



'Hemi-Section': A Step-wise Conservative Approach

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Authors' contributions

This work was carried out in collaboration between all authors. All authors have contributed in designing the study, writing the protocol and interpreting the data. All authors have anchored the field study, gathered the initial data and performed preliminary data analysis. All authors managed the literature searches and produced the initial draft. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

A 22 year old female patient had excruciating pain and a history of root canal treatment in relation to the left mandibular first molar. Upon clinical and radiographic evaluation; it was found having separated instrument fragments in the mesio-buccal canal of the left mandibular first molar and incomplete root canal treatment. After careful evaluation of the radiographs, root canal treatment was completed for the premolar and the distal half of the left mandibular first molar. It was then followed by a hemi-section with removal of the mesial half of the left mandibular first molar. Hemi-section was completed successfully which was confirmed on nine months follow-up evaluation with an intra oral periapical radiograph.

Keywords: Instrument separation; furcal perforation; depth gauging; hemisection.

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1. INTRODUCTION

Endodontic surgeries are performed as a treatment modality where all the non surgical options fail [1]. Some such surgical options are apicoectomy, hemi-section, root resection and bicuspidisation [2]. Thorough assessment is required to come to a surgical treatment plan [1]. Clinical and radiographic evaluation should be done to evaluate the possibilities of a non surgical method [2]. In cases where such options cannot yield good results the patients should be educated well about surgical options [2]. Some instances where a surgical modality could become a priority are separated instrument fragments, ledges which cannot be negated, large perforations etc [2].

2. CASE PRESENTATION

A 22 year old female patient visited SMBT Dental College, Maharashtra, in India with excruciating pain and a history of incomplete root canal treatment in relation to the left mandibular first molar (Fig. 1A). Patient never had any systemic diseases or drug allergy. Routine blood investigations were all normal. Past medical history taking, yielded nothing significant. Upon clinical and radiographic evaluation it was found having separated instrument fragments in the mesial canals of the mandibular first molar and incomplete root canal treatment. Retreatment was ruled out since it had curved canals and a straight line access to the fragments were impossible to achieve using retrieval kits (Fig. 2a) [1]. It also had a furcal perforation adjacent to mesial canals (Fig. 2b) [2]. Following the failure of attempts to bypass, it was decided for hemi-section as the adjacent premolar also required root canal treatment. A hemi-section could be considered as a conservative approach especially when one of the adjacent teeth is sound and healthy. This case involved had a standard healthy second molar. Hence it was decided upon doing a hemi-section to save the distal half of the first molar to use it as an abutment for the final rehabilitation [3]. Step-wise clinical procedure with photographs is illustrated in detail in this report. The patient presented with excruciating pain and a history of root canal treatment in relation to the left mandibular first molar. Upon clinical and radiographic evaluation, it was found that the

mesial canals of the mandibular first molar had separated instruments and the root canal treatment was incomplete. The adjacent premolar also was indicated for root canal treatment. The patient had a history of incomplete root canal treatment with the concerned tooth and the pain was not subsiding even with medication. The mesial canals of the left mandibular first molar were curved, and the fragments were beyond the curvature which ruled out the possibility of a retreatment. There was also a furcal perforation which complicated the prognosis further (Figs. 1A, 2a, 2b).

Intra Oral Periapical radiographs were taken before, during and after the treatment procedure which helped in careful planning and execution.

After careful evaluation of the radiographs, a hemi-section and extraction of the mesial half of the left mandibular first molar was planned. During root canal treatment the biomechanical preparation (cleaning and shaping) was performed with Hand Protaper file system. Irrigating solutions used were normal saline, 0.5% sodium hypochlorite and 2% hydrogen peroxide. Upon completion of root canal treatment for the distal canal of the first molar which took two appointments, the patient was scheduled for a hemi-section (Fig. 2c).

The procedure was initiated by anaesthetising the inferior alveolar nerve and the lingual nerve with 5 ml of 1:200000 lignocaine. A full thickness envelope flap was raised from the mid-buccal/lingual aspect of the second premolar to the mid-buccal/lingual aspect of the second molar by giving sulcular incisions (Figs. 1B, 1C). This was to achieve proper visibility and access to the furcal area of the first molar thus preventing any damage to the associated periodontal tissues while performing the sectioning (Fig. 1D). After reflection of the flap, a long, tapering fissure bur was used to section the first molar (Fig. 1E). A confirmatory radiograph was taken to gauge the depth and evaluate the remaining thickness of the tooth structure to the furcation after reaching a depth in relationship with the free gingival margin (Figs. 2d, 2e). The tooth was then sectioned into two (mesial and distal) halves (Figs. 1F, 2f), and the mesial half was extracted out of the socket (Figs. 1G, 1H, 1I, 2g). The distal half was contoured, and the area was irrigated with normal

saline and sutures were given to approximate the soft tissues with 3-0 silk thread.

