

## HEMISECTION: SPLIT TO SAVE A COMPROMISED MANDIBULAR MOLAR

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### INTRODUCTION

Advanced dental therapeutic techniques have revolutionized the ability to preserve teeth that were once deemed beyond saving. These approaches rely on a multidisciplinary framework. Hemisection, for instance, is a treatment that combines concepts and practices from prosthodontics, oral surgery, endodontics, periodontics, and restorative dentistry.<sup>[1]</sup>

In this procedure, a multi-rooted tooth is surgically modified by preserving the intact portion of the crown along with its corresponding root, maintaining the tooth's stability within the socket at the furcation level. The damaged crown segment and its irreparable root are removed. A critical factor in such cases is meticulous pre-operative evaluation, emphasizing case selection through a thorough analysis in prosthodontics, endodontics, and periodontics.<sup>[2]</sup>

### Indications for hemi section

A) Periodontal indication: Severe bone loss affecting one or involvements, and severe recession or dehiscence of a root;

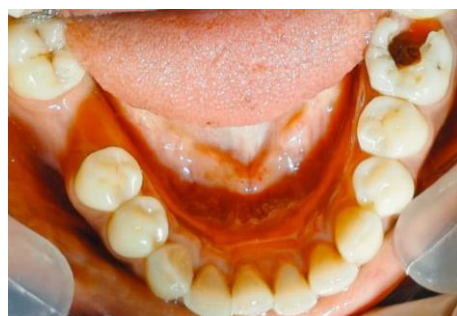
B) Endodontic or conservative indications: Inability to successfully treat and fill a canal, root fracture or root perforation, root decay, and severe root resorption.

### Contraindications for hemi section

Fused roots, endodontically untreatable retained root, weak and insufficient dentin thickness of the retained roots, excessive deepening of the pulp chamber floor, internal root decay, and presence of a cemented post in the remaining root. The following case report describes the hemi section procedure of bilateral mandibular first molars with subgingival caries extension.<sup>[3]</sup>

### CASE REPORT

A 36-year-old female was referred to the department of conservative dentistry and endodontics with a chief complaint of pain and food lodgement in the lower left 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 #36 was found to have a deep carious lesion involving distal and occlusal surfaces. [FIGURE 1].



**Figure 1: Pre operative photograph.**

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 and involving the floor of the pulp chamber [FIGURE 2].

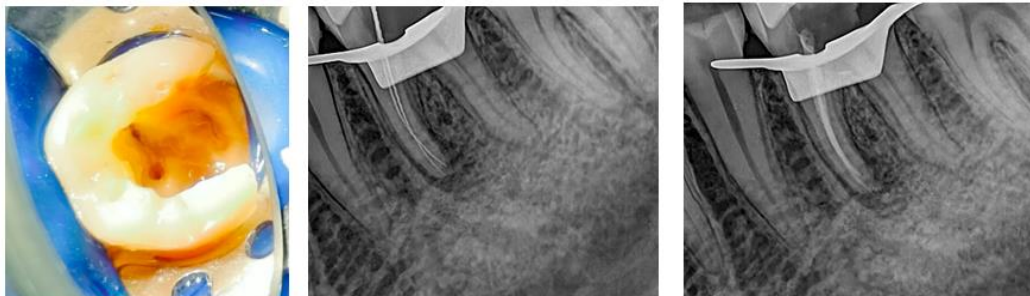


**Figure 2: Pre Operative Radiograph.**

Interproximal bone loss was evident between #36 and #37 along with mild haziness in the furcation area. Periapical radiolucency surrounding the apex of both roots of #36 was also found. 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 non-restorable, 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

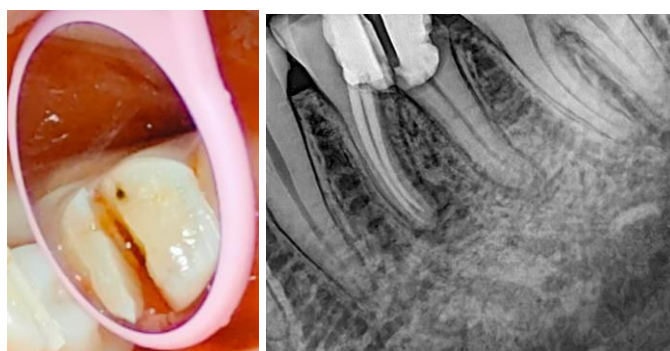
by fixed dental prosthesis over other treatment options. The periodontal prognosis of the mesial root was fair with good bone support. After completion of endodontic treatment that also included removal of all carious tooth structures [Figure 3, 4, 5], hemisection of distal root was performed under local anesthesia.



