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## Restoration of a hemisected molar in the era of implants: A case report

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### Abstract

Hemisection is a surgical procedure characterized by the anatomical division of a multi-rooted tooth into two distinct segments, followed by the extraction of the diseased root or segment. Typically employed in cases of localized pathology affecting a specific root, hemisection aims to preserve the intact, healthy portion of the tooth, maintaining the overall natural tooth structure. This case report presents a successful prosthetic rehabilitation following hemisection surgery after root canal treatment. It is emphasised that with appropriate endodontic treatment and surgical procedures, conventional fixed prosthetics can be used instead of implant treatment.

**Keywords:** Hemisection, root amputation, mandibular molar, fixed partial prosthesis

### Introduction

Dental implants are frequently preferred in the treatment of tooth deficiencies recently. It is widely recognised that implant-supported prosthetic restorations provide a high survival rate and patient satisfaction [1, 2]. However, patients may not prefer implant treatment due to high cost, complex surgical procedures and length of treatment [3]. Thus, clinicians should explore alternative treatment options, particularly for posterior teeth. Hemisection involves the extraction of the diseased tooth root and crown by splitting the molar in two parts [4]. This allows the remaining natural tooth structure to be preserved and restored. Prosthetic treatment can be applied by preserving the natural dentition in cases where implant treatment cannot be applied for various reasons. Hemisection should not be considered only as an alternative to implant therapy. According to literature, hemisection treatment can reduce occlusal stress by shortening distal extensions in cases with indications for removable prostheses, such as Kennedy I and II [5]. However, previous research has shown that hemisection treatment can be used to apply a fixed prosthesis in patients in whom a removable partial denture is indicated due to the loss of a strategic tooth [6]. Hemisection treatment is usually performed in cases of periodontal or endodontic disease. It is recommended in cases of endodontic failure, including broken instrument, perforation, vertical fracture, root resorption, single root caries and severe bone loss [7]. Hemisection is contraindicated in cases where the bone support of the remaining root will be inadequate, when endodontic treatment of the remaining tooth is not possible, in patients with an unfavourable medical history, and when factors such as prognosis and number of remaining teeth will adversely affect restorative and prosthetic treatment [8]. In this case report, the prosthetic management after hemisection procedure will be presented and discussed.

### Case report

A 64-year-old female patient was admitted to our clinic to receive prosthetic rehabilitation. It was confirmed in the patient's medical history that she had no systemic disease. Following the intraoral and radiographic examinations, a treatment plan was determined for the patient (Figure 1a). The patient's informed consent was obtained for the following treatments: Class 1 composite filling to 17, root canal retreatment on 46, metal-fused porcelain (MFP) crowns for 14-12-11-24-27, MFP bridge on 34-35-36(36 cantilever), MFP bridge on 45-46-48, and maxillary removable partial denture (RPD).

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The canal retreatment procedure commenced with the removal of old canal fillings using a 10/06 H-file and rotary instrument. Nevertheless, despite the use of irrigation solution and dissolving chemicals during the procedure, it was noted that the mesial canals were obstructed, and the old canal filling could not be removed (Figure 2a). The treatment protocols modified in the mandible were described and appropriate protocols selected: 1-46 extraction and mandibular RPD. 2- 46 hemisection (mesial root) with a MFP bridge with 45-46-48.

The patient has been referred for hemisection treatment. The distal canal was expanded to 40/06 using a rotary instrument and obturated using a single cone technique with a resin-based root canal sealer (Endoplus, President, Germany). The access cavity was restored with a composite filling. In the same session, the mesial root and the mesial half of the crown were separated with a fissure bur and extracted atraumatically without periodontal flap (Figure 2b). After soft tissue healing was complete, the tooth was prepared and impression obtained with C-type silicone (Oxasil, Kulzer, Germany) and fixed prosthesis were cemented with zinc polycarboxylate cement (Adhesor Carbofine, Kerr, USA). For the construction of removable partial denture in the maxilla, impressions were obtained with irreversible hydrocolloid (Hydrogum, Zhermack, Italy) and finished conventionally. The patient's current occlusion was considered during final adjustment. The patient had a follow up appointment two weeks later and had no complaints and the occlusal arrangements were done (Figure 1b). At the follow-up visit six months later, it was noted that the patient had no complaints (Figure 1c, Figure 2c). Clinical examination revealed good oral hygiene and healthy periodontal tissues. Oral hygiene motivation was provided.

