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The Role of Endodontic Treatment in Preserving Anterior Tooth as Overdenture Abutment: A Case Report

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ABSTRACT

Preserving natural teeth as overdenture abutments provides functional and biological benefits. When these teeth are compromised by structural damage or pulpal pathology, endodontic treatment becomes essential to eliminate infection and maintain the root for prosthetic support. A 46-year-old female patient presented with a severely damaged maxillary anterior tooth and multiple missing teeth. Clinical examination revealed extensive coronal destruction with pulpal exposure, while radiographic evaluation showed periapical radiolucency. The tooth was diagnosed with pulp necrosis and asymptomatic apical periodontitis. Root canal treatment was performed, and a one-month follow-up showed the tooth to be asymptomatic with radiographic signs of healing. Crown lengthening was subsequently carried out to achieve an adequate ferrule effect, followed by partial gutta-percha removal and placement of a metal cast coping to function as an overdenture abutment. The success of overdenture therapy depends on the health of abutment teeth. Endodontic treatment enables preservation of compromised teeth by eliminating infection and promoting periapical healing, highlighting the importance of a multidisciplinary approach for optimal outcomes. This case highlights the importance of integrating endodontic, periodontal, and prosthodontic management to preserve strategically important teeth and enhance the long-term success of overdenture rehabilitation.

Keywords: *Abutment, Endodontics, Multidisciplinary Care Team, Overdenture, Pulp Necrosis*

INTRODUCTION

The preservation of natural teeth as overdenture abutments offers significant biological and functional advantages in prosthetic rehabilitation.[1] Retained roots help maintain proprioceptive feedback through the periodontal ligament, enhance denture support and stability, and play a crucial role in minimizing the progressive alveolar bone resorption commonly associated with complete extractions.[2]These benefits collectively contribute to improved masticatory efficiency, patient comfort, and long-term prosthesis success.[2,3]

However, the teeth selected as overdenture abutments are not always free of pathology. Many presents with extensive coronal

destruction, deep caries, or pulpal and periapical disease, including pulp necrosis.[1,4,5] If left untreated, these conditions can compromise the longevity of the abutment root and jeopardize the prognosis of the overdenture itself. Therefore, endodontic treatment becomes a critical pre-prosthetic phase, ensuring that any existing infection is eliminated and that the retained root remains healthy and functional.[4,6]

A carefully performed root canal treatment allows the clinician to preserve strategically important anterior roots that would otherwise be extracted, thereby maintaining the biological and mechanical advantages of overdenture therapy.[6,7] This case report aims to emphasize the role of endodontic treatment as a fundamental part of pre-prosthetic rehabilitation in a patient requiring an overdenture. The case illustrates the importance of interdisciplinary treatment plan covering endodontics, periodontics, and prosthodontics to achieve favorable functional and esthetic outcomes.

CASE PRESENTATION

A 46-year-old female patient presented with a severely damaged left maxillary anterior tooth and multiple missing teeth. The tooth #21 exhibited extensive coronal loss involving more than two-thirds of the clinical crown and pulpal exposure. The tooth was non-tender to percussion and palpation. Pulpal exposure on the remaining coronal structure. Multiple missing teeth were noted in the maxillary arch, contributing to decreased prosthesis stability and compromised esthetics.

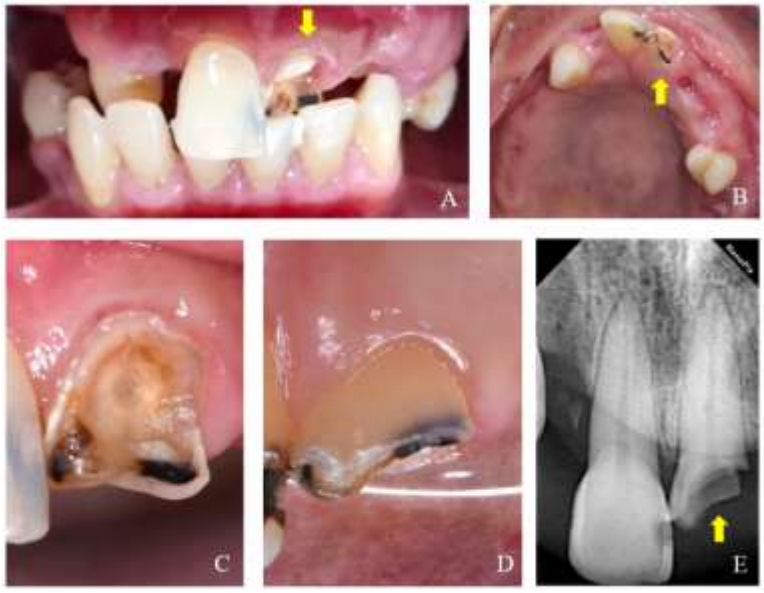

Figure 1. (A)Anterior Examination of Maxilla and Mandibula, (B)Occlusal Examination of Maxilla, (C)Labial view of tooth #21, (D)Palatal view of tooth #21, (E)Periapical Radiograph Examination of tooth #21. (Source: personal documentation and patient consent for publication have been obtained)

