IJPSR (2025), Volume 16, Issue 2 (Case Study)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 14 September 2024; received in revised form, 16 October 2024; accepted, 06 November 2024; published 01 February 2025

TOOTH HEMISECTION RATHER THAN EXTRACTION OF A MUTILATED MOLAR-A 2 YEAR FOLLOW UP CASE REPORT

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Keywords:

Hemisection, Prosthetic Rehabilitation, Resorption

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ABSTRACT: Modern breakthroughs in dentistry have created the opportunity for people to maintain a functional dentition for lifetime. Hemisection is a conservative approach of maintaining tooth. This is an endodontic treatment that involves removing one or more roots as well as the current crown structure in order to promote tooth retention and address nonfunctional dental roots that cannot be maintained. As they are prone to fracture it is critical to replace them using an extracoronal restoration. A 35-year-old male patient complaint of mild intermittent pain in relation to the lower left back tooth region since 15 days. The teeth were tender to percussion. A diagnosis of symptomatic irreversible pulpitis with symptomatic apical abscess with a treatment plan of hemisection in relation to #36 was made. 18 months clinical and radiographic follow-up depicts adequate radiographic healing, high lighting in achieving retention of mesial half of tooth structure and its supporting periodontium.

INTRODUCTION: Progressive enhancement in all parts of dentistry have enabled people to maintain a functional dentition throughout their lives. Therapeutic measures used to ensure tooth retention vary in complexity. The treatment may include a combination of restorative dentistry, endodontics, and periodontics to preserve the teeth in whole or in part [1]. The success rate for endo-surgery ranges from 73% to 99% but indicated only in less than 5% of all endodontic patients [2]. The prognosis depends on diagnosing factors, case selection, indications, contraindications, treatment procedures, periodic evaluations and statistical analysis [3].

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.16(2).516-21

This article can be accessed online on www.ijpsr.com

DOI link: https://doi.org/10.13040/IJPSR.0975-8232.16(2).516-21

The resection methods are described: root amputation, hemisection, radisection, and bisection [4]. If the bone loss is restricted to a single root, the procedure named hemisection may be implemented [5]. It is the splitting of a mandibular molar into two halves, followed by the removal of the damaged root and coronal region. The retained root is endodontically treated, and the furcation area is made self-cleansable by carefully removing the root's lip. As they are prone to fracture it is critical to replace them using an extracoronal restoration [5]. Preffered when one of the molar roots is unsalvageable due to caries, periodontitis or iatrogenic issues. Preserves the tooth structure, alveolar bone, and costs less than alternative treatment choices [6]. Thus a conservative with a favourable prognosis [5].

Indications for a hemisection, according to Weine are:

1. Furcation destruction.

2. Severe vertical bone loss involving only one root of multirooted teeth.
3. Proximity of unfavorable roots.
4. Severe root exposure due to dehiscence.
5. Perforation pulp chamber, or pulp canal of one of the roots.
6. Prosthetic failure of abutments within a splint.
7. Vertical fracture of one root.
8. Severe destruction as a result of furcation or subgingival caries [7].

Contraindications are:

1. Deep furcation perforation.
2. Conjoined roots that cannot be restored.
3. Teeth that have short or unsuccessful canal treatments [8, 9].

Rather than extracting the tooth in toto, this kind of conservative procedure helps preserve as much of the tooth structure as possible [10].

This case report describes a patient who had complained of pain in the lower left back tooth region. The treatment plan involved initial endodontic therapy, followed by hemisection of the distal half of the first molar. After a month, when healing was found satisfactory, a fixed prosthesis was given which served the dual purpose of acting as a splint as well as restoring the masticatory function of tooth. Thus, prognosis of tooth improved, and the need for extraction of tooth was eliminated [11].

Case Report: A 35-year-old male patient reported to the department of Conservative Dentistry and Endodontics with the chief complaint of mild intermittent pain in relation to lower left back tooth since 15 days. On taking the history, the pain was sudden in onset, mild and aggravates on consuming cold beverages. No relevant medical history was noted. Clinical examination revealed distoproximal caries involving distal root and furcation in lower left molar (tooth #36). Cold testing of #tooth 36 elicited an intense lingering pain. The tooth was tender to percussion with grade I mobility and pocketdepth of 4-5 mm on the distal side of the tooth. A preoperative IOPA revealed distoproximal caries involving distal root and periapical radiolucency at the furcation **Fig. 1.** From the clinical and radiographic findings, a diagnosis of symptomatic irreversible pulpitis with symptomatic apical abscess in relation to tooth #36 was established. Since the patient was reluctant for extraction, a conservative course of treatment was chosen, involving the hemisection of tooth #36 followed by prosthetic replacement.

