

Hemisection as a Conservative Management of Grossly Carious Permanent Mandibular First Molar

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Abstract

Hemisection of a molar denotes removal or separation of a root along with its accompanying part of crown. It is a suitable treatment option when the caries, resorption, perforation, or periodontal damage is restricted to one root while the other root is relatively healthy. Hemisection of the affected tooth helps to retain the tooth structure, surrounding alveolar bone, and may also facilitate the placement of fixed prosthesis. This case report describes the hemisection as a successful treatment method to save a grossly carious mandibular first molar with periodontal and periapical involvement. Hemisection and prosthetic rehabilitation yielded a satisfactory result. With careful treatment planning and precise surgical management, undesirable consequences of tooth loss were prevented.

Keywords: Furcation defect, root caries, root resection

INTRODUCTION

As a practitioner of art and science of dentistry, a clinician is expected to provide a functional dentition for lifetime. Loss of the posterior teeth may result in several undesirable sequelae which requires prevention and maintenance measures. The treatment options for an extensively decayed and unrestorable molar are limited. The most common treatment for such tooth may include extraction followed by a removable partial denture, fixed partial denture, or a dental implant to replace the missing tooth. However, with appropriate case selection, hemisection can be a relatively simple, conservative, inexpensive treatment with good chances of success.

Hemisection and root resection have now been established as successful treatment modalities. Yuh *et al.* assessed survival rates of a large number of root-resected molars retrospectively and reported interesting findings with respect to demographic variables. The overall survival rate for root-resected molars was found to be 91.1%.^[1] Carnevale *et al.* reported a survival rate of about 93% over a 10-year follow-up among patients who received hemisection as the management of furcated molars.^[2] The success of hemisection depends, to a large extent, on case selection and following specific endodontic, surgical, and restorative guidelines. It has been suggested that hemisection

should be considered before every molar extraction, because it offers successful long-term results.^[3]

CASE REPORT

A 20-year-old female was referred to the department of conservative dentistry and endodontics with a chief complaint of pain in the lower right back tooth region for 10 days. Pain was mild, intermittent in nature, and aggravated on mastication. She had no relevant medical or dental history.

On intraoral examination, tooth #46 was found to have a deep carious lesion involving distal and occlusal surfaces. The involved tooth was severely tender on percussion. On probing, a periodontal pocket of 6 mm was found on the distal aspect. However, no mobility was observed in the affected tooth. Radiographical examination revealed carious lesion extending to the cervical third of distal root [Figure 1a]. Interproximal bone loss was evident between #46 and #47 along with mild haziness in the furcation area. Periapical

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radiolucency surrounding the apex of both roots of #46 was also found. On the basis of history, clinical and radiographic examination, a diagnosis of chronic apical periodontitis was made with respect to tooth #46. Since the extent of decay rendered the tooth nonrestorable, the patient was explained about the condition and prognosis of tooth with feasible treatment options including extraction and placement of dental implant. However, she opted for hemisection followed by fixed dental prosthesis over other treatment options.

The periodontal prognosis of the mesial root was fair with good bone support. After completion of endodontic treatment that also included removal of all carious tooth structures [Figure 1b], hemisection of distal root was performed under local anesthesia. Full-thickness flaps were elevated on the buccal and lingual aspects of the involved tooth. Upon reflection of the flap, crater-like bony defect along the distal root became more evident. Degranulation was performed using surgical curettes (Hu-Friedy, Chicago, IL, USA) to expose the bone. A low-speed surgical length fissure carbide bur was used under saline irrigation to make vertical cut toward the furcation area. A fine probe was passed through the cut to ensure separation [Figure 2a].

After completion of the sectioning, the root was elevated from its socket using a periosteal elevator and removed. Granulation tissue was curetted out of the distal socket using surgical curettes. The socket was irrigated adequately with sterile normal saline [Figure 2b]. Scaling and root planing of the remaining root surfaces was performed with Gracey curettes (Hu-Friedy, Chicago, IL, USA). The distal root socket and crater-like bony defect were grafted with alloplastic bone graft (hydroxyapatite and β -tricalcium phosphate) [Figure 2c]. Flap was approximated and sutured with 3-0 braided silk. The occlusal table was minimized to redirect the forces along the long axis of the mesial root. Immediate postoperative radiograph showed the well-retained mesial root and extraction

socket of the distal root filled with bone graft [Figure 1c]. Sutures were removed after 2 weeks.

