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HEMISECTION AS A CONSERVATIVE TREATMENT OPTION OF BIFURCATION PERFORATION: CASE REPORT

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KEYWORDS

Bifurcation Perforation, Endodontic Surgery, Hemisection

ABSTRACT

Introduction: *Hemisection is sectioning and removal of one root and its crown portion on multi-rooted teeth. Hemisection denotes a conservative treatment option for large bifurcation perforation, loss of periodontal attachment and was performed to maintain the original teeth structure. This case report aims is to present the management of hemisection of a mandibular first molar with crown rehabilitation.* ***Case and Management:*** *A 16-year-old male complained of pain while biting on his right lower teeth. Clinical examination showed deep caries on the occlusal surface, the tooth has a positive response on percussion and palpation tests. The mobility test was positive on the mesial root and crown. Based on periapical radiographic examination, there was a radiolucent feature extended to the bifurcation area. The diagnosis was pulp necrosis and symptomatic apical periodontitis accompanied by bifurcation perforation. Root canal treatment and hemisection were performed to remove infected tissue, and the remaining part of the teeth was restored with a porcelain-supported fixed prosthesis.* ***Conclusion:*** *Hemisection can be a suitable conservative treatment for teeth with extensive damage and has a good long-term prognosis.*

INTRODUCTION

Hemisection refers to a clinical procedure separating the mandibular molar in two fragments at the furcation, followed by the removal of the diseased portion of the tooth, then preserve and restore the remaining tooth structure to assist in function.[1,2] It is the best treatment when one root was healthy and the other root has severe bone loss or class III furcation involvement so that hemisection is a conservative procedure because of retaining as much of the original tooth structure as possible.[3] In good case selection, hemisection can be a relatively simple, conservative, and inexpensive treatment with a good prognosis.[4]

Hemisection has been confirmed as a good outcome rate treatment.[5] Schmitz *et al.*[6] stated the cumulative survival rate of teeth was treated with root resection or hemisection was 93%. Megarbane *et al.*[7] reported 195 patients have been treated with hemisection with up to 40 years of follow-up, the overall survival rate was 94.8%. Several factors influence the success of a hemisection. Bhutada[8] stated local factors (tooth anatomy, tooth mobility, crown-root ratio, the severity of attachment loss), patient

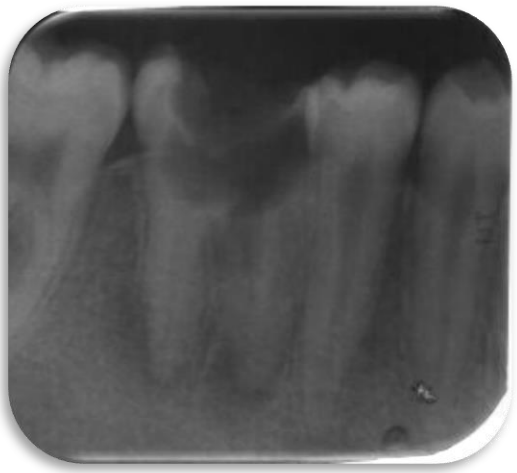
factors (systemic condition/host resistance), and clinician factors (diagnostic and treatment planning skills) were factors that influence the success of the treatment. Thus, Rami *et al*.[9] concluded the keys to the long-term success of hemisection include the thorough diagnosis, selection of patients with good oral hygiene, careful surgical and restorative management.

CASE AND MANAGEMENT

A 16-year-old male complained of pain while biting on the right lower tooth. Clinical examination of molar tooth (46) showed deep caries on the occlusal surface and extended to the buccal and lingual surfaces (Fig.1A), the tooth had a positive response on the percussion test. The mobility test was found on the mesial root and crown. On the probing test, there was an 8mm deep periodontal pocket around the mesial root of the tooth. Based on periapical radiograph examination (Fig.1B), there was a radiolucent feature extended to the bifurcation area. The extraoral examination did not show any abnormality and the patient did not have any systemic disease.

A rubber dam was placed for appropriate isolation. After the whole caries was removed, a large perforated area was detected in the bifurcation including mesial canal orifices. Working length was determined by using a preoperative radiograph and electronic apex locator (Apex ID, SybronEndo, Seoul, Korea.

(A)



(B)

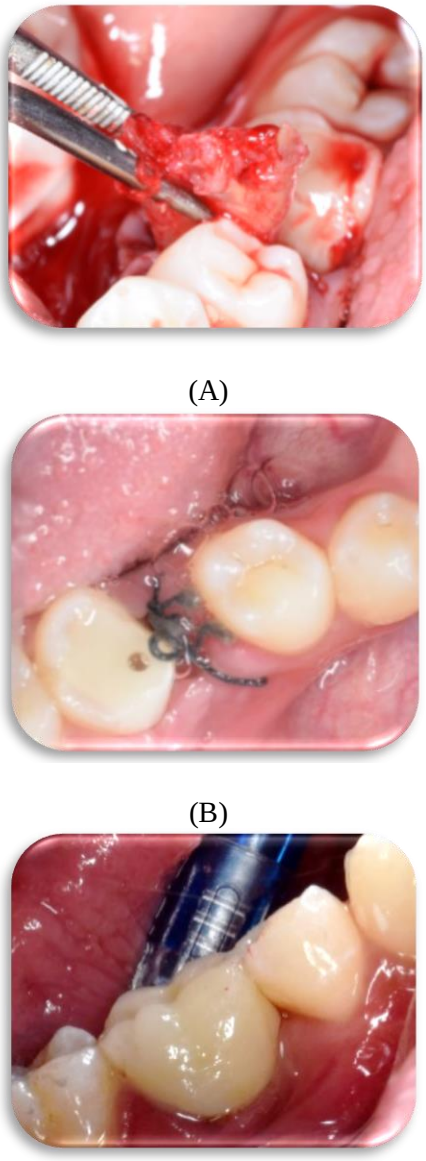
Figure 1. Preoperative condition of mandibular right first molar (46) (A) and preoperative radiograph (B)

