

## Hemisection of Teeth: A Report of Two Cases

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### ABSTRACT

**Background:** Loss of the posterior teeth may succumb to in several unwanted sequelae which requires prevention and maintenance measures. Hemisection refers to sectioning of a molar into two halves followed by removal of the diseased root and its coronal portion.

**Case report:** The present case report aims at highlighting the conservative management of two cases with compromised prognosis of one of the two root roots of mandibular molars with hemisection and use of the treated tooth as an abutment for fixed prosthesis.

**Discussion:** Hemisection is a valid treatment option for the molar teeth's in young children and adults which otherwise have to be extracted due to extensive caries. Also with advances in restorative dentistry good prosthetic rehabilitation can be given.

**Conclusion:** Current cases highlight the interdisciplinary approach of molar hemisection, and prosthetic rehabilitation as an innovative procedure providing long term success with minimal patient apprehension and long term stability.

**Keywords:** Hemisection, restoration, prosthesis.

### INTRODUCTION

The terms 'hemi-section' and 'root amputation' are known collectively called as 'root resection'<sup>1,2</sup> Hemisection refers to sectioning of a molar into two halves followed by removal of the diseased root and its coronal portion. The retained root is endodontically treated and restored with an extra-coronal restoration. Loss of the posterior teeth may succumb to in several unwanted sequelae which requires prevention and maintenance measures. With advances in dental treatment protocol, hemisection has now been established as successful treatment modality. If appropriate case selection and treatment planning is done, hemisection can be a relatively simple, conservative, inexpensive treatment with good chances of success<sup>3</sup>.

Hemisection is used in cases with advanced bone loss and furcation involvement with poor prognosis of any one of the roots of posterior teeth. This procedure represents a form of conservative dentistry, aiming to retain as much of the original tooth structure as possible. Results of retrospective studies have found survival rate for root-resected molars more than 90%<sup>4,5</sup>. For suitable selection of cases, periodontal, prosthodontics, and endodontic assessment is very crucial. From a periodontal perspective, this procedure is indicated if there is severe bone loss limited to one root or involvement of class III furcations that could produce a stable root after hemisection. . Untreatable endodontic failure, due to circumstances such as perforations

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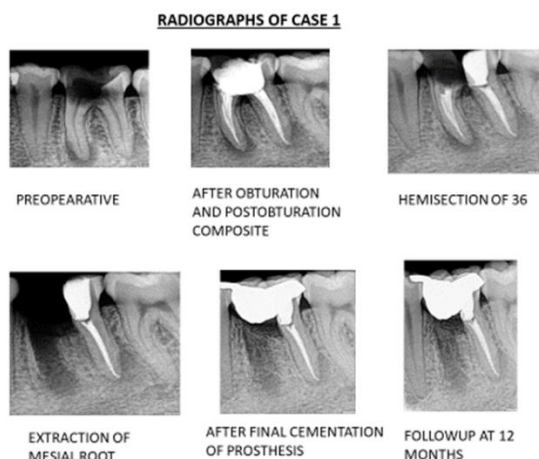


Fig 1: Radiographs of case 1.

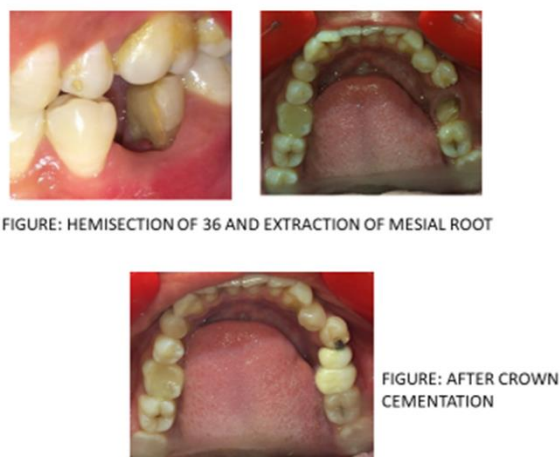


Fig 2: Clinical photos of case 1.

