

Hemisection – A Conservative Management of Compromised Bilateral Mandibular First Molars: A Case Report

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ABSTRACT

Hemi section refers to the sectioning of two rooted teeth, and the removal of the diseased root and its crown portion. When caries, resorption, perforation, or periodontal pathology is limited to one root and the other root remains essentially healthy, it is considered as a conservative treatment option. Hemi section of an affected tooth preserves the dental structure and alveolar bone while being more affordable than alternative treatment methods. The most essential factor in determining long-term effectiveness in such an approach is case selection. This case report describes the hemi section of a bilateral mandibular molar with subgingival caries extension, followed by appropriate restoration.

Keywords: Hemi Section; Mandibular Molar; Root Caries; Root Canal Treatment; Subgingival Caries

Introduction

Losing teeth is always undesirable, especially loss of the posterior teeth frequently causes teeth to drift, lose their ability to masticate, and shorten the arch length, all of which necessitate care and preventative procedures [1]. Dental extraction and replacement are one of the most common options for treating periodontally affected molars with severe decay. An alternative conservative method of tooth preservation is hemi section [2]. The terms “hemisection” and “root am-

putation” as well as “root sectioning” and “bisection” refer to a type of therapy that allows the preservation of alveolar bone, and tooth structure. The fundamental idea behind this procedure is to remove the tooth’s affected components that are not functioning properly to create a healthy periodontal environment. It refers to splitting a molar in half and removing the diseased root together with the crown [3]. This tooth retention necessitates an interdisciplinary approach for diagnosis, treatment planning, and implementation [4]. Hemi section is a better and more economical option than extracting a tooth

and replacing it with an artificial tooth implant or conventional prosthesis [5].

Indications for hemisection [6]:

- 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 hemisection [6]: 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 hemisection procedure of bilateral mandibular first molars with subgingival caries extension.

Case Report

A 19-year-old male patient came to the department complaining of decay and pain in the lower right and left back tooth region for the

past 2 weeks. The patient described dull, constant pain that was exacerbated on biting in relation to the affected tooth. No relevant medical/family history was reported. The patient was cooperative and well-oriented. Clinical examination of the right and left mandibular first molar (#36, #46) revealed the presence of a large mesio-occlusal carious lesion with sub-gingival extension. Periodontal probing of both teeth revealed normal alveolar bone architecture, normal sulcular depth, no pockets, and mobility within physiological limits. As compared to control tooth (#16, #26) cold testing (Endofrost, Coltene, Switzerland) and electric pulp testing (Digitest II, Parkell, USA) revealed an exaggerated response (severe, lingering pain) of #36 and #46. IOPAR with respect to #36 and #46 revealed coronal radiolucency involving enamel, dentin, and pulp with loss of lamina dura, and PDL widening in the mesial root. In addition to the above-mentioned radiographic presentations, #46 also revealed PDL widening in the distal root. The final diagnosis was symptomatic irreversible pulpitis with asymptomatic apical periodontitis with respect to #36 and #46 (Figure 1).



Figure 1: Pre-operative
a) Mandibular occlusal,
b) Clinical - #36,
c) IOPAR - #36,
d) Clinical - #46,
e) IOPAR - #46.

Clinical Procedure

Root Canal Procedure: Informed consent was obtained from the patient prior to the procedure. Oral prophylaxis was performed before starting the root canal procedure, and the tooth was isolated using a rubber dam. Access opening of #36 was performed using Endo Access Bur (no. 2, Dentsply, USA). The initial glide path was created using #10 K file (Mani, Japan), and the working length (mesiolingual & mesiobuccal = 17 mm, distal canal = 16mm) was determined using a radiograph and confirmed using an electronic apex locator

(Canalpro Compact, Coltene, Switzerland). Root canal instrumentation was completed using ProTaper Gold files (Dentsply, USA) up to F2. For the removal of remaining debris, canals were irrigated with 3% sodium hypochlorite (NaOCl) (Parcan, Septodont, France), 17% EDTA (MD-Cleanser, Meta Biomed, South Korea), and 0.9% normal saline using 30 gauge side-vented irrigation needle (Neoendo, Orikam, India) [7]. Access cavity was sealed with a cotton pellet and temporary restorative material (MD-Temp, Meta Biomed, South Korea). During the second visit, access opening of #46 was carried out using the same protocol for #36.

