

# Hemisection of Mandibular Molar: A Conservative Approach for Management of Perio-Endo Lesion

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## ABSTRACT

Hemisection is considered as the conservative treatment option for treating molars with primary periodontal lesion with secondary endodontic involvement that involves the single root. This procedure involves the resection of periodontally involved root along with the associated crown to preserve the remaining part of the molar having sound periodontium. Multi-disciplinary approach should be considered for the proper treatment and prognosis of the tooth as it depends on various factors like severity of bone loss, root trunk length, degree of root separation, the curvature of the root, prosthetic rehabilitation and maintenance of oral hygiene. In this case report, root canal treatment and hemisection followed by prosthetic rehabilitation were successfully performed to treat perio-endo lesions of a mandibular molar.

**Keywords:** Furcation involvement; Hemisection; Perio-endo lesion

## INTRODUCTION

The pulp and periodontium have embryonic, and anatomic correlations. The periodontium communicates with the dental pulp through various pathways such as dentinal tubules, apical foramen, and lateral and accessory canals. These are the pathways through which pathological agents pass between pulp and periodontium, thereby creating perio-endo lesions.<sup>1</sup> Due to the complexities of these infections, a multidisciplinary treatment approach should be applied to treat these primary periodontal with secondary endodontic lesions that include both endodontic and periodontal therapy followed by proper prosthetic rehabilitation.<sup>2</sup>

This article presents a case report of the primary periodontal lesion with secondary endodontic involvement in the lower molar treated by conventional endodontic treatment and hemisection followed by prosthetic rehabilitation.

## CASE REPORT

A 41-year-old female patient reported to the Department of Conservative Dentistry and Endodontics, Kantipur Dental College with a complaint of mobility of the tooth in the lower right back region of the jaw for the past one year. Mobility was progressive and associated with discomfort

on mastication. There was no relevant history of any systemic disease. On intraoral examination, tooth 46 had cervical abrasion with gingival recession. The tooth was tender on percussion with grade II mobility. Probing depth was 10 mm around the distobuccal area (Figure 1) and 12 mm in the distolingual area. The tooth showed nonvital response on the electrical pulp tester as well as to cold and heat tests. An intraoral periapical radiograph (IOPA) showed severe vertical bone loss surrounding the distal root along with furcation involvement. However mesial root exhibited completely intact bone support (Figure 2). Cone Beam Computed Tomography (CBCT) of that area also showed similar findings. (Figure 3). Thus, it was identified as a primary periodontal lesion with secondary endodontic involvement of tooth 46.

The patient was explained the condition and prognosis of the tooth with feasible treatment options. The patient opted for hemisection followed by prosthetic rehabilitation over other treatment options.

Root canal treatment was performed. After access cavity preparation, working length was determined and canals were prepared with K-files. Irrigation was carried out with 2.5% NaOCl and 17% EDTA and calcium hydroxide was placed as intracanal medicament. On the subsequent visit,

canals were dried with sterile paper point and obturation was done using gutta-percha and resin-based sealer. Composite was used for post-endodontic restoration (Figure 4-6).

After completion of endodontic therapy, the patient was referred to the Department of Periodontics for hemisection. After one month, under local anesthesia, the full thickness mucoperiosteal flap was elevated by giving a crevicular incision from the second premolar to the second molar (Figure 7). A vertical cut was made faciolingually through the buccal and lingual developmental grooves toward the pulp chamber and the furcation area using a long shank tapered fissure carbide bur (Figure 8). The distal root along with its crown was extracted a traumatically and inflammatory granulation tissues were removed with the help of Gracey curettes. Thorough debridement and irrigation were done to remove bony chips. Platelet-rich fibrin (PRF) was placed for the preservation of the extraction socket. The flap was repositioned and sutured

using 3-0 black silk. The occlusal table was reduced to redirect the forces along the long axis of the mesial root and the operated area was covered with a periodontal dressing. Immediate IOPA showed the good condition of the extraction socket and the mesial root (Figure 9-13). After 1 week, the sutures were removed, and wound healing was evaluated. At 1 month of follow-up, healing was satisfactory with reduced pocket depth and mobility (Figure 14).

The patient was recalled after 1 month for prosthetic rehabilitation. But due to the pandemic of COVID – 19, the patient could not report back. The patient visited after 5 months, and healing was uneventful. The patient was advised for Fixed Partial Denture (FPD) using tooth 47 and mesial root of 46 as an abutment. Porcelain fused to metal (PFM) crown in 46 and all-metal crown in 47 was advised. Tooth preparations were done, and a provisional prosthesis was provided. After 1 week, cementation of FPD was done with the help of Glass Ionomer Cement (Figure 15-18).