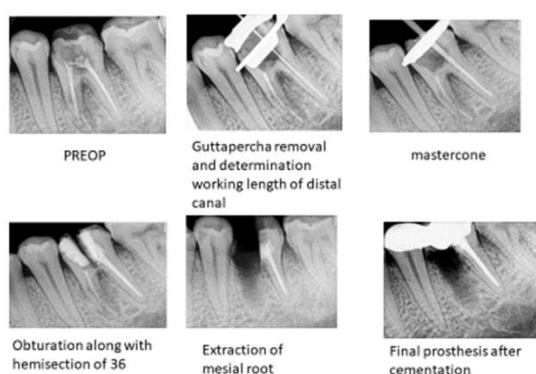


Fig 3: Radiographs of case 2.

and broken instruments, is another indication for hemisection. From a restorative standpoint, treatment by hemisection is indicated for failure of an abutment within a fixed prosthesis, provided a portion of the tooth can be retained to act as the

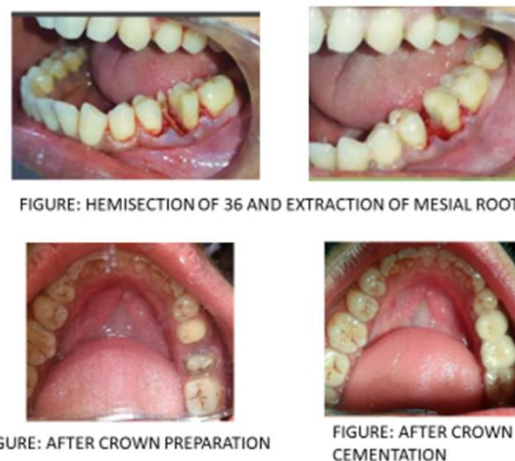


Fig 4: Clinical photographs of case 2.

abutment for the prosthesis. Other indications include vertical root fracture confined to a single root of a multirooted tooth or any severe destructive process that is confined to a single root, including caries, external root resorption, and trauma.

In the past, not much stress has been given to the prosthetic rehabilitation following hemisection of the tooth. The prosthesis placed after hemisection should result in re-establishment of tooth form and function, along with proper distribution of occlusal forces. Routinely, a fixed partial denture is placed with retained root and one adjacent intact tooth as abutments.

Thus, this article presents two cases of hemisection of endodontically treated grossly carious mandibular molars where a modified fixed partial denture design was fabricated to splint the remaining portion of the tooth with adjacent tooth.

## CASE REPORT

### CASE 1

A 22-year-old male was referred to the department of Conservative dentistry and Endodontics with a chief complaint of pain in the lower left back tooth region since 15 days. Pain was mild, intermittent in nature, which aggravated on mastication. On further enquiry, patient did not give any significant medical and previous dental history. Extra oral examination revealed no abnormality.

On intraoral examination, the grossly carious mandibular left first molar was found #36 involving the furcation area and extending subgingivally in the mesial root of the tooth (Figure 1). The involved tooth was severely tender on percussion. On probing, a periodontal pocket of 6 mm was found on the mesial aspect. However, no mobility was observed in the affected tooth. Radiographical examination revealed carious lesion extending to the cervical third of mesial root. Periapical radiolucency surrounding the apex of mesial root of #36 was also found (Figure 1). On the basis of history, clinical and radiographic examination, a diagnosis of chronic apical periodontitis was made with respect to tooth #36. 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 or fixed dental prosthesis. However, he opted for hemisection followed by fixed dental prosthesis over other treatment options. Considering the young age and awareness of the patient, it was planned to save the tooth rather than extracting it. Endodontic treatment was carried out in distal root followed by extraction of mesial root was planned.