After an observational period of 1 week, finding satisfactory healing of the soft tissues the sutures were removed. Crown preparations were done in regard to the second premolar and the distal half of the first molar, followed by rubber base impressions for fabrication of a modified two unit porcelain fused to metal bridge. The segment was restored temporarily with a modified two unit acrylic bridge for a period of two weeks to ensure complete healing before loading it for regular functioning. Modified two unit porcelain fused to metal bridge was cemented using glass ionomer luting cement, after verifying for complete healing of the extraction site (Fig. 1J).

Three months (Fig. 2h) and six months (Fig. 2i) clinical and radiographic evaluation suggested satisfactory healing process. Nine months follow-up radiographic images, confirmed complete healing (Fig. 2j). Patient never had any discomfort during this period.

3. DISCUSSION

Sound, healthy tooth devoid of dental caries and any other problems should not be disturbed unless necessary. Whenever there is a possibility of saving the tooth either completely or at least partially one must attempt to do so [4]. One should prefer doing hemi-section whenever indicated to prevent involvement of the adjacent tooth and for better patient care [5].



Fig. 1. Clinical photographs of hemi-section; A: Pre-operative photograph. B: Post Endodontic treatment; C: Flap reflection; D: Crown sectioning; E: Crown sectioning; F: Removal of the mesial half; G: Post hemi-section, H: Extracted mesial half; I: Suturing done, J: Post operative photograph after bridge cementation (porcelain fused to metal)



Fig. 2. Radiographic images of hemi-section; a: Diagnostic IOPA; b: Perforation and separated instrument; c: Post endodontic treatment; d: Depth gauging; e: Depth gauging; f: Crown sectioning; g: After hemi-section; h: Post cementation of the bridge; i: 6 months post-operative IOPA; j: 9 months post-operative

A hemi-section is indicated generally when there is periodontal problems with furcal invasions [4,5], an untreatable endodontic failure non surgically like separated instruments at the apical end with curved canals, root resorptions [6] and perforations. It is also indicated in badly mutilated teeth where more than half of the crown structure and part of the root structure is lost due to dental caries [7]. Furcal invasions with grade 3 or more can be treated successfully with this surgical option if there is no mobility and sufficient bone support to the root [4]. The separated or fractured instruments at the apical end of the curved root canals in molars; hemisection or root resection can be the only option to treat the patient successfully. Here, the unaffected root can be conserved to use as an abutment for a fixed prosthesis [3]. Root resorptions; whether it is

internal or external can have deleterious effect on treatment modalities and hence, hemisection can be considered to save the unaffected roots (half) to use as abutments in order to put the tooth to function [6]. Perforations are of different kinds; but one must always try to seal the perforations with an appropriate material before attempting most invasive surgical procedures. However; strip perforations and large furcal perforations could be difficult to treat by sealing the perforations since the prognosis becomes poor. In such cases, a more invasive technique like hemisection should be performed [3]. Badly mutilated tooth having lost a lot of tooth structure; both crown and root on either mesial or distal half could become an absolute indication for hemisection [7]. The unaffected half of the tooth can be treated endodontically and planned for a

hemisection to use it as an abutment to cement a prosthesis [7]. One can use the partially saved tooth segment as an abutment for a fixed prosthesis provided it has healthy supporting periradicular tissues. Careful planning and evaluation has to be done for such a procedure as it involves a conservative approach to restore function and aesthetics in the involved quadrant [8]. Hemi-section would be a better choice to perform as one need not disturb the adjacent healthy tooth to fabricate a three unit bridge [9,10]. Careful evaluation, planning and execution of the procedure with utmost care can yield successful long term results for the clinicians thereby ensuring patient comfort and safety [11].

4. CONCLUSION

Hemi-section is a better choice whenever indicated than extraction. It can fetch a long term successful results if performed carefully. Healthy tooth should not be disturbed unless necessary even to use it as an abutment.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

ETHICAL APPROVAL

Not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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