**Figure 3: Access Opening Under Rubber Dam, Figure 4: Working Length Determined Using 10k Files, Figure 5: Obturation Done With Gutta Percha.**

A low-speed surgical length fissure carbide bur was used under saline irrigation to make vertical cut toward the

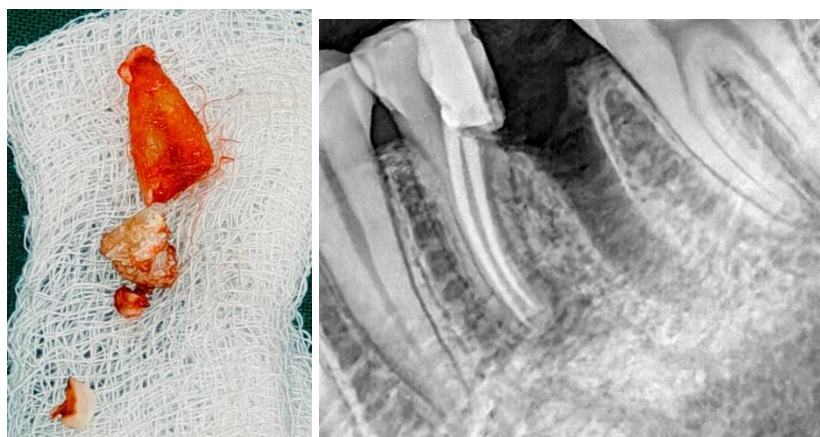
furcation area. Radiograph was taken to ensure separation [Figure 6,7].



**Figure 6,7: Separation of Roots Are Done.**

After completion of the sectioning, the root was elevated from its socket using a periosteal elevator and using root forceps, it was removed [Figure 8]. Granulation tissue was curetted out of the distal socket using surgical curettes. The socket was irrigated adequately with sterile normal saline and betadine. 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 [Figure 9].



**Figure 8: Extraction of Distal Root Done.**



**Figure 9: Suturing Done, Post Operative Photograph And Radiograph.**

Sutures were removed after 2 weeks. At 1-week recall visit, healing was found to be satisfactory, while mobility was absent. Tooth preparation of the mesial portion of the first permanent molar and second molar was performed followed by porcelain-fused-to-metal prosthesis [Figure 10].



**Figure 10: Crown Cementation Done.**

Radiographs at 2 months suggested progressive formation of bone in the extraction socket along with resolution of radiolucency around the mesial root of #36 [Figure 11].



**Figure 11: Follow Up Radiograph - After 2 Months - Shows Healing Of Distal Root Socket.**

## DISCUSSION

Hemisection is the sectioning of multi-rooted teeth with their crown portion, with the loss of periodontal attachment, and is performed to retain the original tooth structure and attain the fixed prosthodontic prosthesis.<sup>[4]</sup>

The term "root resection" encompasses both "root amputation" and "hemisection." According to Newell, the primary advantage of procedures like amputation,

hemisection, or bisection is the ability to retain part or all of the tooth. These procedures require restorative management of the crown and endodontic treatment for the remaining root or roots.<sup>[5]</sup>

In many cases, surgical repair will be very difficult, if not impossible, and the bony window may be so large that a periodontal defect is created. If neither the nonsurgical nor surgical options is feasible, other possible treatment options include root resection, hemisection, tooth replantation, or extraction followed by the placement of a bridge or osseointegrated implant.<sup>[6]</sup>

If the lesion is located on the distal or the lingual surface of the root, it may be impossible to visualize and correct the defect from a surgical approach. In these situations, tooth replantation for a single-rooted tooth, root resection, or hemisection may be the only treatment choices if an attempt is to be made to retain the tooth. Otherwise, extraction may be the only option.<sup>[6]</sup>

Success of root resection procedures depend, to a large extent, on proper case selection. It is important to consider the following factors before deciding to undertake any of the resection procedures.

- **Extent of Bone Loss:** Advanced bone loss around one root with sufficient bone levels around the remaining roots.
- **Tooth Position and Angulation:** Teeth with improper alignment, such as molars that are buccally, lingually, mesially, or distally tilted, are unsuitable for resection.
- **Root Divergence:** Teeth with well-separated roots are more suitable for resection, while those with closely approximated or fused roots are less ideal candidates.
- **Root Length and Curvature:** Long, straight roots are preferred over short or conical ones for resection.
- **Endodontic and Restorative Feasibility:** The retained root(s) must be amenable to endodontic treatment and restoration.<sup>[7]</sup>

Research findings on the outcomes of root resection vary. Some studies have shown a survival rate of over 90% for root-resected molars, while others have reported a failure rate of approximately 30% over a 10-year period.<sup>[8]</sup>

The overall survival rate of a large number of root-resected molars by Yuh et al. in a retrospective study was found to be 91.1%.<sup>[9]</sup>

A survival rate of nearly 93% over a 10-year follow-up was reported in another study by Carnevale et al. in cases where hemisection was performed for the management of furcated molars.<sup>[10]</sup>

## CONCLUSION

Hemisectioning a compromised mandibular molar represents a conservative and strategic approach to preserving natural dentition when full extraction would otherwise seem inevitable. By selectively removing only the diseased root and maintaining the healthy portion, hemisection not only extends the functional lifespan of the tooth but also supports the surrounding bone and adjacent teeth. Success depends heavily on careful case selection, meticulous surgical technique, and well-planned prosthetic rehabilitation. Ultimately, hemisection embodies the principle of "saving what can be saved," offering patients a viable, biologically friendly alternative to implants or bridges when appropriately indicated.

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