Successful management of inter-radicular bone loss associated with endodontic origin using tampon full pulpotomy: A case report

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Received Date : July 17, 2023
Accepted Date : January 16, 2024
Published Date : January 23, 2024
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Abstract

Inter-radicular bone loss resulting from inflammation or infection of the dental pulp poses a clinical challenge in endodontic-periodontal treatments. This case report presents a 36-year-old female patient who presented with severe discomfort in the left mandibular first molar. Thorough clinical and radiographic examinations confirmed the presence of symptomatic irreversible pulpitis and symptomatic apical periodontitis, along with a significant furcal radiolucency. A full pulpotomy (FP) using calcium-enriched mixture (CEM) cement was initially planned; however, due to the hyperemic nature of the amputated pulpal tissue, hemostasis could not be achieved even with the application of sodium hypochlorite. As a result, a tampon FP procedure was performed. Subsequent follow-up visits demonstrated short-term symptom resolution and long-term radiographic evidence of complete bone healing in the inter-radicular and apical regions. This case report underscores the effectiveness of the tampon FP technique and the use of CEM cement as a biomaterial for managing inter-radicular bone loss with an endodontic origin. Early diagnosis and appropriate treatment planning are paramount for achieving successful outcomes in complex endodontic-periodontal lesions. Further research is warranted to assess the long-term success and stability of tampon FP in similar cases.

Keywords: Inter-radicular bone loss, endodontic-periodontal lesions, tampon full pulpotomy, vital pulp therapy, Calcium-enriched mixture (CEM) cement; Tricalcium silicate.

Abbreviations: FP: Full Pulpotomy.

Introduction

Inter-radicular bone loss, also referred to as periodontal furcal lesions of endodontic origin, presents a significant challenge in endodontic-periodontal treatments, requiring an integrated approach to address both pulpal and periodontal components of the lesion [1]. The intricate connection between the periodontal ligament (PDL) and the root canal system, including accessory canals, facilitates the spread of inflammation or infection from the diseased pulp to the furcation region, leading to bone resorption/loss and compromising tooth health and stability [2].

Successful management of inter-radicular bone loss associated with endodontic origin necessitates addressing the underlying etiological factor, such as pulpal disease, through appropriate endodontic treatment modalities, resulting in the resolution of associated periodontal pathology [3]. To target the pulpal disease, various endodontic treatment modalities have emerged, with vital pulp therapy (VPT) techniques gaining attention as alternative options to conventional root canal therapy (RCT) for managing pulpal inflammation [4, 5]. These approaches aim to preserve tooth vitality while promoting the resolution of periradicular/inter-radicular pathology [6]. Emphasizing the importance of identifying and managing the underlying etiology, effective resolution of the pulpal disease contributes to successful treatment outcomes in inter-radicular bone loss cases.

This article aims to highlight the significance of a novel approach known as tampon full pulpotomy (FP) in managing inter-radicular bone loss associated with endodontic origin [7]. The tampon FP technique involves the removal of coronal pulp tissue and the application of an endodontic biomaterial, such as Calcium-enriched mixture (CEM) cement, to protect the dental pulp wound and promote healing. This technique proves particularly beneficial in cases where achieving hemostasis becomes challenging due to the hyperemic nature of the inflamed dental pulp.

Case report

A 36-year-old female patient Caucasian presented with severe discomfort in the left mandibular first molar. The main concern was persistent pain and discomfort following a previous restorative treatment on tooth 36, which had a large composite restoration placed a few months ago. Clinical examination revealed high sensitivity to percussion and confirmed symptomatic irreversible pulpitis (IP) through pulp vitality tests using cold spray. Periodontal probe depths were within the normal range. Radiographic evaluation showed an extremely deep restoration, indicating possible pulp exposure, as well as a large furcal radiolucency and widening of the periodontal ligament at both apices (Fig. 1A). Further examination revealed the presence of an extra root, radix entomolaris.