Endodontic Phase: In the first visit, local anesthesia was administered using 1.8mL of 2% lidocaine with 1:80,000 epinephrine [Lignox 2% ADR INJ, Indoco Remedies Ltd. (Warren, Pharma), Mumbai, MH, India] via inferior alveolar nerve block technique. Under rubber dam isolation and magnification (6x) the caries were excavated using large BR#31 round bur (Mani, Inc., Utsunomiya, Japan).

Pulp chamber was explored using DG16 endo explorer (Hu-Friedy, Chicago, Illinois, USA). The patency was confirmed with the SS hand 10k file (Mani, Japan) Working length was determined using an apex locator (Root ZX Mini; J Morita, Japan) and confirmed radiographically **Fig. 2**. The cleaning and shaping was done with the 20k SS hand files (Mani, Japan), followed by rotary instrumentation up to 25-4% in both the canals. Subsequently, the canals were irrigated with 2.5% sodium hypochlorite (NaOCl) (Prime Dental Products, India) and normal saline solution (0.9%).

The master cone radiograph was confirmed and checked for tugback **Fig. 3.** The root canals were dried with paper points and obturated with lateral compaction technique using AH Plus sealer (De Trey; Dentsply, Konstanz, Germany) **Fig. 4.**

Periodontic Phase: Local anaesthesia was administered and crevicular incision from the region of the first premolar to the second molar was made followed with elevation of full thickness mucoperiosteal flap. Further curettage and debridement were performed due to the obvious bone defect. The distal root was extracted by making a vertical cut faciolingually towards the bifurcation area using a long shank tapered fissure carbide bur (Mani, Japan).

When extracting the distal root, great care was taken to avoid damaging the nearby tooth and bone and was further confirmed radiographically **Fig. 5.** Comprehensive root planing of the mesial root was carried out with curette in conjunction with debridement and irrigation of the socket. The surgical dressing was completed, and sutures were inserted without any occlusal load on the mesial root followed with core build up by dental amalgam was done **Fig. 6.** One month later, fixed partial denture was planned for the rehabilitation of the hemisected tooth with respect to teeth #36 and 37.

Prosthodontic Phase: Tooth preparation was carried out for porcelain fused to metal crown on teeth #36 and 37.

Impression was recorded followed by cementation of the crown. Periodically, recall was carried out to ensure the restoration's success and healing **Fig. 7**.

24 months follow up radiograph showed a good bone fill in relation to distal root indicative of good healing and probing pocket depth was reduced with no mobility **Fig. 8.**

