biocompatible medicament or technique for vital pulp therapy. Mineral trioxide aggregate (MTA) has been documented extensively and is a viable option for a biocompatible material for pulp therapy.^{13,14,15,16,17} During the past several years, special attention has been paid to MTA usage in endodontic treatment of

permanent teeth^{17, 18, 19, 20,21} as well as probable alternative of formocresol in primary teeth vital primary teeth.^{22, 23,24,25,26} But there are some shortcoming of MTA which are difficult handling, long setting time, and potential discoloration. Portland cement (PC) has a similar composition and biologic effect to MTA, but needs further investigation before it can be used in dentistry.^{27,28}

Recently, with improvement of medicaments, that are not only biocompatible, but also bioinductive, the focus has been directed from preservation and conservation to regeneration of the remaining pulp tissue.^{24,25,29} Calcium silicate-based material, which called Biodentine® is a new option composed of tricalcium silicate that has been described as a dentin replacement material. It has properties similar to PC and MTA,^{30,31} Biodentine has the potential to induce apposition of reactionary dentin by stimulating odontoblasts and reparative dentin by induction of cell differentiation.^{15,32} The pH of Biodentine is very high (pH = 12), giving it bacteriostatic properties. It also has the ability to form a good marginal seal. Finally, Biodentine handles with a creamy, rather than sandy, texture and it sets completely within 12 minutes.³³ This material is new biologically active cement which has dentine-like mechanical properties. Unlike other Portland cement-based products, it is sufficiently stable so that it can be used both for pulp protection and temporary fillings.³⁴ The manufacturer claimed about the biocompatibility and the bioactivity of the material, which is important when used as indirect and direct pulp capping and pulpotomy. Furthermore, it preserves pulp vitality and promotes its healing process. British Journal of Medicine & Medical Research, assessed the biological effects of Biodentine for use in pulp-capping treatment, on pseudo-odontoblastic (MDPC-23) and pulp (Od-21) cells. Secondly, the same authors evaluated the effects of Biodentine and MTA on gene expression in cultured spheroids. They

concluded that Biodentine and MTA may modify the proliferation of pulp cell lines.³⁵

According to the manufacturer, Biodentine consists of a powder in a capsule and liquid in a pipette. The powder mainly contains tricalcium and dicalcium silicate, the principal component of Portland cement, as well as calcium carbonate. Zirconium dioxide serves as contrast medium. The liquid consists of calcium chloride in aqueous solution with an admixture of polycarboxylate.

Biodentine was shown to be biocompatible, i.e. it does not damage pulpal cells in vitro or in vivo, and is capable of stimulating tertiary dentin formation. Hard tissue formation is seen both after indirect and direct capping with Biodentine. Compared the biocompatibility of Biodentine with that of MTA and a hardening calcium hydroxide. They reported that Biodentine is biocompatible.³¹ The bioactivity of this material, demonstrating the formation of hydroxyl apatite when immersed in phosphate solution.³⁶ Bioactivity of it is confined by studying its effects on pulp progenitor cells activation, differentiation and dentine regeneration in human tooth cultures. They concluded that Biodentine is stimulating dentine regeneration by inducing odontoblast differentiation from pulp progenitor cells.³⁷ The capacity of Biodentine to induce reparative dentin synthesis by modulating pulp cells to secrete transforming growth factor-beta 1 (TGF- β 1) and stimulate human dental pulp mineralization.³⁸ Histologically, the bioactive tricalcium silicate demonstrated the ability to induce odontoblast differentiation from pulp progenitor cells. The resulting mineralized matrix had the molecular characteristics of dentine. Biodentine is stronger mechanically, less soluble and produces tighter seals. This qualifies it for avoiding three major drawbacks of calcium hydroxide, i.e. material resorption, mechanical instability and the resultant failure of preventing microleakages.. When used as a dentine replacement material in the sandwich

technique overlaid with composite, significant leakage occurred at the dentine to material interface. On the other hand materials based on glass ionomer cement were etched successfully and no chemical and physical changes or micro-leakage were detected when the materials were used as bases under composite restorations. The micro-hardness of all the materials was unaffected by etching. During the setting phase of Biodentine, calcium hydroxide ions are released from the cement. This results in a pH of about 12.5 and a basification of the surroundings. This high pH inhibits the growth of microorganisms and can disinfect the dentine.³⁹

CONCLUSIONS:

Biodentine is a clinically practical material for vital pulp therapy in primary molars. It holds promise for clinical dental procedures as a biocompatible, bioactive and easily handled product with short setting time comparison with other similar materials. Due to this major advantages and appreciable properties and ability to achieve biomimetic mineralisation, biodentine has great potential to revolutionise the management of affected tooth in the operative dentistry. Biodentine pulpotomy is a simple technique for reliable biocompatible vital pulp procedure. So this study was an attempt to evaluate biodentin as a reliable pulpotomy agent in future. As more research is performed regarding this interesting alternative to MTA, we will provide with more reliable data and more confidently implement of Biodentine into routine clinical applications in future.

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