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Conservative Management of a Mandibular Molar with Severe Perio-Endo Lesion Using Hemisection: A Clinical Case Report

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Abstract

Hemisection is a conservative dental procedure involving the removal of one root and the associated crown portion of a multirooted tooth. This technique is predominantly applied to mandibular molars with complex perio-endo pathologies that compromise one root while preserving the other. Hemisection was chosen as the treatment approach to preserve the unaffected root and maintain functionality. This case report outlines the diagnostic process, treatment protocol, surgical procedure, and postoperative outcomes of treating periodontally involved mandibular molar demonstrating the effectiveness of hemisection as a conservative dental intervention.

Introduction

Hemisection is a conservative dental procedure involving the surgical division of a multi-rooted tooth, typically a molar, by removing one of its roots along with the associated crown portion. Root amputation dates back to Farrar in 1884 (1) as treatment for multirooted teeth with furcation involvement, Gottlieb and Orban (2) in 1933, and Messinger and Orban in 1954 (3). Today, a distinction is made between root resection (RR) and crown resection (CR) procedures. RR includes root amputation or any RR at the level of the cementoenamel junction without removal of portions of the crown. CR addresses hemisection (bicuspidization), trisection, and premolarization (4).

Hemisection aims to preserve as much of the natural tooth structure as possible, allowing the remaining root to continue functioning effectively. It is often considered when one root is severely compromised due to decay, periodontal disease, or fracture, while the other roots remain healthy and stable.

The biological basis for this procedure lies in the connection between periodontal disease and pulp health. In 1964, Simring and Goldberg highlighted the correlation between periodontal disease and dental pulp (5).

The periodontium communicates with the dental pulp through various pathways, such as dentinal tubules, apical foramen, and lateral and accessory canals (6). These pathways allow pathological agents to travel between the pulp and periodontium, leading to perio-endo lesions.

As emphasized by Cohen and Hargreaves in Pathways of the Pulp, "Preserving the natural tooth structure should always be the clinician's priority, as it offers the most predictable long-term results." Hemisection reflects this principle by providing an alternative to complete extraction, particularly in cases where saving part of the tooth helps maintain occlusal stability and function.

The significance of hemisection in modern dentistry lies in its ability to extend the lifespan of teeth that would otherwise be considered non-restorable. According to Weine, "The ultimate goal of endodontic and periodontal treatment is to maintain the natural dentition in a state of health, function, and comfort for the lifetime of the patient"(7). By selectively removing the damaged root, hemisection offers a cost-effective solution that reduces the need for more extensive procedures, such as dental implants or bridges.

Moreover, hemisection aligns with the broader trend of minimally invasive dentistry, which

prioritizes patient comfort and long-term oral health outcomes. Carnevale et al. reported a survival rate of approximately 93% over a 10-year follow-up period for patients who underwent hemisection for the management of furcated molars instead of extraction (8).

The success of hemisection largely depends on proper case selection and adherence to specific endodontic, surgical, and restorative guidelines. It is suggested that hemisection should always be considered before opting for complete extraction to achieve long-term beneficial results (9).

CASE REPORT

A 39-year-old female patient reported to the Department of Periodontics and Implant Dentistry with the chief complaint of pain in her lower right back tooth region for the past 3 months. The patient gives a history of pain which was dull and intermittent which aggravates during mastication, leading to difficulty in chewing. The patient is classified as ASA Type I (normal healthy patient).

On Intraoral examination, No dental caries were found on tooth 46. Tooth 46 exhibited grade II mobility, grade III furcation involvement, tenderness on percussion, negative response to vitality testing and a 10 mm periodontal pocket on the distal aspect. On soft tissue examination, swelling was evident on the distal aspect of tooth 46. Pus discharge was evident in 46.

Periapical radiographs revealed significant bone loss surrounding the distal root of tooth 46. Widening of the periodontal ligament (PDL) space was noted on the mesial root of tooth 46. The bone support surrounding the mesial root was intact and considered suitable for retention. Based on clinical and radiographic findings, the case was diagnosed as a Primary-perio Secondry-endo lesion.

Given the localized nature of the bone loss and the compromised distal root, hemisection was planned. The mesial root showed no signs of pathology and was considered suitable for retention. The treatment plan included:

- - Endodontic treatmen(RCT).
- - Surgical hemisection to remove the affected distal root.
- - Restorative rehabilitation with a full-coverage crown

After completing the etiotropic phase (scaling and root planing), root canal therapy was done in 46. After endodontic therapy, hemisection was performed in 46.

SURGICAL PROCEDURE

The procedure was performed under local anesthesia using 2% lignocaine with adrenaline (1:80000). A crevicular incision was made from the mesial aspect of tooth 46 to the mesial aspect of tooth 47, followed by a single vertical releasing incision on the mesial aspect of tooth 46. A full-thickness mucoperiosteal flap was elevated, and inflammatory granulation tissues were removed using Gracey curettes to expose the vertical bone defect.

A vertical cut was then applied faciolingually through the buccal and lingual developmental grooves of the tooth, extending through the pulp chamber and furcation to resect the distal root along with its crown. A high-speed long-tapered fissure carbide bur was used to create the vertical cut toward the bifurcation area. The distal root was then extracted atraumatically. The distal socket was thoroughly debrided and irrigated with sterile saline to remove any remaining bony chips. The flap was then approximated and sutured using 3-0 black silk sutures. A periodontal dressing was applied.

Postoperatively, the patient was prescribed antibiotics and analgesics and was advised on proper oral hygiene practices. A follow-up appointment was scheduled after one week for suture removal, and healing was uneventful.After a healing period of four weeks, the patient proceeded to the restorative phase, during which a full-coverage crown was placed.

