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Deep restoration with bioceramic cement: from the pulp floor to top of the cavity

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Carious lesions in the root region are a major challenge in daily clinical practice. In addition being difficult to detect (diagnosis is often a radiographic finding), they are also very challenging due to their proximity to the pulp tissue and the difficulty of access for restorative procedures.

Biodentine^M is a calcium silicate-based material that has, among its main properties, bioactivity, compressive strength, and short setting time. These qualities make it possible to use Biodentine^M as a one-step filler in the case of conservative treatments of the pulp, with or without exposure.^{1,2,3}

Unlike MTA, the indications of which are more focused on endodontics, Biodentine[™] has demonstrated proven results in pulp regeneration.⁴ When compared to glass ionomers, Biodentine[™] is more resistant and bioactive.³ The latter characteristic is not found in GICs, which are not indicated for placement directly on the pulp without another material as a liner or base, such as calcium hydroxide or MTA.^{5,6,7,8,9} Moreover, Biodentine[™] does not cause discoloration of tooth structure like MTA does.¹⁰ Thus, it is an excellent option for cases of deep cavities, even those with direct pulp involvement. This article aims to show some of the characteristics and indications of Biodentine[™] through a clinical case report.

Case Report

A 77-year-old Caucasian patient presented to the dental clinic after five years without dental care. The clinical findings showed significant bone loss, chronic periodontitis, and loss of some teeth that stabilized the occlusion. The patient reported cold sensitivity in tooth #46, especially when ingesting liquids.

Periapical X-ray confirmed the findings of the clinical examination and root caries was also detected in the distal root of tooth #46, which answered positively to the sensitivity test (Fig.1-2).

The treatment plan began with a focus on returning the patient to adequate periodontal health. In a subsequent session, with improved condition of the periodontium, the restoration of tooth #46 was performed. Under block anesthesia of right inferior alveolar nerve and rubber dam isolation, the amalgam restoration was completely removed and access to the caries cavity obtained (Fig. 3-5). Despite the proximity to the pulp tissue, no exposure occurred, and the class II cavity was fully restored with Biodentine™ (Fig. 6-8).

At two months' follow-up, no symptoms were reported, no periapical lesion was observed radiographically, and the clinical examination showed normal vitality (Fig. 9-10). Thus, it was decided to perform the definitive restoration, leaving Biodentine[™] as the definitive base.

The Biodentine[™] material was partially removed and a resin composite filling placed over it (Fig. 11). Selective etching of enamel was done, followed by the application

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Fig. 1: Initial clinical situation.



Fig. 4: Septomatrix in position.



Fig. 2: Initial X-ray.



Fig. 5: Cavity deep.



Fig. 3: Class II cavity prepared.



Fig. 6: Biodentine[™] applied in a Bio Bulk-Fill approach.

of an adhesive system (Palfique Bond[®], Tokuyama) (Fig. 12-13). After light-curing, the matrix system (SeptoMatrix, Septodont) was set and a large matrix with a soft ring was used for a better contour and proximal contact point (Fig. 14). The restoration was started in the distal portion, changing the class II cavity into a class I cavity (Fig. 15). Finally, the occlusal face was completed using Palfique LX5[®] (Tokuyama) composite (Fig. 16). After light-curing, glycerin gel was applied to allow better photo-activation of the surface layer. The restoration was then finished and polished, before removing the rubber dam and checking occlusion (Fig. 17).

Important observations

Firstly, it was decided not to remove the amalgam restoration on the mesial face because, although the amalgam corrosion had stained the tooth structure, the restoration did not harm the health of the tooth. It was felt that removal could cause more aggravation to the pulp tissue and consequent loss of pulp vitality.

With regard to the periodontium, the subgingival treatment had the desired effect within two months. The occlusal adjustment allowed for a decrease in the mobility of two teeth that had previously displayed increased mobility due to vertical bone loss.

Discussion

Caries lesions close to the pulp are a challenge to both diagnose and access in our daily practice, as demonstrated in our reported case. Indirect pulp capping is a procedure that aims to preserve pulp vitality by avoiding endodontic treatment.^(5,6) Different materials have been used for indirect pulp capping over the years. Pastes based on calcium hydroxide, glass ionomer, and MTA are presented in several studies as options for this treatment.^(5,6,78) However, the more effective materials in terms of bioactivity (MTA) do not have enough resistance to fill the entire cavity like Biodentine[™], which can be used as a single material to bulk-fill a cavity from pulp to crown for up to six months. In the present case, Biodentine[™] remained for a period of two months, which was enough time for the signs and symptoms to resolve and a definitive restoration to be placed.

Conclusion

Biodentine[™] is an excellent option for restoring teeth with deep cavities, with or without pulp exposure. Important properties such as bioactivity, resistance, and short setting time, in addition to excellent plasticity, allow Biodentine[™] to be easily placed in more challenging cases of difficult access and close pulp proximity, as reported in this clinical case.

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Fig. 7: Clinical situation after 12 minutes and the removal of the matrix.



Fig. 10: Biodentine[™] restoration after 2 months.



Fig. 13: Adhesive application.



Fig. 16: Immediate finished restoration.

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Fig. 8: Clinical situation after the removal of the rubber dam.



Fig. 11: Removal of the external part of Biodentine™.



Fig. 14: Placement of a matrix system (Septomatrix, Septodont).



Fig. 17: Clinical situation after finishing and polishing.

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Fig. 9: Follow-up X-ray 2 months postoperatively.



Fig. 12: Selective etching of enamel.



Fig. 15: Reconstruction of the distal wall with composite.

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