

Retreatment of Central Incisor with Iatrogenic Damage Using Biodentine with Anatomical Fiber Post and Direct Composite Resin Restoration: A Case Report

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Abstract

Keywords

- ▶ retreatment
- ▶ iatrogenic access
- ▶ anatomical fiber post
- ▶ direct resin composite
- ▶ Biodentine

Endodontic retreatment is a procedure performed on a tooth with previously endodontic treated whose need requires further endodontic treatment to achieve a successful result. The iatrogenic damage can occur when opening the access cavity and may affect root canal wall structures. Biodentine has a similar compressive strength range to natural dentine and can serve as a substitute for damaged dentin. The wide root canal accompanied with minimum remaining tooth structure is restored with an anatomical or custom fiber post to provide retention for the restoration. A 20-year-old female presented with a chief complaint wanted to restore her upper anterior tooth region. The patient had come to a dentist before but the treatment had not finished. Radiographic examination indicated iatrogenic damage which may have happened during access cavity preparation. Endodontic retreatment using biodentine and anatomic fiber post demonstrated excellent and promising clinical performance over an evaluation period of 6 months.

Introduction

Iatrogenic errors in endodontic treatment can be categorized based on the treatment stage: (1) during access cavity preparation; (2) during root canal instrumentation (such as ledge, root perforation, root transportation, fractured instrument); (3) during root canal obturation (like inadequate root canal filling length or density, vertical root fracture); and (4) other mishaps during root canal treatment (such as aspiration or ingestion, extrusion of irrigant, emphysema).¹ Common errors during access cavity preparation include incomplete pulp removal, choosing the wrong point for access, using a drill that is too large for the pulp chamber, incomplete access,

failure to remove the coronal roof, and perforations in the floor of teeth.² Biodentine can be utilized as a dentin replacement and, with its excellent handling properties, it can be molded into the desired shape using the right procedure.³ In this case, excessive dentin loss was repaired utilizing Biodentine and anatomical post-fiber-reinforced composite to enhance its stress-bearing ability, forming a conservative treatment strategy for optimal effectiveness.

Case Presentation

A 20-year-old female with a chief complaint wanted to restore her upper anterior tooth region. She presented

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with a history of unfinished dental procedure of left maxillary central incisor initiated elsewhere. On examination, a restoration was seen in tooth no. 21 (►Fig. 1A, B). Vitality tests showed no response and the tooth was within normal limits in percussion, palpation, mobility and periodontal probing. Radiographic examination indicated iatrogenic access cavity preparation error, inadequate obturation, and no periradicular changes with the concerned tooth (►Fig. 1C).

The tooth was anesthetized locally and isolated using a rubber dam. The procedure involved cavity access and root canal retreatment using R-endo file to eliminate obturation material (►Fig. 2A). The root canal was negotiated using a K-file, and the working length was measured using an apex locator and radiographic technique. The root canal was prepared using the crown-down technique with a ProTaper Gold file up to F3 (30/.09vt). The root canals were flushed with 3% sodium hypochlorite, activated with an endoactivator, and then flushed with a saline solution. Final irrigation

was done by using 17% EDTA followed by rinsing with saline solution. The root canals were dried with paper points and the gutta-percha master cone was verified through radiographic assessment (►Fig. 2B). The root canals were obturated using warm vertical compaction with AH Plus sealer. A radiograph was taken for confirmation of the obturation (►Fig. 2C).

In the second visit, after removing temporary restoration and postspace preparation, Biodentine was used to replace the damaged dentin in the mesial wall (►Fig. 3A). Fiber post-fitting trial in the root canal was done and a radiograph was taken for confirmation (►Fig. 3B and C). An anatomical post was made with composite resin and cementation was performed. Final restoration was done using direct resin composite (►Fig. 3D).

Endodontic retreatment with direct resin composite restoration demonstrated excellent and promising clinical performance in endodontically treated anterior teeth over an evaluation period of 6 months (►Fig. 4).

