Case report

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Direct pulp capping with Biodentine – case reports

Emilia Karova

Department of Conservative Dentistry, Faculty of Dental Medicine,

Medical University, Sofia, Bulgaria

Abstract

Direct pulp capping is a conservative, biologically acceptable and reliable method of preserving the vitality of the exposed pulp. It can successfully be considered as an alternative treatment to pulpectomy. Biodentine is a biocermic material preferred for its bioactive nature, excellent adhesion to the underlying dentin, low degree of solubility and very good physical and handling qualities. The teeth in the presented clinical cases remained asymptomatic, without radiographic changes and with normal EPT values.

Keywords: Biodentine, direct pulp capping, vital pulp therapy

Introduction

Modern endodontic treatment has a more conservative approach to dental pulp, claiming that its vitality can be preserved by applying the achievements of material science. The modifications of treatment protocols meet patients' expectations for conservation of pulp tissue and improve the long-term prognosis of the cases.

Treatment of deep carious lesions of permanent teeth sometimes results in dental pulp exposure. Literature data are still controversial concerning the choice of a proper treatment method (1, 2), although pulpectomy is still considered to be with the most predictable outcome (3, 4). However, the survival rate of endodontically treated teeth is lower compared to that of vital teeth, especially in molars (5).

Vital pulp therapy, namely direct pulp capping, is recommended in cases with pulp exposure due to trauma, iatrogenic damage during excavation of carious tissues or in teeth with signs of irreversible pulpitis.(6 , 7) It is preferable to perform it in younger patients, due to the higher plastic and healing capacity of the pulp. (8)

Preservation of the reversibly inflamed tissue and its coverage with a capping material are accepted as critical for dental pulp healing. (9)
Recently, new biological approaches to pulp capping have become possible with the manufacturing of bioceramic materials. The case prognosis was improved due to their bioactive and biocompatible nature. Capsules of Biodentine appeared on the market in 2010, after the MTA cement has already been introduced. Direct contact of this highly alkaline material with the vital tissue causes local pulp necrosis, reduces inflammation and protects the pulp from bacterial infection (10). The dentin-cement interface is sealed with the released calcium and silicon ions and forms a mineral-infiltrated zone. Thanks to the active mineralization, reactionary and reparative dentin synthesis is induced. A dentin bridge is formed in the area of contact with the pulp.(11)
Biodentine is claimed to have better physical and handling qualities compared to MTA cement. (12) It demonstrates a lower degree of solubility in comparison with the bioaggregate. (13)

Case Description

The initial and late clinical findings of four cases are presented after one year of follow-up.

Case 1
A 36-yr-old male patient came to the practice with complaints of food impaction between teeth 17 and 18. An asymptomatic distal carious lesion was found on tooth 17, with grey-colored soft carious tissue. (Fig. 1) After the removal of the decayed tissue, communication with the pulp chamber of 1 mm was established, probing of dentin provoked sharp pain. The EPT value was 37 μA, the radiographic appearance was normal.

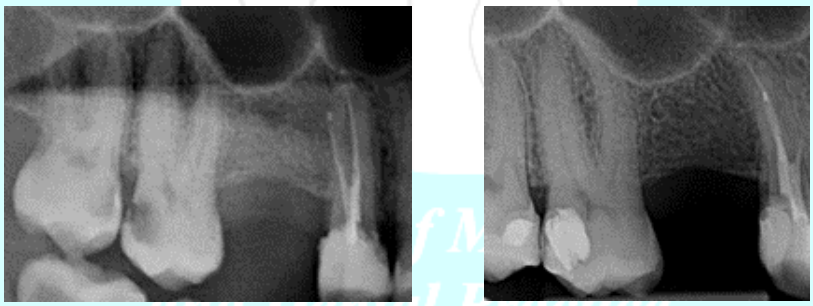

Fig. 1 Case 1 – initially and after 1 year

Case 2 and 3
A 28-yr-old female patient complained of aesthetic problems on tooth 15 and discomfort on tooth 47 during mastication. The examination revealed mesial proximal caries on tooth 15 and distal-occlusal one - on tooth 47, both with signs of an acute carious lesion. When probing the dentin, 1 mm communication with the pulp was established, the tissue was at the level of dentin with a normal color. The EPT was 26 μA for tooth 15 and 34 μA for tooth 47. No radiographic changes were detected.

Case 4
A 25-yr-old female visited the practice with complaints of a broken distal surface of tooth 46. The lesion was deep, in close contact with the pulp, the carious tissue was wet and soft. After removal of the decayed tissue, communication with the pulp chamber was established between 0.5-1 mm in size. The dentin surface had the characteristics of demineralized tissue. The tooth was vital (EPT=30 μA), with no periapical lesions.

Fig.2 Case 2-4 after 1 year follow-up

Biodentine was used to fill all cavities and remained in place for two weeks. Absence of complaints, normal EPT values and radiographic findings were prerequisites to complete treatment with a composite restoration over the layer of the pulp capping agent.

The patients were followed for 1 year. All teeth were asymptomatic, with preserved normal EPT values, without radiographic changes. (Fig. 1 , 2) No leakage was observed on the tooth-restoration interface.

Discussion

A thorough clinical examination of the patient and proper case selection mainly affect the treatment outcome and the success of the vital pulp therapy. Evaluation of the progress of inflammation is one of the main difficulties in the diagnostic process, since there is a lack of reliable clinical findings with which to register and measure it. Some of the authors assume that the degree of pulpal bleeding and the time required to control hemorrhage are sufficiently effective tools for assessment the state of the of pulp.(8)

The selected cases are diagnosed based on a comprehensive medical history combined with the recorded clinical signs of pain, clinical examination, radiography and electric pulp tests as the most common diagnostic protocol. (14, 15) Biodentine was preferred as the capping material not only for its bioactive nature, but for its excellent adhesion to the underlying dentin and sealing properties superior to MTA. (12, 16) Due to the lower water content, the material is less porous than MTA (12), thus expected to enable less leakage to the pulp tissue. The larger the pore diameter and the probability of penetration of microorganisms, the worse the treatment outcome. (12) Microleakage of the pulp capping material and restoration, not the type of material, is the most critical factor for a good long-term treatment prognosis. (17, 18)

The cases were followed for a year, and the decision for treatment success was based on the absence of pain or other complaints or discomfort, preserved periapical health on radiograph, and maintained pulpal vitality. The characteristics studied corresponded to the routine protocol for evaluation of treatment outcome based on clinical and radiographic assessment. (19, 20)

The literature is inconclusive regarding the importance of a formed dentinal bridge to successful treatment. Some authors find it as a prerequisite for healing (21), while others claim that most often its structure is porous and poorly mineralized, and in addition, there are certain limitations in its accurate radiographic assessment. (22- 24) According to them, any case can be considered a success if the tooth is still vital and asymptomatic, as ours were.

Conclusion

Direct pulp capping with Biodentine is a conservative, biologically acceptable and reliable method of preserving the vitality of the exposed pulp. It can successfully be considered as an alternative treatment to pulpectomy.

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Corresponding author:

Emilia Karova, PhD
1 blv. " Georgi Sofiiski" Faculty of Dental Medicine
1431 Sofia, Bulgaria
e-mail: e.karova@fdm.mu-sofia.bg

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