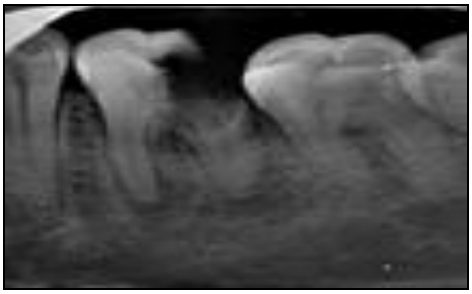

FIG. 1: PRE OPERATIVE RADIOGRAPH

FIG. 2: WORKING LENGTH DETERMINATION

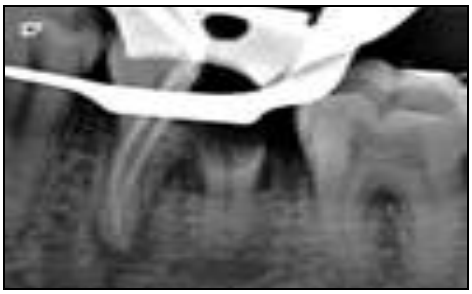

FIG. 3: MASTER CONE RADIOGRAPH

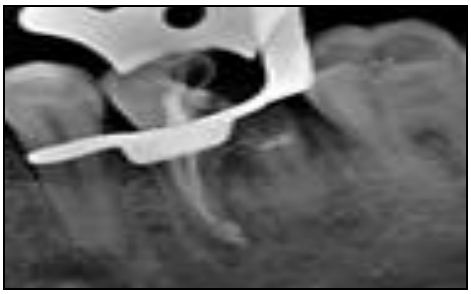

FIG. 4: OBTURATION RADIOGRAPH

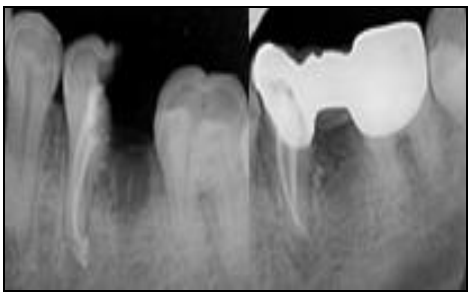

FIG. 5: HEMISECTIONED TOOTH

FIG 6: POST ENDODONTIC RESTORATION WITH AMALGAM

FIG 7: CORONAL PROSTHESIS

FIG 8: 24 MONTHS FOLLOW UP RADIOGRAPH

DISCUSSION: Nowadays, people want to keep their natural teeth for a lifetime [12]. Crack and dental caries extending to the root often present with restorative treatment challenges [13]. Assessing periodontal, prosthodontic, and endodontic conditions is crucial for choosing the right patients. Before any molar extraction, according to Buhler, hemisection should be taken into consideration as it offers a reliable, cost-effective, and biologically sound option with good long-term success [14]. A periodontal-endodontic defect is treated with root canal debridement and, as an adjunct, surgical techniques that provide improved access for cleaning the root surfaces and apical diseases [15, 16]. The patient's caries index, medical condition, and level of oral hygiene should all be taken into account before choosing a tooth for hemisection [1].

However, it is associated with some disadvantages such as:

1. Any surgical procedure, it can lead to pain.
2. Root surfaces that are reshaped by grinding in the furcation are more susceptible to caries.
3. Remaining roots must undergo endodontic therapy and the crown must undergo restorative management [17].

Park SY applied root excision therapy to 691 molars in 579 patients. After reviewing from 342 out of 402 molars for more than a year, it was determined that the prognosis for periodontal disease was better with root excision than it was for non-periodontal disease [1]. *According to recent findings by Park *et al.* [7], if the patient practices good dental hygiene, hemisection of molars with dubious prognosis may be able to preserve the teeth without causing noticeable bone loss over an extended period of time. According to Saad *et al*. (2008), hemisection of a mandibular molar may be an appropriate course of therapy if the decay is limited to one root and the other root is in good health, allowing the remaining tooth to potentially function as an abutment [1]. When hemisection is used to keep a challenged tooth in place, the prognosis is similar to that of any other tooth that receives endodontic therapy [18].

The Following four Criteria are Crucial for Choosing a Molar for Hemisection [19]: Root Form, Root Divergence, Furcation Location, and Remaining Root Attachment. In order for the tooth to continue functioning on its own after losing some of its root support, a restoration is required for function and stabilization of occlusion [18].

Points to Consider while Fabricating a Prosthesis: If nonocclusal surfaces lack physiologic form or if margins are flawed, restoration may exacerbate periodontal disease. An occlusal contact area that is not adequately designed changes permissible forces into destructive forces, which ultimately results in hemisection failure. In order to have an insertion path that is compatible with the anterior abutment, hemisected abutments are tapered more than 6 to 10 degrees. To make up for this, the abutment is fitted with buccal and lingual grooves. To lessen the stresses on the retained hemisected root, the occlusal table is shrunk in size.In order to decrease nonworking contacts and lessen laterally directed stresses, cuspal inclines are made less steep. Premolar restoration of the retained root assisted in lowering the masticatory burden. According to Stein, "the sanitary pontic is the best design for posterior region, aesthetic permitting [20].

Good and managed thriving restoration is essential for the success of periodontal health. Using a crown splinter as a retainer in abutment teeth can be an alternative. The preparation crown splinter is similar to inlay preparation, which is more conservative and less damaging hard tissue in vital teeth. Furthermore, the crown splinter more preserves periodontal health while causing minor pulpal damage [21].

Long-term success depends on careful patient selection with good oral hygiene, meticulous surgical and restorative management, and a thorough diagnosis. Hemisection should be discussed as a possible alternative to extraction and implant therapy when patients are thinking about their treatment options [18].