During the third visit, under rubber dam isolation initial irrigation was done using 0.9% saline and 3% NaOCl. Radiograph was taken to ensure the master cone fit. Final irrigation was done (saline, 3% NaOCl, and 17% EDTA) and canals were dried using absorbent paper points. Obturation of distal canals of #36 and #46 was carried out using a resin-based sealer (Dia-Proseal, Diadent, South Korea) and gutta-percha using down pack and backfill technique (Fi-G, Fi-G, Woodpecker, Japan). Access cavity was restored with composite resin (Tetric N Ceram, Ivoclar, Switzerland).

Hemisection Procedure: Under local anesthesia (1:80000, Xicaine, ICPA, India) interdental papilla and gingival margins were reflected using a periosteal elevator extending from the second premolar to the first molar (#35, #36). For resection, tapered fissure carbide bur was used vertically from the buccal to the lingual wall oriented

more mesially than distal. The mesial section of the tooth was extracted, and the site was irrigated with 0.9% saline. The retained segment was shaped to provide a smooth surface and the tooth was kept out of occlusion (Figure 2). After 1 week, the hemisection procedure for tooth #46 was carried out following the same procedure as mentioned above (Figure 3). For fixed prosthesis tooth preparations were performed in #36 and #46, and the shoulder finish line of 1 mm width was given using TF30 bur (Mani, Japan), and an overall reduction of 2mm was done. Dual stage putty impression was taken using putty impression material and light body impression material (Aquasil Soft Putty, Dentsply, and Reprisil Light Body Dentsply). A3 shade was selected and fixed partial denture (FPD) was cemented in #36 and #46 using luting glass ionomer cement (GC Fuji 1, GC, Japan). The post-operative radiograph (Figure 4) represents the clinical and IOPAR image after 3 months of follow-up.

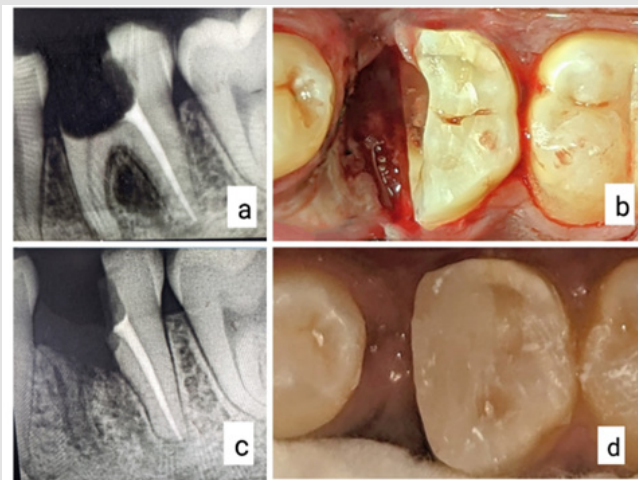


Figure 2: Hemisection of #36

- Endodontically treated distal canal,
- Immediately after hemisection - clinical,
- Immediately after hemisection - IOPAR,
- 1-month follow up - clinical.

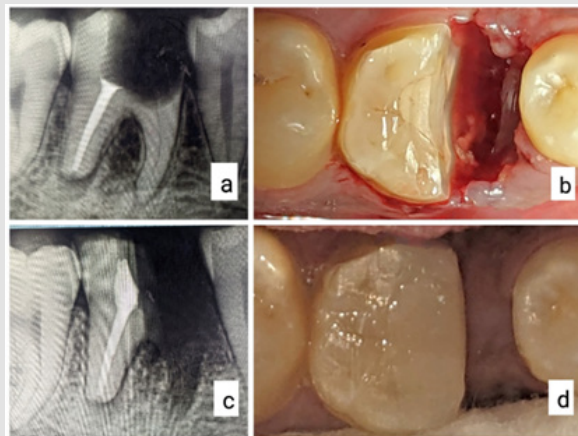


Figure 3: Hemisection of #46

- Endodontically treated distal canal,
- Immediately after hemisection - clinical,
- Immediately after hemisection - IOPAR,
- 1-month follow up - clinical.

