

Hemisection and porcelain fused to metal crown splinters on the first molar: A case report



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Abstract

Objective: The aim of this treatment was to preserve the remaining tooth structure and to restore the function of the tooth

Methods: A 37-year-old female patient with a chief complaint of pain in the lower right molar tooth after root canal treated one week ago. Clinical examination revealed a cavity on the disto-occlusal side achieve half the crown of the tooth with a dentin depth. Percussion: (+), palpation: (-), mobility: (-), vitality: (-). Radiograph examination revealed radiolucent area mesial root and \pm 1.5mm radiopaque images that are thought to be file fractures in the apical foramen. Vertical radiolucent lines on dental bifurcation were detected vertical

bone loss was evident on mesial root of the lower right molar with furcation involvement. Management of the patient is hemi section and Porcelain fused to metal crown splinter.

Results: After one month of hemi section, no pain detected, the gingiva shows good healing, no Intra and extraoral swelling, trismus was absent, and objective examination percussion test was (-) and mobility (-).

Conclusion: Hemi section is a conservative and effective treatment of choice overcome vertical radiolucent lines on dental bifurcation and broken file in the apical foramen.

Keywords: Apical Foramen, Crown splinter, Fractures, Hemi section, Porcelain fused to metal (PFM).

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Introduction

Hemisection is a conservative way to save a carious tooth involving one root in a tooth with multiple root, to preserve as much of the original tooth structure as possible.^{1,2}

Indications for a hemisection, according to Weine from periodontal perspective, are furcation destruction, severe vertical bone loss involving only one root of multirouted teeth, Proximity of unfavorable roots from the teeth that are discussing, often prevent adequate hygiene maintenance in the proximal area and severe root exposure due to dehiscence. Endodontic and restorative perspective is an endodontic failure (perforation pulp chamber, or pulp canal of one of the roots), prosthetic failure of abutments within a splint, vertical fracture of one root and severe destructive the result of furcation or subgingival caries, traumatic injury, and extensive root perforation during endodontic therapy.³⁻⁶

Contraindicated from hemisection is that the root canal cannot be prepared adequately, root fusion cannot be separated and strong adjacent teeth available for bridge abutments as alternatives to a hemisection.^{7,8}

The purpose of a hemisection is to maintain tooth structure as much as possible. Success rates consider periodontal, prosthodontic, and endodontic.^{1,9} The success rate was 91.1% in molar teeth experiencing

hemisection. Carnevale et al. reported a success rate of about 93% during the 10-year follow-up of molar tooth hemisection as management of furcation molar. Case selection following endodontic, surgical, and restorative guidelines is the success of hemisection.¹⁰ Consideration of hemisection must be done before the molar teeth are extracted because it has long-term success.^{5,10} The purpose of this article is to report multiple root teeth with hemisection.

Case Report

A 37-year-old female patient came to the Departement Conservation Universitas Gadjah Mada with a chief complaint of pain in the lower right molar tooth when used for chewing. The tooth was treated endodontic one week ago. The patient stated that there was a history of ampicillin allergy. No extra oral abnormalities were found.

Tooth condition 46 There is a cavity on the disto occlusal side achieve half the crown of the tooth with a dentin depth, open pulp with an orifice that is closed with restoration. Percussion: (+), palpation: (-), mobility: (-), vitality: (-). Probing gingival pocket of teeth 46 in the mesiobuccal, buccal mid buccal, mesiolingual, and mid buccal, lingual sections with a depth of 1.5 mm, distobuccal, and distolingual with a depth of 1 mm [Figure 1A](#).