Radiographically, periapical radiolucency was observed (Figure 1). A well-defined slight of periapical radiolucency associated with tooth 21, indicating chronic inflammation. Loss of lamina dura continuity around the apical region. Sufficient remaining root length and no evidence of vertical root fracture. Adequate bone height around the root, making it a viable candidate for retention as an overdenture abutment. Based on the clinical and radiographic finding, tooth #21 was diagnosed with pulp necrosis and asymptomatic apical periodontitis. The remaining root structure was deemed maintainable, and the tooth was selected for endodontic treatment prior to overdenture

rehabilitation to eliminate infection and preserve the strategic abutment.

After being informed of the tooth's condition and prognosis, the patient signed the informed consent regarding the treatment and case publication. Root canal therapy was performed, and a one-month follow-up revealed the patient to be asymptomatic with radiographic evidence of healing.

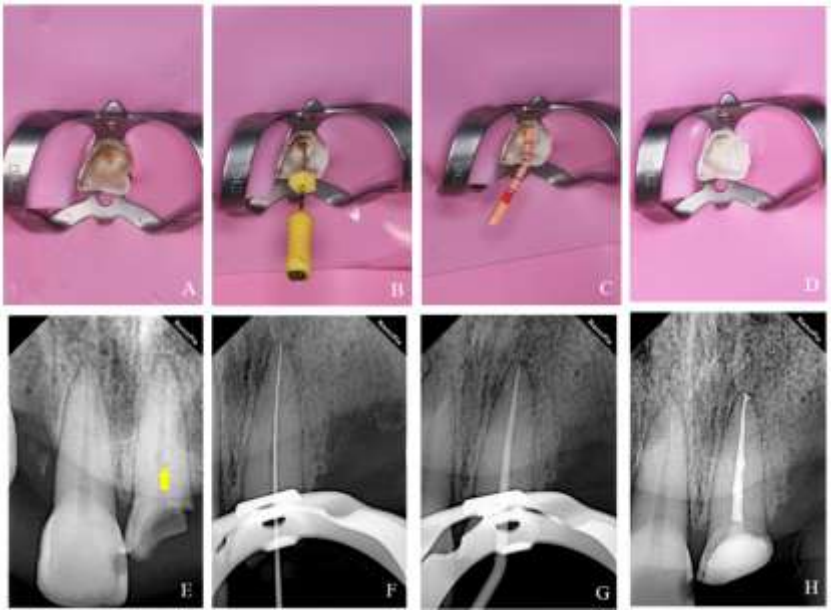

Figure 2. (A)Initial Examination tooth #21, (B)Initial Apical File, (C)Cone Fitting of Gutta-percha, (D)Obturation, (E)Initial Radiograph tooth #21, (F)Radiograph of Initial Apical File, (G)Radiograph of Cone fitting, (H)Radiograph of Obturation. (Source: personal documentation and patient consent for publication have been obtained)

Initial examination included clinical (Figure 2A) and radiographic evaluation to assess canal anatomy, working length estimation, and periapical status (Figure 2E). The initial radiograph confirmed the absence of periapical lesions and supported the decision to retain the tooth as an abutment.

After access cavity preparation, the initial apical file (IAF) was established using hand K-file #15 to determine canal patency and 19 mm for working length (Figure 2B). Chemo-mechanical preparation was performed using rotary e-flex blue #25.06 file protocols. Copious irrigation with 2,5%NaOCl and 17% EDTA was performed, accompanied by ultrasonicactivation with an EndoActivatorto ensure effective disinfection while preserving dentin integrity, which is critical foroverdenture abutment longevity.

Following canal preparation, cone fitting of gutta-percha was performed to confirm apical adaptation and working length accuracy (Figure 2C). Radiographic verification showed optimal apical fit without overextension, indicating adequate canal shaping and apical control (Figure 2G).