## Discussion

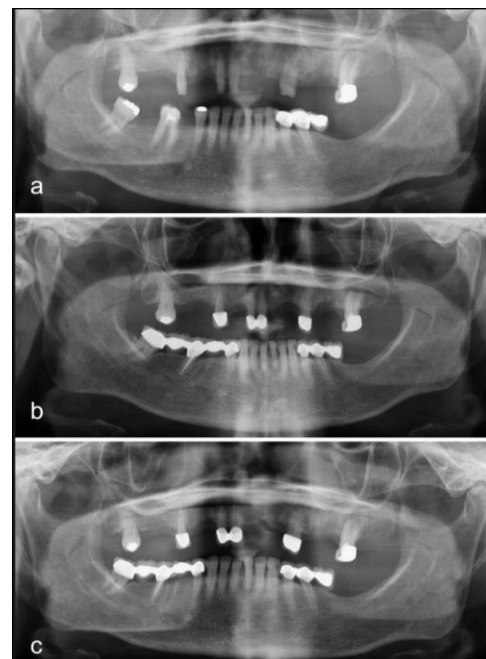
Alternative methods should be considered when deciding on prosthetic treatment. Hemisection is a simple and cost-effective treatment that has been used for many years. Regarding success rates, Bühler *et al.* [9] reported a failure rate of 13.1%. Park *et al.* [10] stated that hemisectioned teeth could be retained in the mouth with proper hygiene over a seven-year follow-up period. It should be noted that the bone is better preserved by keeping the tooth in the mouth. However, if the hemisectioned tooth is lost in the long term, implant placement should be considered again. In the literature, hemisection treatment has been reported to have advantages such as providing a fixed prosthesis for patients who will receive a removable denture or reducing distal extensions in removable denture cases [5, 6]. In current case report, a fixed prosthesis was applied with the hemisection procedure to a patient who had an indication for a RPD after tooth extraction.

It has been observed that teeth with hemisection can be restored as abutments or by inlay application [11]. Park *et al.* [10] reported that teeth used as pier abutments had a longer survival rate, although this was not statistically significant. In our case, the retained tooth was also used as a pier abutment and patient had no complaints at the four-month follow-up.

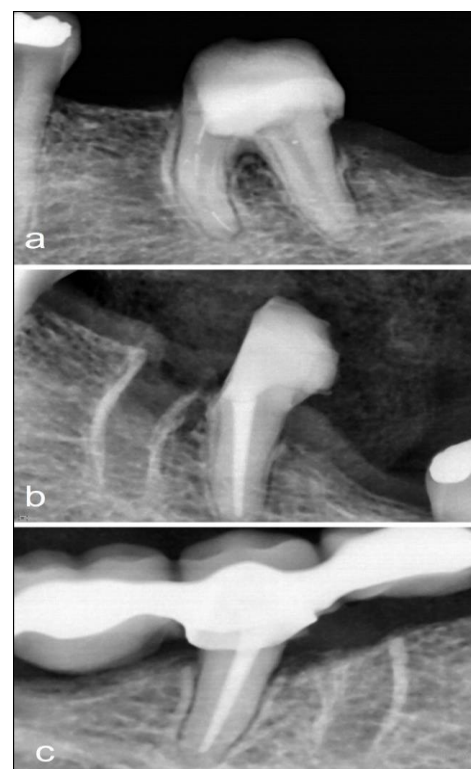
Although the anatomy of the mandibular first molars would seem to benefit from keeping the mesial half in the mouth, there are studies in which the distal half is retained. Even though there is no clear consensus in the literature, the clinical condition of the tooth affects decision [12, 13]. As the distal root was utilised as abutment in our study, it is essential for the prognosis of the treatment that the tooth is asymptomatic as a

result of the root canal treatment.

The prosthetic treatment of hemisectioned teeth requires meticulous planning. Any incompatibilities in the restoration margin or non-physiological shapes of non-occlusal surfaces can lead to periodontal issues. Similarly, it is important to minimize the occlusal table and eliminate inappropriate stresses on the occlusal surfaces [14]. The most critical aspect of long-term preservation of hemisectioned teeth is a high level of oral hygiene. It is important that the patient should not neglect oral care and that any problems that arise should be resolved in the initial stages by continuing to attend follow-up appointments [15].



**Fig 1:** Orthopantomographic images of the patient a: Pre-op, b: Post-op, c: Post-op 6 months



**Fig 2:** Periapical images of hemisectioned tooth a: Initial b: After RCT and hemisection, c: Post-op 6 months

**Conclusion**

Conclusively, hemisection treatment provides a simplified and economical treatment approach that can be an alternative to implant therapy from a prosthetic perspective. Furthermore, it should be considered as an alternative to tooth extraction due to its benefits and should be offered along with other treatment options.

**Conflict of Interest**

Not available

**Financial Support**

Not available

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