Consent to treatment was obtained after explaining the procedure and its associated risks and benefits to the patient. The patient received local anaesthesia (2% lidocaine with 1:100 000 epinephrine) using a conventional inferior alveolar nerve block. After this, caries was removed and access cavity preparation was done under rubber dam isolation. The WL determination was with the help of an electronic apex locator (Root ZX; J Morita, Tokyo, Japan) twice during the procedure and confirmed by using radiographs. Canal shaping was done with the help of ProTaper rotary instruments according to the manufacturer's instructions. 2.5% sodium hypochlorite was used as irrigant. Canals were dried with absorbent paper points and obturation was done with gutta percha and zinc oxide eugenol based sealer in lateral condensation. After completion of endodontic treatment, after 15 days of obturation, hemisection of mesial root was carried out under local anesthesia. Full-thickness flaps were elevated on the buccal and lingual aspects of the involved tooth. A low-speed surgical length fissure carbide bur was used under saline irrigation to make vertical cut toward the furcation

area. After completion of the sectioning, the root was elevated from its socket using a periosteal elevator and removed. The socket was irrigated adequately with sterile normal saline. Scaling and root planing of the remaining root surfaces was performed with Gracey curettes (Hu-Friedy, Chicago, IL, USA). 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 distal root. Immediate postoperative radiograph showed the well-retained distal root and extraction socket of the mesial root. Post operative amoxicillin 500 mg thrice daily and ibuprofen 400 mg BD for 5 days. Also, Chlorhexidine 0.12% mouth rinse was prescribed to the patient for 1 week. Sutures were removed after 1 weeks. The surgical site was then allowed to heal with no occlusal stress on distal root for 4 weeks

Patient was recalled after 3 months. IOPA revealed good bone regeneration which indicates good healing absence of any signs and symptoms. Then, the restoration of hemisected tooth was planned with fixed partial denture. Tooth preparation on second molar and distal surface of first premolar was performed. Diagnostic impressions were made with irreversible hydrocolloid impression material. Diagnostic casts were obtained. Face bow record was made and transferred to a semi-adjustable articulator and maxillary cast was mounted. Mandibular diagnostic cast was mounted using interocclusal record, to check for any occlusal prematurities and interferences and necessary occlusal corrections were carried out. Tooth preparation was done in relation to 35, distal root of 37 to receive a porcelain fused to metal restoration (Figure 2). insertion. This will also help in maintenance of gingiva by making it self-cleansable. Final impression was made using putty-reline technique and master cast was obtained. Wax pattern was fabricated, sprued, and invested. Casting procedure was carried out using standard techniques. Metal framework was tried in the patient's mouth and final prosthesis was cemented using glass ionomer cement. Post cementation instructions regarding periodontal maintenance were given. Recall was done periodically to assure the healing and success of the restoration. Radiographs at 3 months and 9 months suggested progressive formation of bone in the extraction socket along with resolution of radiolucency.

**CASE 2**

A 28-year-old patient reported to the department of conservative dentistry and endodontics with chief complain of pain in lower left back teeth since a week. Patient complained of pain on mastication, which was relieved on removal of stimulus. There was no significant past medical and dental history. On intraoral examination, the tooth #36 showed dislodged restoration and was tender on percussion. Periodontal probing depth was within normal limits all around the tooth. Radiographic examination revealed root canal treated teeth with instrument fracture in mesial canal and periapical radiolucency surrounding the mesial root (Figure 3). So, a diagnosis of chronic generalized periodontitis was made based on history, clinical and radiographic examination. Patient was given different treatment options but opted to save the tooth. Thus, retreatment was planned initially in relation to 36 after taking the written consent. Under rubberdam isolation, coronal restoration was removed and access to the chamber was made. After removing gutta-percha with protaper retreatment files (Dentsply), attempts were made to bypass the instrument. However, after repeated unsuccessful attempts, decision was made to change the treatment plan and root resection was planned with informed consent. Gutta percha was removed from distal canal with h files and retreatment files. biochemical preparation was done with protaper universal till F3. Irrigation was done with 3% sodium hypochlorite and 2% chlorhexidine and obturated using gutta-percha and zinc oxide eugenol with cold lateral condensation.