Obturation was completed using gutta-percha and sealer with a hydraulic obturation technique to achieve a hermetic seal (Figure 2D). The final radiograph demonstrated dense, homogeneous filling extending to the working length, with no voids or extrusion (Figure 2H).

Figure 3. (A)Disinfection area, (B)incision, (C)osteoctomy with reduce of bone, (D)suturing after crown lengthening. (Source: personal documentation and patient consent for publication have been obtained)

Crown lengthening was then accomplished to achieve the ferrule effect for mechanical retention. Following completion of root canal treatment, a crown lengthening procedure was planned to obtain adequate clinical crown height and ensure proper restoration of tooth #21 as an overdenture abutment. The procedure was indicated due to severe coronal tooth structure loss and subgingival extension of the remaining tooth structure, which compromised the ferrule effect and violated the biologic width.The surgical field was thoroughly disinfected using antiseptic solution to maintain aseptic conditions and minimize the risk of postoperative infection (Figure 3A).

A full thickness mucoperiosteal flap was performed by making a sulcular incision around tooth #21, extending to the adjacent teeth as needed to provide adequate access and visibility of the underlying alveolar bone and root surface (Figure 3B). Osteotomy was carried out using rotary instruments under copious irrigation to reduce the alveolar bone height. The bone reduction was carefully controlled to re-establish a proper distance between the alveolar crest and the future restorative margin, ensuring preservation of the biologic width and sufficient ferrule for definitive restoration (Figure 3C). After achieving the desired bone contour and clinical crown length, the flap was repositioned apically and secured with interrupted sutures to promote optimal healing. Hemostasis was achieved, and postoperative instructions were provided to the patient (Figure 3D).

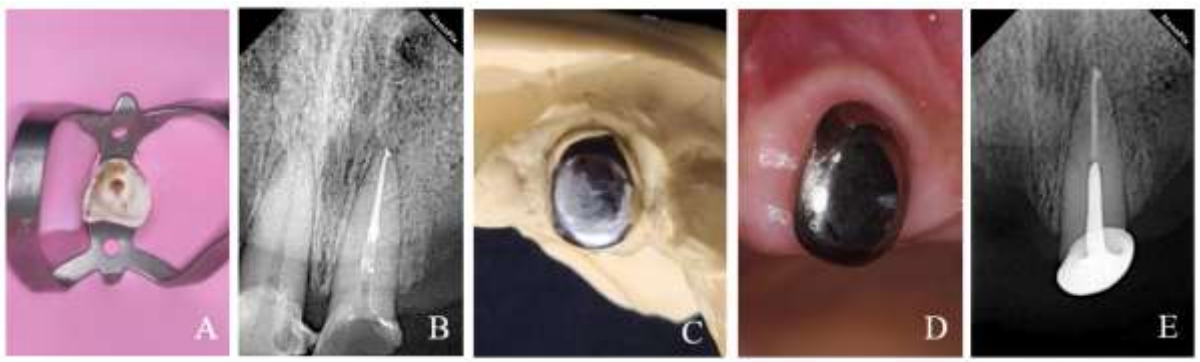

Figure 4. (A)Gutta-percha removal, (B)Radiograph of gutta-percha removal, (C)Metal coping, (D)Metal coping abutment insertion, (E)Radiograph of Metal coping insertion. (Source: personal documentation and patient consent for publication have been obtained)

After 1 month following the completion of root canal treatment and confirmation of adequate obturation, gutta-percha removal was performed to prepare the tooth for use as an overdenture abutment. The coronal portion of the root canal filling material was selectively removed using heated instruments and rotary files, leaving an adequate apical seal to maintain endodontic integrity (Figure 4A). A radiograph was taken after gutta-percha removal to confirm the remaining apical obturation length and ensure that no disruption of the apical seal had occurred. The radiographic evaluation demonstrated a well-condensed apical filling with sufficient space coronally for subsequent prosthetic procedures. (Figure 4B)

After canal preparation, a custom metal coping was fabricated to reinforce the structurally compromised tooth and distribute occlusal forces evenly (Figure 4C). The coping design aimed to enhance fracture resistance and provide a stable foundation for the overdenture attachment system. The metal coping was inserted intraorally and evaluated for marginal adaptation, retention, and passive fit (Figure 4D). Proper seating of the coping was achieved without interference, ensuring optimal support for the overdenture prosthesis. A post-insertion radiograph of the metal coping was obtained to verify complete seating, accurate adaptation to the root structure, and the absence of voids or misalignment. Radiographic findings confirmed satisfactory positioning of the coping and preservation of the apical seal (Figure 4E).