Radiographic examination of teeth 46 revealed

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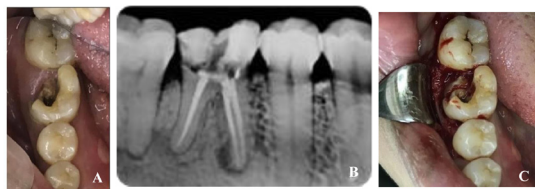


Figure 1. A. Clinical features of teeth 46, B. Dental radiography 46 seen vertical radiolucent lines on dental bifurcation and vertical bone loss was evident on mesial root, C. Flap opening

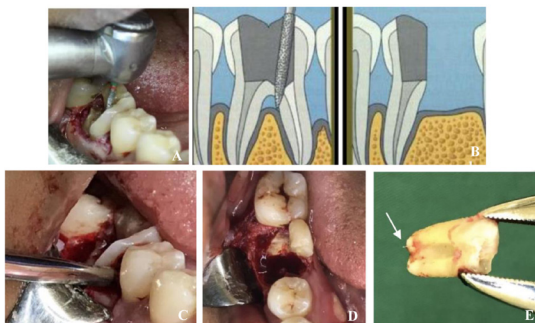


Figure 2. A. Separation of teeth 46, B. Schematic overview of hemisection procedures, C. Separation of roots mesial root, D. socket visible E. Instrument fragments on mesiobuccal roots



Figure 3. A. Application of bone graft and membrane graft, B. Suturing, C. Post hemisection 1 week

root canal filling material in distal Figure 1B, mesiobuccal, and mesiolingual roots. At the mesial root, there is a radiolucent area and ± 1.5 mm radiopaque images that are thought to be file fractures in the apical foramen. Vertical radiolucent lines on dental bifurcation, was detected vertical bone loss was evident on mesial root of the lower right molar with furcation involvement.

Tooth 46 was diagnosed as previously treated teeth accompanied by symptomatic apical periodontitis and vertical fractures in bifurcation. Hemisection of mesial root followed by crown splinter PFM (Porcelain Fused to Metal) on teeth 45 and 46 with fiber post on the distal root of tooth 46 was planned. The prognosis is Dubia ad Bonam, because the remaining hard tissue structure remains small, but still can be restored, the supporting tissue on the distal part of the root is good, the is remaining alveolar bone half length of the tooth, no mobility, and there is no history of systemic disease.

The first visit was hemisection under mandibular block anesthesia and triangular flap design forms

Figure 1C. Opening of the flap using a periosteal elevator, visible bifurcation and vertical fractures in the bifurcation of the teeth 46.

Figure 2A-Figure 2B tooth separation 46 uses a long fissure-shaped diamond bur with vertical buccal-lingual direction cutting to divide the crown and root of the tooth into two parts, mesial and distal. During the cleavage process, the teeth were irrigation with saline solution Figure 2C- Figure 2E. The mesial root was separated from the tooth using a flat-shaped elevator. The mesial root of tooth 46 was removed using mandibular molar root pliers. Figure 3A-Figure 3B.

The wall of the socket and the bifurcation area are smoothed with bone files and curetted. The sharp part of the teeth smoothed using a fine finishing bur and irrigated with saline. The cavity in the distal crown was covered using zinc phosphate cement. Bone graft was applied in the extracted mesial root socket of tooth 46 then covered with membrane graft. Flap reposition was done then the flap was sutured with interrupted suture technique. Postoperative instructions were: explanation how to take, drugs (antibiotics, anti-inflammatory, analgesics) and chlorhexidine mouthwash to the patient.

Figure 3C seven days after hemisection, no pain and no swelling, detected no trismus, good suture condition, visible gingiva around the operating area is still inflammatory, teeth 46: percussion (-) and mobility (-).

There were no complaints of pain after one-month hemisection, gingival healing, no Intra and extraoral swelling, trismus was absent, and teeth 46: percussion (-) and mobility (-).Furthermore, post space preparation was performed, a fiber post #3 was cemented into the canal by a resin-based cement (Build-IT FR, Pentron), fiber reinforcement resin composite core were built on the post Figure 4A and Figure 4B and was used to preparing the core in tooth 45 and 46 to make a PFM crown splinter. Visual color determination was by comparing the color of tooth and Vita Shade Guide Classic (Vitapan), obtained A3 color. Tooth molding 45 and 46 was carried out using a double molding technique with silicone material Figure 5A and Figure 5B.