Root canals preparation was completed with the rotary file system (ProTaper Gold, Dentsply Sirona, Ballaigues, Switzerland). Irrigation solution used 2,5% sodium hypochlorite during root canal preparation. The final irrigation procedure before root canal obturation was performed 2,5% sodium hypochlorite and 17% EDTA (Endo Solution, Cerkamed, Peterborough, UK). Root canals were dried by using paper point and were obturated with cold lateral compaction

method used gutta-percha and epoxy resin sealer (AH Plus, Dentsply Sirona, Ballaigues, Switzerland). Then, the prefabricated fiber post was placed to the distal root, the core build-up was done by using fiber reinforced core material (Build it FR, Pentron, Wallingford, USA), then the periapical radiograph was taken (Fig.2).

Figure 2. Periapical radiograph of endodontically treated and post placement

At a follow-up appointment one week later, a hemisection procedure was performed. A mucoperiosteal flap was reflected with a triangular incision to expose the hemisection area. The surgery area was debrided. Mesial and distal roots were separated with a fissure diamond bur in the buccal-lingual direction. Mesial root was extracted (Fig.3A) and the mesial socket was curated. The area was irrigated with antiseptic solution and sutures were placed. The surgical area was healed after one-week post hemisection (Fig.3B). The suture was removed, and the remaining distal part of the mandibular right first molar and the lingual crown of the second premolar were prepared and restored with porcelain supported fixed prosthesis (Fig.3C).



(A)

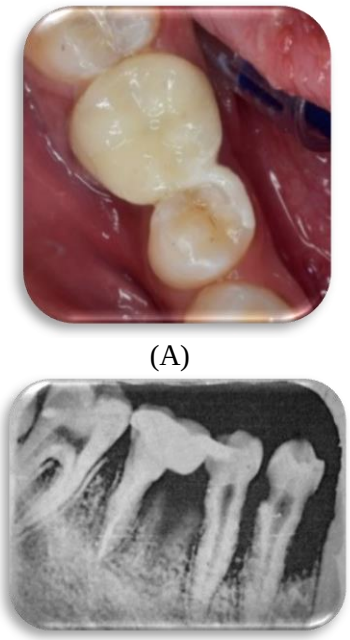
(B)

(C)

Figure 3. Mesial root extraction (A), one-week follow up post-hemisection (B) and the tooth was restored (C)

After one-month, the follow-up examination showed the tooth was asymptomatic clinically and the extracted cavity of the mesial root

was completely healed (Fig.4A), then the periapical radiograph was taken (Fig.4B).



(A)

(B)

Figure 5. One month follow up (A) and postoperative radiograph (B)

DISCUSSION

The loss of posterior teeth and not replace them may cause some undesirable conditions, such as extrusion of the opposing tooth, alveolar bone loss, increased risk of temporomandibular disorder, and loss of chewing function,[10,11] thus, maintain the teeth as long as possible is important. In multi-rooted tooth when there was only one problem in one root, hemisection could be the best option for treatment.[3]

This treatment can produce predictable results as long as proper diagnostic, endodontic, surgical, and prosthetic procedures were performed.[12] Behl[13]stated that it was important to consider the following factors before decided to perform hemisection, those are advanced bone loss around one root with an acceptable level of bone around the remaining roots, angulation and position of the tooth in the arch, the divergence of the roots, length, and curvature of roots, and feasibility of endodontics and restorative dentistry in the root to be retained. Assessment of root furcation accessibility for easy separation procedures should be considered before performing the treatment. Also, oral hygiene status, caries index, and medical status should be done well before deciding on a tooth for a hemisection.

In the present case, the mesial root was removed since it was the infected part of the roots, there was also a deep periodontal pocket and mobility with second degree, and large perforation in the bifurcation area tend to mesial root. Retention of the distal root has various advantages. The placement of a longer post for intracanal retention is possible. The distal root has a broader and straight apex that could bear the mastication load better.[14] The endodontic therapy sequence of the retained root was performed followed by separating off the involved root and crown part. Then the retained root has to be prosthetically rehabilitated and maintenance of the hygienic measures.[15]

A hemisected tooth loses a part of periodontal support after a hemisection procedure. The remaining root requires a restoration with post and core to function as independently or as an abutment for fixed partial denture. Crown preparation design

followed the root contour by eliminating the furcation roof and create a concave shaping of the root trunk and crown. Masticatory forces should be reduced with the de-occluded occlusal part. The margins should be proper without any overhangs or plaque retentive features to prevent periodontal damage, they also were placed supra-gingivally to maintain gingiva self-cleansing.[16,17]

CONCLUSION

Hemisection can be a suitable conservative treatment for tooth with extensive damage and has a good long-term prognosis. Local factors, patient factors, and clinician factors should be done properly as cornerstones for a successful treatment.

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