**Figure 1: Periodontal pocket with distal root**



**Figure 2: Pre-operative radiograph**



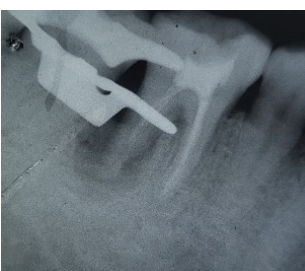
**Figure 3: Pre-operative CBCT**



**Figure 4: Access Opening**



**Figure 5: Working length determination**



**Figure 6: Post Obturation**



**Figure 7: Reflection of mucoperiosteal flap**



**Figure 8: Sectioning of distal root**



**Figure 9: Extracted distal root**



**Figure 10: PRF on distal socket**



**Figure 11: Suture placed**



**Figure 12: Periodontal dressing placed**



Figure 13: Immediate postoperative radiograph



Figure 14: Follow-up after 1 week

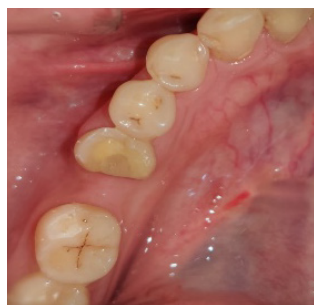


Figure 15: Follow-up after 5 months



Figure 16: After tooth preparation



Figure 17: Fabricated FPD



Figure 18: FPD cemented

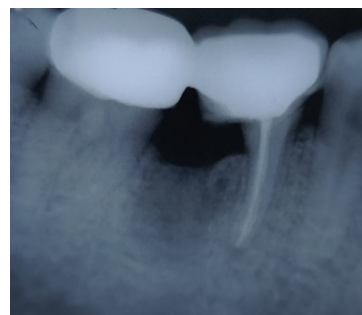


Figure 19: Post-cementation radiograph

## DISCUSSION

The periodontal-endodontic lesions is characterized by the involvement of the pulp and periodontal tissues in the same tooth. It may start as a separate entity, either through periodontium or pulp, but there is a chance to have a combined effect at the time of presentation. Progression of the periodontal disease leads to pulpal involvement mainly via apical foramen. Other pathways may include accessory, lateral, and secondary canals as well as dentinal tubules.<sup>1</sup> Elimination of both the disease process is required for the success of combined periodontal and endodontic lesions.

Hemisection is defined as the sectioning of a tooth consisting of two roots into the two halves followed by the removal of the diseased root and its coronal portion, which are not preservable by either endodontic treatment or periapical surgery.<sup>3</sup> It is a conservative and alternative treatment option instead of extraction. Indications of hemisection are; severe vertical bone loss involving only one root of multi-rooted teeth, furcation involvement, endodontic failure or vertical fracture of one root. The procedure converts furcation involved multi-rooted teeth into the non-furcated single-root tooth. It retains the tooth structure and surrounding bone, provides favorable environment for oral hygiene maintenance, reduces financial burden and psychological trauma of the patient associated with tooth loss.

The survival rate of the tooth treated with hemisection varies according to different authors. The survival rate is 93% over a 10-year follow-up according to Carnevale et. al,<sup>4</sup> and 80-94% as reported by Friedman.<sup>5</sup> Fugazzotto<sup>6</sup> compared the success rates of root-resected molars and molars treated with the implant which were 96.8% and 97.0% respectively and concluded that both root resection and implant placement with appropriate restoration demonstrated a high degree of success. Kinsel et al.<sup>7</sup> reported a 15.9% failure rate for root-resection therapy, whereas single implants showed a 3.6% failure rate.

For the long-term survival of hemisected teeth various factors like amount of bone support, angulation, and position of teeth in the arch, medical conditions, oral hygiene of patients, endodontic, periodontal, and prosthodontic factors should be considered.<sup>8</sup> As these hemisected molars fails mainly due to endodontic or restorative problems rather than periodontal disease, care must be provided for proper cleaning, shaping, and obturation of the remaining roots.

Platelet-rich fibrin was used for socket preservation to maintain the original topography of the alveolar ridge. It is harvested from venous blood, which is rich in fibrin, platelets, white blood cells, growth factors, and cytokines that helps to regulate proliferation, differentiation, and apoptosis of repair-related cells, and subsequently promotes tissue repair.<sup>9</sup>

The remaining tooth structure are adequately restored with extra coronal restoration to prevent chances of failure by root fracture. In this case, FDP with two abutments i.e., the mesial root of mandibular first and second molar was provided. Due to the inappropriate crown root ratio of the remaining mesial root, a single crown was not feasible. Ideally intentional root canal treatment of the abutment tooth is suggested. However, it was not performed in this case as studies suggest that clinical and radiographic success of vital teeth, when used as an abutment for crown and FPD, is relatively high ranging between 92 to 98% at different follow-up periods ranging between 5 - 20 years.<sup>10</sup> According to Goodacre et. al. need for endodontic treatment was only 1% among abutments of all ceramic crowns and 11% among abutments for FPDs.<sup>11</sup>

However, hemisection also has some disadvantages such as pain and anxiety associated with surgical procedures, root surfaces reshaped by grinding in the furcation site are susceptible to caries, improperly shaped occlusal contact areas may convert acceptable forces into destructive forces

and predispose tooth to trauma from occlusion leading to root fracture and ultimate failure.<sup>12</sup> This procedure has limitation like closely approximated or fused roots, medically compromised patients, patients with bad compliance, and poor endodontic candidates or inoperable endodontic roots.<sup>13</sup>

## CONCLUSION

Hemisection is an effective and conservative treatment alternative for molars with perio- endo lesions with furcation involvement over the conventional treatment modalities. It preserves the remaining part of the tooth having sound periodontium. The prognosis depends upon condition of remaining root, prosthetic rehabilitation, and oral hygiene of the patient. Therefore, this procedure requires meticulous planning, a multi-disciplinary approach as well as regular maintenance for long-term survival.



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