DISCUSSION

Perio-endo lesions present a complex clinical challenge due to the intricate relationship between periodontal and endodontic pathologies. The involvement of both periodontal and pulpal tissues complicates diagnosis and treatment planning. When conventional endodontic and periodontal therapies prove insufficient, hemisection can serve as a viable treatment option. This procedure aims to preserve the

remaining healthy tooth structure while eliminating the diseased portion.

Hemisection involves the surgical removal of a compromised root and its corresponding portion of the crown in multi-rooted teeth, typically molars. The goal is to retain the healthy root structure, supporting continued functionality within the dental arch.

This treatment is particularly beneficial when the lesion is localized to one root, provided the remaining root has adequate bone support and periodontal stability. By removing the affected root, the source of persistent infection can be eliminated, encouraging periodontal healing and improving the overall prognosis of the tooth.

In the present case, all possible treatment options were discussed with the patient, including hemisection. The patient declined tooth extraction and, due to financial constraints, also rejected the option of a dental implant.The long-term success of a hemisected molar depends on several interrelated factors, including root anatomy, mobility, crown-to-root ratio, severity of attachment loss, occlusal relationships other factors such as maintenance therapy, endodontic and restorative therapy, the patient's general health (10).

Studies have shown that the long-term prognosis for molars with Grade III furcation involvement is poorer than for those with lesser degrees of involvement (11). Early intervention through root resection or hemisection at the initial stage of furcation invasion tends to lead to better outcomes.

Carvalho et al. reported a 93% survival rate after 10 years for patients who underwent hemisection instead of extraction(12). Park et al. conducted root resection therapy in 691 molars of 579 patients. Their analysis revealed that root resections for periodontal concerns yielded a more favorable prognosis, particularly when the remaining roots retained over 50% bone support (13).

Fugazzotto found a cumulative success rate of 96.8% for root-resected molars, comparable to a 97.0% success rate for molar implants, suggesting both procedures demonstrate high functionality and longevity (14). Basten et al. observed that 92% of hemisected molars remained functional over a 12-year period (15).

However, hemisection is not without limitations. The procedure requires careful surgical execution to prevent damage to the remaining root and surrounding structures. Post-operative complications such as root fractures, periodontal breakdown, or secondary infections can occur, particularly if oral hygiene maintenance is inadequate. Moreover, the longevity of the hemisected tooth is often contingent on the quality of the final prosthetic restoration and the patient's compliance with follow-up care.

CONCLUSION

Hemisection offers a conservative, cost-effective, and functionally beneficial option for preserving the unaffected root. When performed on appropriately selected cases with comprehensive periodontal and endodontic support, it can result in favorable outcomes and prolonged tooth retention.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflict of interest: There are no conflicts of interest.

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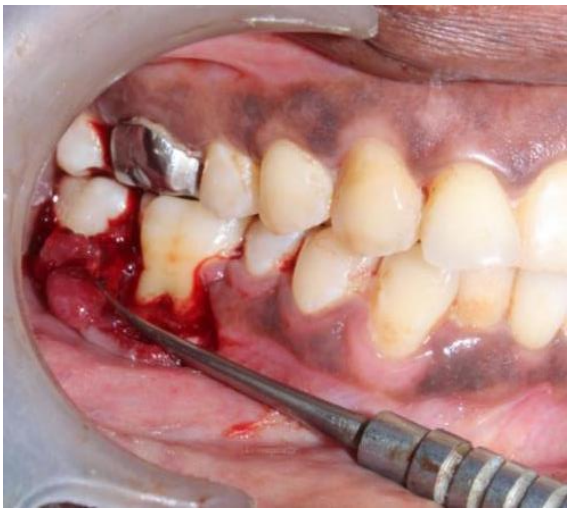
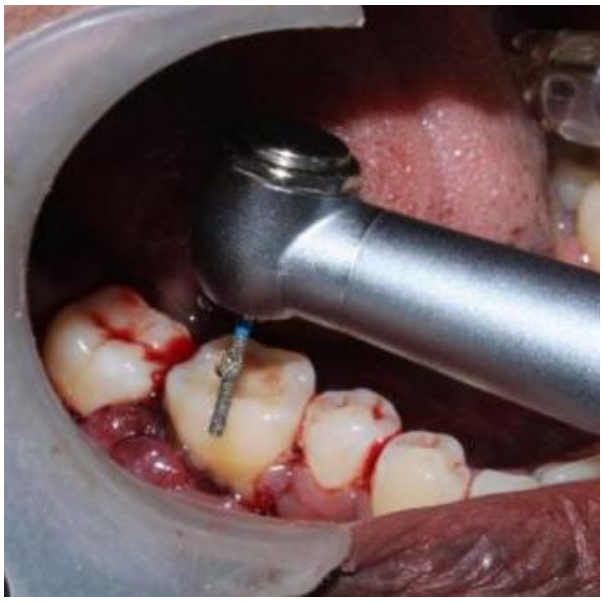
FIGURES

PREOPERATIVE IMAGE

CREVICULAR INCISION AND VERTICAL INCISION GIVEN IN 46



FLAP ELEVATION WAS DONE



VERTICALLY ORIENTED CUT WAS MADE FACIOLINGUALLY THROUGH BUCCAL & LINGUAL DEVELOPMENTAL GROOVES, THROUGH THE PULP CHAMBER,THROUGH THE FURCATION

HEMISECTION OF THE DISTAL ROOT WAS DONE

FLAPS APPROXIMATED USING SUTURES AND PERIODONTAL DRESSING WERE GIVEN

FINAL RESTORATION WAS GIVEN

RADIOGRAPHIC IMAGE OF 46