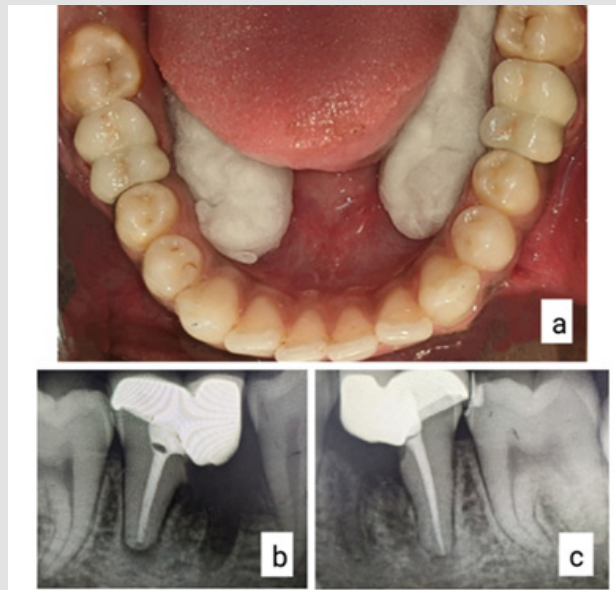


Figure 4: Post-operative after 3-month follow-up
 a) Mandibular occlusal with FPD in #36 and #46 - clinical,
 b) IOPAR - #36,
 c) IOPAR - #46.

Discussion

Hemisection is a beneficial alternative procedure for saving multi-rooted teeth that were initially suggested for extraction. It is a relatively simple and conservative treatment with good chances of success. A lot of factors influence the clinician's decision for selecting a case for hemisection. These can be classified into three categories [8]:

- a) Local considerations, such as tooth anatomy, mobility, crown-to-root ratio, degree of attachment loss, the interaction between the inter- and intra-arch teeth, and strategic dental value for retention or removal.
- b) Clinical aspects include a careful case selection process, diagnostic and treatment planning abilities, knowledge of available therapy alternatives, and clinical insight or service delivery expertise
- c) Patient factors like the health of a patient, the importance of the tooth to the patient, costs, and time factors.

According to Park et al. [9], if the patient maintains excellent oral health, hemisection is a dependable treatment option for molars with an uncertain prognosis as it will preserve the teeth without obvious bone loss for a longer period of time. It is also critical to assess the root's accessibility for ideal separation and the bone support of the remaining root. This method gives a dependable therapeutic option, with a prognosis similar to any tooth receiving endodontic treatment. If the bone support around the root is adequate, this procedure can be

employed; nevertheless, adequate root size must also be present for a favorable outcome. Yuh, et al. [10] discovered that the overall survival rate of root-resected molars was 91.1% after 3 years of follow-up in a retrospective analysis. In another study, Carnevale, et al. [11] found that hemisection for the treatment of molars resulted in a survival rate of about 93% after a 10-year follow-up. Buhler [12] discovered a 32% failure rate after 10 years on 34 resected molars where endodontic infection and root fracture were the main reasons for failure, whereas periodontal disease only resulted in the extraction of one tooth. Blomlof, et al. [13] found a similar failure rate during a three to ten-year follow-up. A retrospective analysis of up to 40 years of follow-up showed a 94.8% survival rate for root resection and hemisection procedures [14]. These findings show that the hemisection procedure has a high long-term success rate, hence it was chosen as the treatment option in this case. However, restoration may make the periodontal situation worse if the occlusal surfaces have inadequate margins or physiologic form. Furthermore, if the occlusal contact is constructed improperly, a tooth may be more susceptible to occlusion-related harm, and eventually hemisection may fail [8].

Conclusion

From the perspective of conservative dentistry, hemisection is crucial for avoiding tooth extraction. Hemisection is a multidisciplinary approach combining endodontic, restorative, and prosthodontic procedures, and offers a further choice for preserving teeth and bone structure. Therefore, when maintaining a tooth's component seems to lengthen the life of a prosthesis, we advise patients to have the option of hemisection or root resection instead of extraction.

Conflict of Interest

No conflict of interest exists.

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