At 1-month recall visit, healing was found to be satisfactory, while mobility was absent [Figure 2d]. Tooth preparation of the mesial portion of the first permanent molar and second molar was performed followed by porcelain-fused-to-metal prosthesis [Figure 3a and b]. Radiographs at 3 months and 9 months suggested progressive formation of bone in the extraction socket along with resolution of radiolucency around the mesial root of #46 [Figure 3c and d].

DISCUSSION

Loss of posterior teeth may result in several undesirable sequelae such as mesial drifting, loss of arch length, and loss of masticatory function. As previously discussed, treatment options for an extensively decayed and nonrestorable molar are limited. A clinician must decide a treatment option based on the patient's age, medical history, and the ability to maintain oral hygiene. Consideration of the cost of treatment and available clinical evidence of success of different modalities is indispensable.

In the present case, all possible treatment options were explained to the patient, including hemisection, as the decay was limited to distal root. Since the patient was young, she was reluctant to lose her tooth. In addition, her financial conditions made her to reject the option of dental implant.

The long-term success of hemisected molar depends on a number of interrelated factors: periodontal condition of tooth, root anatomy, maintenance therapy, endodontic and restorative therapy, and the surgical procedure itself.^[3]

From periodontal aspect, the amount of bone support and degree of furcation involvement are major determinants for case selection and prognosis. Studies have found that the

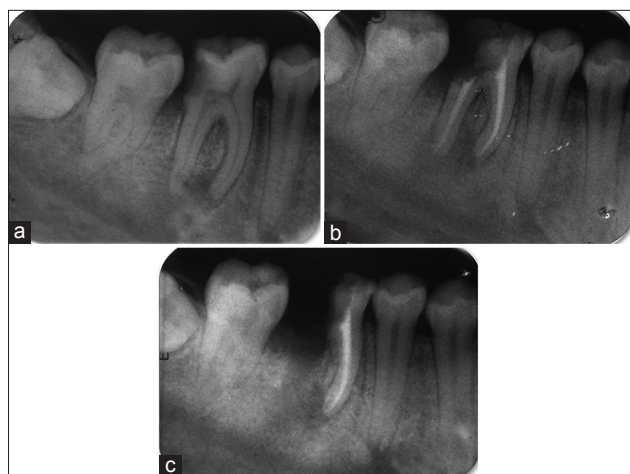


Figure 1: (a) Preoperative radiograph showing the extent of carious lesion and periapical radiolucency. (b) Radiograph after completion of root canal treatment and removal of carious tooth structure. (c) Immediate postoperative radiograph showing extraction socket filled with bone graft

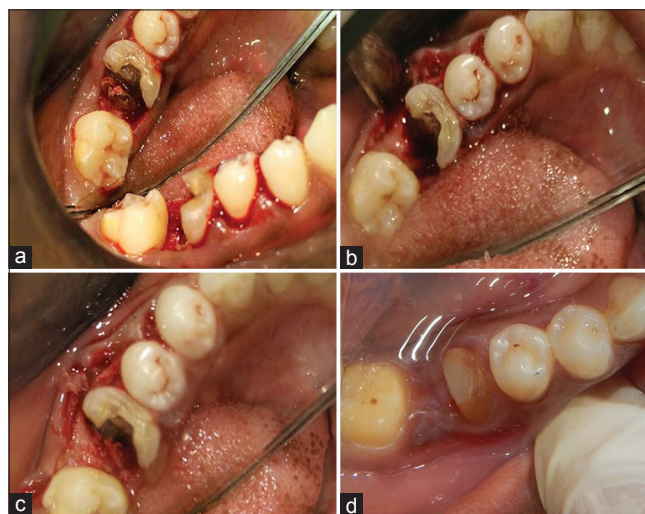


Figure 2: (a) Clinical photograph showing line of resection through furcation area. (b) Surgical field after removal of resected half of tooth structure. (c) Alloplastic graft placed in the socket of distal root. (d) One-month postoperative photograph showing healing of soft tissue