DISCUSSION

The preservation of natural teeth as overdenture abutments offers significant biological and functional advantages, including enhanced prosthesis stability, improved proprioceptive feedback, and reduced residual ridge resorption.[20] Retaining roots under overdentures helps maintain periodontal ligament function, which in turn preserves mechanoreception and improves occlusal force regulation. Clinical studies have shown that patients rehabilitated with tooth-supported overdentures exhibit markedly less vertical alveolar bone loss than those wearing conventional complete dentures.[8] These benefits highlight the importance of maintaining strategic teeth in the dental arch whenever possible.[9,10]

However, the success of overdenture therapy depends heavily on the health and long-term viability of the abutment teeth. When abutment teeth present with pathology-such as pulp necrosis or apical periodontitis-endodontic treatment becomes a mandatory and critical step before prosthetic rehabilitation. In this case, the maxillary anterior tooth exhibited extensive coronal loss, pulp necrosis, and periapical radiolucency, which posed a significant threat to both local bone stability and the prognosis of future overdenture treatment.[4] Without intervention, persistent infection would likely result in progressive periapical bone destruction, potentially leading to tooth loss and compromised prosthetic support.[11,12]

Evidence supports the role of endodontic therapy in ensuring predictable healing and preserving alveolar structures.[13] Research has shown that untreated periapical lesions may contribute to 25–40% localized bone loss, while successful root canal treatment promotes resolution of inflammation and regeneration of periapical tissues. Naert et al. reported minimal vertical bone loss (0.6–1.2 mm over 10 years) around roots maintained under overdentures, emphasizing that biological stability is achievable with proper endodontic and periodontal management.[14] Furthermore, long-term clinical data show that endodontically treated abutment teeth exhibit high survival rates: Budtz-Jørgensen et al. documented a >80% 10-year survival rate, significantly improving the functional lifespan of overdentures.

The present case confirms that endodontic therapy is not merely adjunctive but essential in the preservation of abutment

teeth for overdenture use.[4,20] By eliminating intracanal infection, controlling periapical pathology, and restoring structural integrity, endodontic treatment creates a stable biological foundation that supports prosthetic loading.[11,15] This contributes directly to improved overdenture retention, enhanced patient comfort, and long-term functional stability. Moreover, retaining even a single anterior abutment provides psychological benefits for patients, offering a sense of continuity and natural support.[10]

Overdentures play an essential role in minimizing residual ridge resorption and maintaining proprioception through preservation of the periodontal ligament.[7,16]The long-term success of this prosthetic option is strongly determined by the condition and stability of the abutment teeth. This case highlights that high-quality endodontic treatment is a critical and affirming step in ensuring the longevity of overdenture abutments, as it allows the clinician to retain strategically important teeth with predictable pulpal healing and structural reinforcement.[20,17]Evidence shows that endodontically treated teeth used as overdenture abutments demonstrate excellent long-term survival when supported by sound periodontal conditions and appropriate prosthodontic design.[15,18] Therefore, integrating endodontic therapy into the multidisciplinary treatment plan not only preserves natural tooth structure but also significantly enhances overdenture function, patient comfort, and overall prosthetic prognosis.

Therefore, the integration of high-quality endodontic treatment within a multidisciplinary approach is fundamental to the success of overdentures.[18,,19] This case illustrates that with appropriate infection control, structural management, and careful prosthodontic planning, compromised teeth can be transformed into reliable and long-lasting overdenture abutments. Ultimately, the value of endodontic treatment is affirmed through its capacity to preserve natural dentition, prevent bone loss, and significantly enhance the overall prognosis of overdenture therapy.

Despite the favorable clinical outcome, this case report has inherent limitations. The evidence presented is based on a single clinical case, which limits the ability to establish a causal relationship or draw generalized conclusions. Moreover, the follow-up period was limited, preventing comprehensive evaluation of the long-term prognosis of the endodontically treated abutment tooth under functional overdenture loading. Future studies involving larger patient cohorts and longer observation periods are necessary to better determine the long-term stability and survival of overdenture abutment teeth following endodontic therapy.

CONCLUSION

Endodontic treatment plays a crucial role in preserving compromised teeth as overdenture abutments by eliminating infection and promoting periapical healing. When combined with appropriate periodontal and prosthodontic management, strategically important teeth can be successfully maintained to support overdenture rehabilitation. A multidisciplinary approach therefore provides a predictable strategy for improving prosthetic stability, maintaining alveolar bone, and enhancing long-term functional outcomes.

Declaration by Authors

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