The patient had no relevant medical history. Intra-oral findings included the presence of an extremely deep composite restoration probably reach the pulp, create pulp inflammation (i.e. IP), and signs of periodontal involvement. Based on the symptoms and diagnostic findings, the final diagnosis was symptomatic IP associated with symptomatic apical periodontitis and a furcal lesion of endodontic origin, indicating furcation involvement due to endodontic pathology. Treatment options, including tooth extraction and implant replacement, nonsurgical endodontic treatment, and vital pulp therapy (VPT), were discussed with the patient. After obtaining informed consent, the patient chose to proceed with VPT. Local anesthesia was administered, and a standard endodontic access cavity was prepared under appropriate isolation. Complete removal of the coronal pulp tissue was performed using a sterile round end bur and copious irrigation. Despite attempts to achieve hemostasis using normal saline solution (5 min) and full-strength sodium hypochlorite (1 min), it was unsuccessful. As a result, a tampon full pulpotomy (FP) procedure was performed utilizing calcium-enriched mixture (CEM) cement (BioniqueDent, Tehran, Iran) as an endodontic biomaterial to protect the pulp wound, promote healing, and maintain pulp vitality. The coronal cavity was filled and sealed with resin composite (Fig. 1B).

Regular follow-up visits were scheduled to monitor the progress of the treatment. The patient reported symptom resolution within the first week following the procedure, and the treated tooth remained functional without discomfort or mobility. At the 5-year follow-up, radiographic evaluation confirmed complete bone healing in the inter-radicular and apical regions (Fig. 1C). Assessment of treatment outcomes was determined through clinician-assessed and patient-assessed methods. No adverse or unanticipated events or consequences were observed during the course of treatment.

Discussion

This case report highlights the effectiveness of the tampon FP approach and the use of CEM cement as an endodontic biomaterial in the management of inter-radicular bone loss with endodontic origin. By addressing both the endodontic and periodontal components of the lesion, this treatment modality resulted in favorable outcomes, including bone healing in the inter-radicular and periapical regions. The tampon FP technique, employed in this case, involved the meticulous removal of coronal pulp tissue and the application of CEM cement over the hyperemic pulp with uncontrollable bleeding [7, 8]. This approach effectively addressed the interradicular bone loss and apical pathology associated with symptomatic IP.

The selection of CEM cement as an endodontic biomaterial in this context was based on its proven biocompatibility [9], remarkable sealing ability [10], and potential to stimulate osteogenesis [11], dentinogenesis [12] and cementogenesis [13].

Figure 1: Illustrations of the reported mandibular left first molar with a radix entromolaris root treated with tampon pulpotomy technique: (A) Initial periapical radiograph, when the patient was referred with severe pain and discomfort of the tooth 36 which was diagnosed as symptomatic irreversible pulpitis having PDL widening/apical periodontitis at mesial, distal, and radix entomolaris roots and also inter-radicular bone loss with endodontic origin. (B) Tampon full pulpotomy using calcium-enriched mixture cement and then, immediate composite restoration of the tooth at the same treatment session. (C) 5-year follow-up periapical radiograph showing complete healing of the periapical and inter-radicular bone loss.
demonstrated favorable treatment outcomes in VPT of primary [14] as well as permanent dentition [15]. By utilizing CEM cement, the tampon FP technique provided a suitable scaffold for tissue regeneration and facilitated the healing process in the affected area. Early diagnosis and appropriate treatment selection are crucial in achieving successful outcomes in complex endodontic-periodontal lesions. In this case, prompt recognition of the IP and apical periodontitis allowed for the selection of the tampon FP approach as an alternative to tooth extraction and implant replacement or nonsurgical endodontic treatment. By preserving the vitality of the affected tooth through VPT, the associated periodontal pathology was effectively managed, resulting in symptom resolution and functional tooth preservation. While this case demonstrates positive results, further research and long-term studies are necessary to evaluate the long-term success and stability of the tampon FP technique in similar cases. Long-term follow-up evaluations, including radiographic assessments and clinical examinations, are essential to assess the longevity of bone healing and the overall stability of the treated tooth. We follow the PRICE 2020 Flowchart for this report.

Conclusion

The successful management of inter-radicular bone loss with endodontic origin using the tampon FP approach and CEM cement as a biomaterial demonstrates the potential of this treatment modality in preserving the vitality of vital teeth. Early diagnosis, appropriate treatment selection, and the integration of endodontic and periodontal principles are essential for achieving favorable outcomes in complex endodontic-periodontal lesions.

Financial support: NA

Conflicts of interest: The authors have no conflicts of interest.

Acknowledgment: NA

References