"Root resection" is the combined term for "root amputation" and "hemi-section." Newell claims that keeping part or all of the tooth is an advantage of amputation, hemisection, or bisection. The crown must have restorative treatment performed on it, and endodontic therapy must be administered

to any surviving root or roots [22]. Remaining tooth structure was restored with crown splinter PFM after repositioning the occlusal contacts in a favorable position because occlusion modifications are required after hemi section because root fracture is the main reason for failure [23]. Newell evaluated the quality of 70 root-resected molars from 62 patients. In 21 (30%) of the resections, the presence of subgingival, residual roots, furcal lips, and/or ledges was deemed to be problematic. Maxillary molar failure rates were higher than mandibular molar rates (22.7%) [24].

On 34 resected molars, Buhler observed a 32% failure rate after ten years. Once more, periodontal collapse resulted in the extraction of only one tooth, although endodontic disease and root fracture were the primary causes of failure. In a follow-up conducted three to ten years later, Blomlof *et al.* [8] discovered the same failure rate [25].

579 patients had 691 molars treated with root excision therapy by Shin-Young Park. Of the 402 molars that had been followed up on for more than a year, 342 had their associated factors investigated. They came to the conclusion that patients with periodontal issues had a better prognosis from root excision than those without it. It was crucial that the remaining roots had more than 50% bone support in order to get the desired outcome. This recommendation could enhance the predictability of treatment including root excision [26]. In an academic setting, >50% of teeth remained functional after 9 years of root resection therapy [27].

According to a study by Atul Jain, hemisection was performed with the removal of the mesial root and crown in a case of significant loss of the mesial root due to external root resorption and a decent quantity of the distal root remaining with appropriate bone support. After moving the occlusal contacts into a more advantageous location, the remaining tooth structure was repaired using composite and utilised as an abutment in a crown and bridge [1]. According to a review article by Saraf *et al.* outcomes of several studies reveal success rates ranging from 62% to 100% with follow up periods of 1 to 23 years and they came to the conclusion that when hemisection is performed, an overall success rate of approximately 88% can be predicted [28]. Kumar performed a hemisection procedure on a 45-year-old male patient. It had a persistent chronic sinus tract associated with a periodontal pocket in relation to an endodontically treated and crowned lower right first molar. Following a provisional diagnosis of vertical root fracture in relation to mesial root of 46, exploratory surgery was done. The mesial root was extracted. Socket preservation was done by grafting the extraction site with a mixture of the demineralized freeze-dried bone allograft [29].

Basten *et al.* found that 92% of all hemisected molars sustained over a period of 12 years, with failures attributed to recurrence of caries, endodontic and strategic issues [30].

CONCLUSION: The case study highlights the significance of specialised knowledge and professional communication through its therapeutic planning, surgical sequencing, and pluridisciplinarity. A baton used for tooth extraction is called a hemisection. The procedure's long-term success is determined by the careful selection of cases.

ACKNOWLEDGEMENT: The author would like to express their gratitude towards researchers and research scholars in the field whose work laid the foundation for this review. They would like to thank editorial team members and reviewers for their constructive feedback and their valuable suggestions during the review process. The inclusion of their input has substantially improved the clarity and coherence of this article.

CONFLICTS OF INTEREST: The author declares no conflict of interest.

REFERENCES:

1. Jain A, Bahuguna R and Agarwal V: Hemisection as an alternative treatment for resorbed multirooted tooth-A case report. Asian J Oral Health Allied Sci 2011; 1(1): 44-6.
2. Elemam RF and Pretty I: Comparison of the success rate of endodontic treatment and implant treatment. ISRN Dent 2011; 2011(1): 1-8.
3. Babaji P, Sihag T, Chaurasia VR and Senthilnathan S: Hemisection: A conservative management of periodontally involved molar tooth in a young patient. J Nat Sci Biol Med 2015; 6(1): 253-55.
4. Parmar G and Vashi P: Hemisection: a case-report and review. Endodontology 2003; 15(1): 26-9.
5. SA BINH and Alqahtani A: Tooth Hemisectioning as an Alternative to Extraction: A Case Report. J Dent Sci 2020; 2(1): 1-3.