Discussion

Operative procedures involve the removal of decayed tissue, repair of imperfections, and reinforcement of weakened dentin structures. An excessively large access cavity increases the risk of perforations, compromises the biomechanical function of root-treated teeth, and makes the tooth more vulnerable to coronary or root fractures. For optimal visualization during the coronary opening, it is crucial to analyze the coronary chamber in contemporary imaging examinations, choose a drill consistent with coronary volume, ensure good illumination, and employ magnification.²

Biodentine is indicated to replace damaged dentine, both in the crown and root.⁴ It can be manipulated and molded similarly to natural dentin. It serves as a long-lasting replacement for damaged or lost dentin, rather than solely as a material for capping the pulp. The surface can be adhered to with various adhesives before applying the final restoration

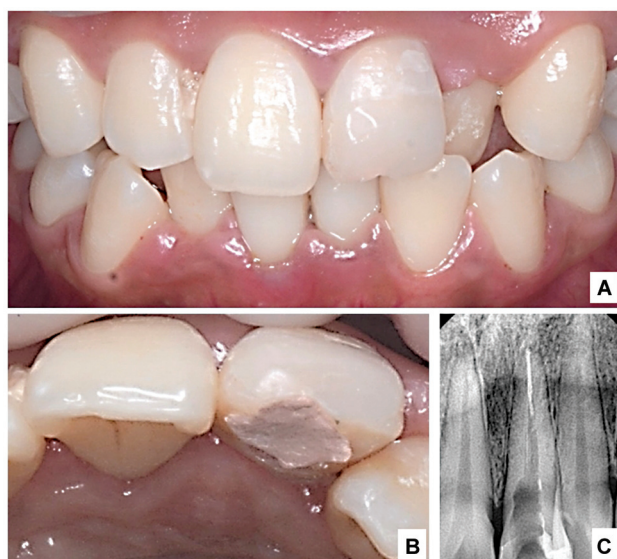


Fig. 1 (A) Labial appearance, (B) occlusal appearance of tooth no 21, and (C) radiographic finding of tooth no 21.

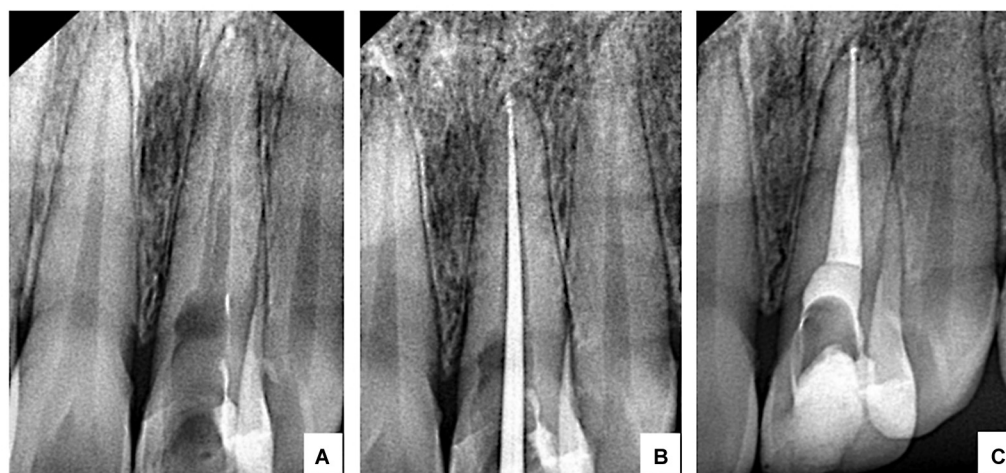


Fig. 2 (A) Radiograph after removing obturation material on tooth no 21, (B) Master Apical Cone (MAC) confirmation radiograph, and (C) radiograph after obturation on tooth no 21.