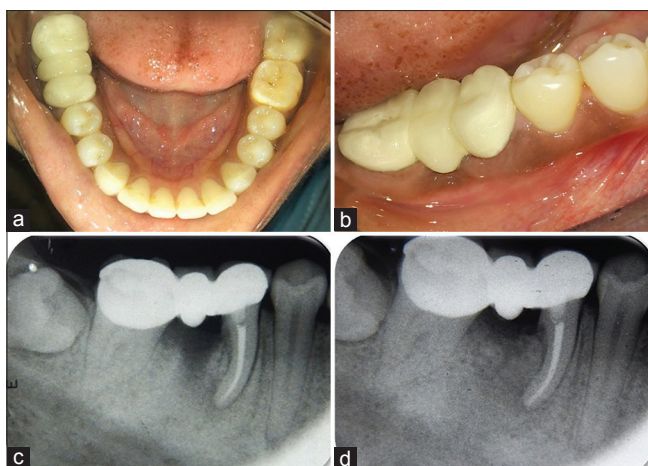


Figure 3: (a) Occlusal view of porcelain-fused-to-metal prosthesis. (b) Buccal view of porcelain-fused-to-metal prosthesis. (c) Postoperative radiograph at 3 months. (d) Postoperative radiograph at 9 months

long-term prognosis of molars with Grade III furcation is poor when compared to molars with a lesser degree of furcation involvement.^[4,5] It indicates that root resection or hemisection performed at the incipient stage of furcation invasion is more likely to result in successful outcome. Considering these factors, favorable result in the present case may be attributed to minimal extent of furcation involvement at the time of surgery. Moreover, socket preservation at the site of extracted root done in this case contributed to maintain the original topography of alveolar ridge.

From endodontic point of view, factors such as inoperable canals, weakening of the lateral walls of the remaining roots during endodontic instrumentation or postpreparation, and poor postdesign are the causes of failure of resected molars. Langer *et al.*^[6] found that 36% of root-resected mandibular molars failed over 10 years, most commonly due to endodontic or restorative problems (root fracture, followed by recurrent untreatable periapical lesions and caries) and not periodontal disease. Hence, an endodontist must try to preserve as much tooth structure as possible.

Unfortunately, the literature does not reveal consistent data regarding the long-term prognosis of root resection or hemisection. Basten *et al.*^[7] reported that 92% of all resected molars survived an average of 12 years, failure reported was because of recurrent caries or due to endodontic and strategic reasons. This relatively high success rate of resected molars was also reported by Hamp *et al.*^[8] Erpenstein, however, reported unfavorable results of hemisected molars with an overall failure rate of 20.6% in which pathologic apical factors were the overwhelming cause.^[9] Bühler^[10] and Langer *et al.*^[6] came to the same conclusion through their studies that initial outcome of resected molar teeth is favorable but not so in the long term.

While many studies have evaluated prognosis and success rate of root-resected molars, only a limited number of studies have directly compared root resective therapy with dental implants. Fugazzotto^[11] found that cumulative success rates were 96.8% for root-resected molars while 97.0% for molar implants and

concluded that both molar root resection and molar implant placement with appropriate restoration demonstrated a high degree of success in function. However, Bühler reported that failure rates of two treatment alternatives were not substantially different with an average reported failure rate of 13.1% among hemisected teeth.^[12] In contrast to this, Zafropoulos *et al.* reported that, in periodontitis patients, hemisected mandibular molars were more prone to complications than dental implants.^[13] While both procedures demonstrate high and low success rates depending on the appropriately applied treatment plan and presence of deleterious factors, they are not interchangeable in clinical situations.

CONCLUSION

Conservative management of grossly carious multirooted teeth in young patients not only preserves the dentition but also reduces the financial burden, psychological trauma, and occlusal dysfunction associated with tooth loss. Hemisection seems to be a reliable treatment option for saving a nonrestorable molar which otherwise needs to be extracted.

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Conflicts of interest

There are no conflicts of interest.

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