6. Nowakowski T: Anthony, Serebnitski Alex, Pesun. J.Igor. Hemisection as a treatment option: a case report. Oral Health J 2010; 100(3): 83-9.
7. Styaningrum Y, Kuncoro RA, Untara RT and Kristanti Y: Hemisection and porcelain fused to metal crown splinters on the first molar: A case report. J Dentomaxillofac Sci 2022; 7(3): 186-89.
8. Falakaloglu S, Adiguzel O, Oztekin F, Deger Y and Ozdemir G: Hemisection: Two case reports. Int Dent Res 2016; 6(1): 16-20.
9. Taori P, Nikhade PP and Mahapatra J: Hemisection: a different approach from extraction. Cureus 2022; 14(9): 29410
10. Khetan RR and Mahapatra J: Hemisection: A Boon for the Hopeless Tooth. Cureus 2024; 16(5): 59967.
11. Joshi K, Singh V and Kambalyal P: Hemisection-saving by Slicing. Adv Hum Biol 2016; 6(2): 104-7.
12. Karimah F, Hutami ER, Nugraheni T and Mulyawati E: Hemisection as an alternative management for mandibular first molar with bifurcation lesion and root fracture: a case report. In 4th International Conference on Sustainable Innovation 2020–Health Science and Nursing (ICoSIHSN 2020) Atlantis Press 2021; 209-212.
13. Khazin SM and Omar SH: Different extra-coronal restoration options of hemisected teeth on structurally compromised mandibular molar: Report of two cases. IIUM J of Orofacial and Health Sci 2023; 4(1): 89-98.
14. Park SY, Shin SY, Yang SM and Kye SB: Factors influencing the outcome of rootresection therapy in molars: A 10-year retrospective study. J Periodontol 2009; 80(1): 32-40.
15. Parwani S, Rathi N, Wankhade S and Bartere S: Hemisection–ray of hope for hopeless tooth in a patient with progressive destruction of periodontium: a rare case report. J Dent Res 2020; 4: 1-6.
16. Esh S and Adhikari HD: The last hope of survival: Hemisection of mandibular molar. J Prim Care Dent Oral Health 2022; 3(1): 24-6.
17. Shah S, Modi B, Desai K and Duseja S: Hemisection a conservative approach for a periodontally compromised tooth: a case report. J Adv Oral Res 2012; 3(2): 21-5.
18. Radke U, Kubde R and Paldiwal A: Hemisection: A window of hope for freezing tooth. Case Rep Dent 2012; 2012: 390874.
19. Parmar G and Vashi P: "Hemisection: a case report and review," Endodontology 2003; 15(1): 26–9.
20. Schmitt MS and Brown HF: "The hemisected mandibular molar. A strategic abutment. J Prosthet Dent 1987; 58(2): 140–44.
21. Faqiha FA, Carissa C, Nugraheni T and Mulyawati E: Hemisection with crown splinter in perforation mesial canal wall first molar mandible: a case report. Bali Med J 2021; 10(3): 1220-1224
22. Newell DH: The diagnosis and treatment of molar furcation invasions. Dent Clin North Am 1998; 42: 301-37.
23. Styaningrum Y, Kuncoro RA, Untara RT and Kristanti Y: Hemisection and porcelain fused to metal crown splinters on the first molar: A case report. Journal of Dentomaxillofacial Science 2022; 7(3).
24. Newell DH: The role of the prosthodontist in restoring root-resected molars: A study of 70 molar root resections. J Prosthet Dent 1991; 65: 7-15.
25. Bühler H: Evaluation of root-resected teeth. Results after 10 years. J Periodontol 1988; 59: 805-10.
26. Park SY, Shin SY, Yang SM and Kye SB: Factors influencing the outcome of root-resection therapy in molars: A 10-year retrospective study. J Periodontol 2009; 80: 32-40.
27. Esh S and Adhikari HD: The Last Hope of Survival: Hemisection of Mandibular Molar. Journal of Primary Care Dentistry and Oral Health 2022; 3(1): 24-6.
28. Munir B: Hemisection as an alternative treatment for mandibular molars with separated instrument: a case report. Journal of University Medical & Dental College 2022; 13(3): 453-5.
29. Koç B, Koç D and Sen D: Rehabilitation of mandibular molar teeth with single crown prosthesis after root resection and hemisection applications due to vertical root fracture: two case reports. ADJ 2024; 10(1): 91-101.
30. Taori P, Nikhade PP and Mahapatra J: Hemisection: a different approach from extraction. Cureus 2022; 14(9).

How to cite this article:
Dhadda S, Raisingani D, Mittal P and Prasad AB: Tooth hemisection rather than extraction of a mutilated molar-a 2 year follow up case report. Int J Pharm Sci & Res 2025; 16(2): 516-21. doi: 10.13040/IJPSR.0975-8232.16(2).516-21.