A week later, the patient returned for control. The patient reported no complaints, evaluation of the surrounding tissue, and occlusion showed good results. The crown splinter insertion was carried out using self-adhesive resin cement (Rely-X U200, 3M ESPE). In the next control, visit the patient did

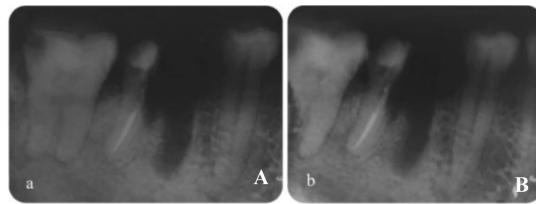


Figure 4. A. Post preparation, B. Fiber post fitting

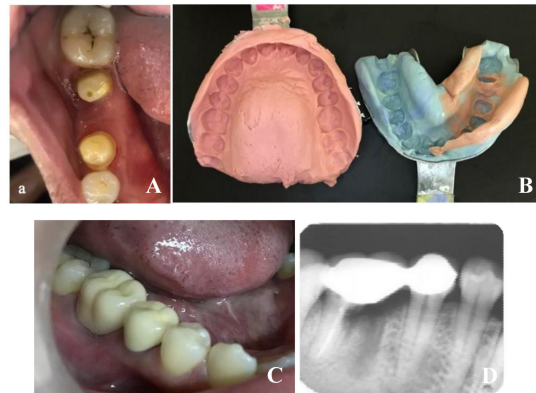


Figure 5. A. Preparation results, B. Results of printing the maxilla and mandible, C. Crown splinter insertion, D. Radiograph after post insertion

not have complaints, a clinical check showed good results. [Figure 5C](#) and [Figure 5D](#).

Discussion

The chief complaint of the patient was painful when used for chewing because there were vertical fractures and an extruded broken instrument at the apical foramen of the mesial root. Improper use of intracanal instrument combined with limited flexibility and strength may result in an intracanal instrument separation.¹¹

Hemi section is an alternative treatment to overcome a multirouted tooth with endo-perio lesion, and a restorative problem indicated for extraction. The success of the long-term hemisected molar depends on some interrelated factors: a periodontal condition of the tooth, maintenance therapy, root anatomy, endodontic and restorative therapy, and the surgical procedure itself. The patient's oral hygiene, caries index, and medical status should be considered.^{10,12,13}

Two crucial factors for hemi section treatment are the previous endodontic treatment and the second final restoration.¹⁴ The remaining root after hemi section has to function independently to serve as an abutment for a splint or bridge.¹⁵ A higher survival rate hemi section molars used as intermediate abutments of a fixed bridge because the occlusal loads on the intermediate abutment are smaller than on terminal abutments and single abutments.^{1,16} The significant long-term success of

the fixed bridge is the number of occlusal forces and root fractures was frequently reported in resected molars with higher occlusal loads.^{12,17} Periodontal disease can be caused by restoration; if the margins are defective or occlusal surfaces do not have a physiologic form. An improperly shaped occlusal contact area converts acceptable forces into destructive forces leading to failure of hemisection.¹⁸

The use of hemi section to retain tooth offers a prognosis comparable to the tooth with conventional endodontic treatment.⁵ Hemi section of molars with dubious prognosis can maintain the teeth without a bone loss for a long-term period, provided that the patient has optimal oral hygiene.^{19,20}

The case successful management Hemi section was performed to overcome tooth with endo-perio lesion and furcation involvement because the roots were not closely approximated or fused. Endodontic treatment must be completed before hemi section to avoid intra-pulpal dystrophic calcification and postoperative tooth sensitivity. 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.

Conclusion

Hemi section is a conservative and effective treatment of choice overcome vertical radiolucent lines on dental bifurcation and broken file in the apical foramen.

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Conflict of Interest

The authors report no conflict of interest

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