Seven days later hemisection of mesial root was planned under 2% local anaesthesia. Full-thickness flaps were elevated on the buccal and lingual aspects of the involved tooth and root resection was done as described in case 1 (Figure 4). Sutures were taken to approximate the flap and Immediate postoperative radiograph showed retained distal root and extraction socket of mesial root. Postoperative analgesics and antibiotics were given along with 2% chlorhexidine as mouth rinse. Socket was allowed to heal with no occlusal stress on distal root. Patient was recalled after 2 months and IOPA was taken showing bone regeneration and healing in absence of any signs and symptoms. Then, the

restoration of hemisected tooth was planned with fixed partial denture. Tooth preparation on second molar and second premolar was done and impressions were made similar to case 1 to receive fixed partial denture. After final cementation of prosthesis occlusal discrepancies were checked with articulating paper. Oral hygiene instructions were given and patient was recalled for followup at every 3 months.

**DISCUSSION**

Loss of posterior teeth may result in several undesirable sequelae such as mesial drifting, loss of arch length, and loss of masticatory function and bone loss. Hemisection is a valid treatment option for the molar teeth's in young children, which otherwise have to be extracted due to extensive caries. Thus, conservative management of extensive carious molar tooth in young patients can not only preserve the tooth but also reduce the financial burden, psychological trauma and occlusal dysfunction.

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. The treatment options to replace severely damaged and possibly unrestorable teeth include removable partial denture, fixed partial denture, and dental implant. In the present case, all possible treatment options were explained to the patient, including hemisection, as the decay was limited to mesial root. Implant therapy is a predictable option with good functionality<sup>6</sup> however, in this case, the patient chose an alternative treatment because of financial considerations and her desire to retain a previously placed fixed partial denture.

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<sup>7</sup>. Studies have found that the prognosis of molars with Grade III furcation is poor when compared to molars with a lesser degree of furcation involvement<sup>8,9</sup>. Considering these factors, favorable result in the present case may be attributed to minimal extent of furcation involvement at the time of surgery. The main

objectives of it are to facilitate postoperative maintenance and also to prevent further attachment loose.

From endodontic point of view, factors such as inoperable canals, weakening of the lateral walls of the remaining roots during endodontic instrumentation. Langer *et al.*<sup>10</sup> 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, in this particular case care has been taken to locate all the canals and obturate them upto apical terminal also all the procedure has been carried out under rubber dam isolation. Special attention was given to provide coronal seal as coronal restoration plays important role in bacterial penetration<sup>11</sup>. Moreover, socket preservation at the site of extracted root done in this case contributed to maintain the original topography of alveolar ridge.

Since hemisected teeth fail by root fractures, it is important to restore them adequately by an extracoronary restoration<sup>12</sup>. Restoration is required not only for function and stabilization of occlusion, after removal of tooth structure but also to serve as an abutment for fixed partial denture or splint. Special attention was given in the fabrication of the prosthesis, surfaces were designed to avoid any periodontal destruction and occlusal interferences. An improperly shaped occlusal contact area converts acceptable forces into destructive forces leading to ultimate failure of hemisection. Hence, abutment are given a taper greater than 6–10 degree to have a path of insertion compatible with the anterior abutment and occlusal table is reduced in size in order to reduce the forces on the retained hemisected root. Cuspal inclines are made less steep to reduce laterally directed forces and eliminate the nonworking contacts. Retained root is restored as premolar which helped to reduce the masticatory load. All these factors were kept in mind while fabricating the splint kind of prosthesis in the present

## CONCLUSION

Therefore, these cases highlights the interdisciplinary approach of molar hemisection, and prosthetic rehabilitation as an innovative

procedure providing long term success with minimal patient apprehension and long term stability.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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