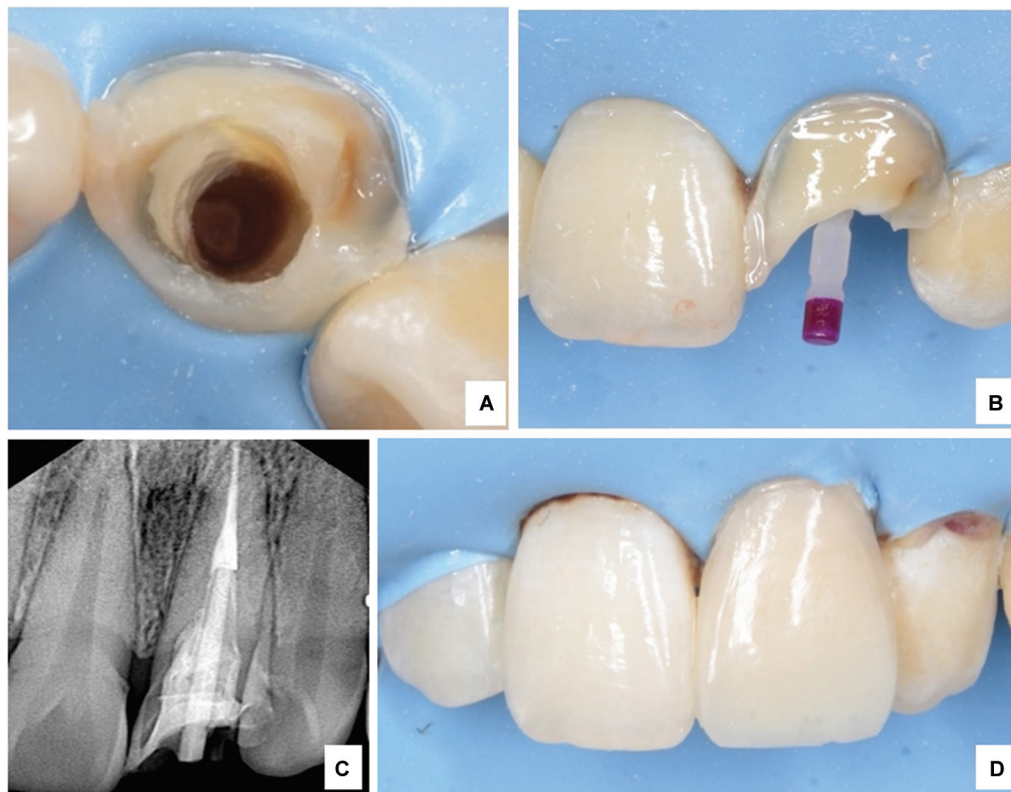


Fig. 3 (A) Biodentine application on the mesial wall, (B) post fitting, (C) Post cementation confirmation radiograph, and (D) direct resin composite restoration.



Fig. 4 Evaluation after 6 months.

composite resin.³ Biodentine's compressive strength increases over time until it reaches a level comparable to natural dentine. It exhibited the highest compressive strength among all the studied materials.⁵

Endodontically-treated teeth might be substantially weakened when the canals are widened due to the advancement of decay along with endodontic access and/or excessive preparation. Repairing extremely weakened teeth is difficult due to their increased susceptibility to breaking and wearing out. Fiber posts designed for flaring canals are not easily accessible. Another way is to reinforce glass fiber posts by using composite resin. Composite resin has a similar elastic modulus to dentin, which results in a uniform stress distribution between the anatomical composite post and dentin surface, resembling that of a healthy tooth. Posts lined with composite resin showed

superior fracture resistance compared to alternative approaches. The anatomical post decreases the amount of luting cement used and provides a more precise fit on the canal wall.⁶

Direct composite resin restoration is a beneficial treatment choice for preserving additional tooth structure in root-filled teeth. Composite resin direct repair offers superior results. It offers greater resistance to tooth fracture compared to amalgam and also provides intra-coronal reinforcement. A retrospective investigation has confirmed that cavities with up to three surfaces can be successfully healed using composite restoration and adhesive procedures. Endodontic access and loss of the axial walls results in a twofold increase in cuspal displacement and strain. Reducing stress in the remaining tooth structure and interfaces is essential when restoring endodontically treated teeth with resin composite.⁷

Conclusion

Proper imaging, precise selection of the drill, good illumination, and magnification are essential to avoid iatrogenic errors. Endodontic retreatment followed by Biodentine placement and anatomic fiber post with direct resin composite as final restoration was successfully carried out to restore the function of the tooth including mastication, esthetics, and protection of the supporting tissues of the tooth.

Conflict of Interest

None declared.

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