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Hemisection: Success with tooth section – A Case Series

Medicine

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ABSTRACT

The progress of inflammatory periodontal disease ultimately results in attachment loss sufficient enough to affect the bifurcation or trifurcation of multirooted teeth. The presence of furcation-involved teeth in a periodontal patient influences the treatment plan. The selection of procedures that can be used for the treatment of periodontal disease in multi-rooted teeth can first be made only after the presence and depth of furcation lesions are assessed. Hemisection refers to removal or separation of roots with its accompanying crown portion of multi-rooted teeth, most likely mandibular molars. Hemisection of the affected tooth helps preserve the tooth structure, alveolar bone and promote cost savings over other treatment options. This case series describes a simple procedure for hemisection in mandibular molar by vertical cut method and its subsequent restoration.

KEYWORDS:

Attachment loss, furcation involved teeth, hemisection, mandibular molars

Introduction:

The objectives of furcation therapy are (i) to facilitate maintenance; (ii) prevent further attachment loss; (iii) obliterate the furcation defects as a periodontal maintenance program. Hemisection is resective type of surgical therapy used in the treatment of furcation involvement. It involves removal of a portion of the anatomic crown and its associated root or resection of only one root from a multirooted tooth.[1] Hemisection is most likely to be performed on mandibular molars with buccal or lingual Grade II or Grade III furcation involvements.

For many years, the presence of significant furcation involvement meant a hopeless long term prognosis for the tooth. However, clinical research has indicated that furcation problems are not as severe as originally suspected if one can prevent the development of caries in the furcation. Relatively simple periodontal therapy is sufficient to maintain these teeth in function for longer periods.[2,3] Investigations of hemisected teeth have shown that such teeth can function successfully for longer periods.[4,5,6]

Case Series:

Case 1: A 40 year old female patient reported to the Department of Endodontics with the chief complaint of deep proximal caries in relation with 36. Thus, root canal treatment was advised to the patient. During root canal treatment, the ledges were formed in middle one third of mesio-lingual canal, due to which endodontic prognosis with mesial root was considered poor. Thus, the patient was referred to the Department of Periodontics for the hemisection of the same tooth. (Figures 1a, 1b, 2a, 2b, 3a, 3b, 4a, 4b)

Figure 1a: Pre-operative clinical view

Figure 1b: Pre-operative radiographic view

Figure 2a: Intra-operative clinical view

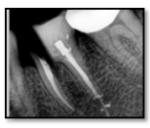

Figure 2b: Intra-operative radiographic view

Figure 3a: Post-operative clinical view

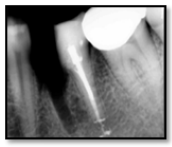

Figure 3b: Post-operative radiographic view

Figure 4a: Clinical view after crown placement

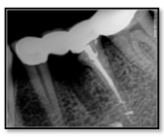

Figure 4b: Radiographic view after crown placement

Case 2: A 36 year old female patient reported to the Department of Endodontics with the chief complaint of deep proximal caries in relation with 47. Thus, root canal treatment was advised to the patient. During caries excavation, 1 mm exposure was found on the mesial wall. Also, both the mesial canals were completely calcified. Thus, the patient was referred to the Department of Periodontics for the hemisection of the same tooth. (Figures 5a, 5b, 6a, 6b, 7a, 7b)

Figure 5a: Pre-operative clinical view

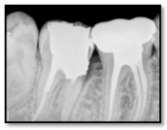

Figure 5b: Pre-operative radiographic view

Figure 6a: Hemisected tooth Portion

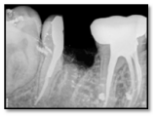

Figure 6b: Hemisected tooth radiographic view

Figure 7a: Post-operative crown placement

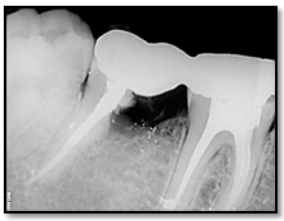

Figure 7b: Post-operative radiographic view

Figure 7a: Post-operative crown placement Figure 7b: Post-operative radiographic view

Case 3: A 54 year old male patient reported to the Department of Endodontics with the chief complaint of abscess in relation with 36. The patient had undergone root canal therapy 8 years back. On radiographic examintaion, it was found that the mesial root was vertically fractured. Thus, the patient was referred to the Department of Periodontics for the hemisection of the same tooth. (Figures 8a, 8b, 9a, 9b, 10a, 10b, 11)

Figure 8a: Pre-operative clinical view

Figure 8b: Pre-operative radiographic view

Figure 9a: Intra-operative clinical view

Figure 9b: Intra-operative radiographic view

Figure 10a: Hemisected tooth Portion

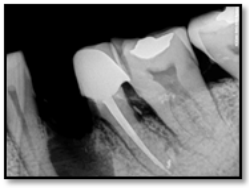

Figure 10b: Hemisected tooth radiographic view

Figure 11: Post-operative crown placement

Treatment procedure: The procedure was explained to the patient and informed consent was obtained from each patient. After appropriate local anesthesia, a full thickness mucoperiosteal flap was elevated. A small amount of facial or lingual bone was removed to provide access for elevation and facilitate root (partial tooth) removal. A cut was then directed from just apical to the contact point of the tooth, through the tooth and to the facial & distal orifices of the furcation. This cut was made with a high-speed, cross-cut fissure carbide bur. The curved periodontal probe was placed into the furcation to determine the angle of hemisection.

After sectioning, the root was elevated from its socket. Care was taken not to traumatize bone on the remaining roots or to damage adjacent root. This provided visibility to the furcation area of the remaining roots and simplified the debridement of furcation with hand & rotary instruments.

Therapeutic protocol for hemisection as suggested by Carnevale (1995)[7] is as follows:

Phase 1: Endodontic treatment
Phase 2: Crown build-up
Phase 3a: Root resection or root separation during preliminary prosthetic preparation
Phase 3b: Relining and insertion of a prefabricated shell provisional restoration
Phase 3c: Impression for a metal reinforced provisional restoration
Phase 4: Insertion of the reinforced provisional restoration
Phase 5a: Periodontal surgery
Phase 5b: Root resection or root separation if not previously

Discussion:
Factors to be considered in the treatment of furcation (hemisection) involved teeth are:

A] Tooth related factors: Tooth mobility, probing depth, tooth position in dental arch, degree of furcation involvement

B] Patient related factors: Functional and esthetic demands, age and health conditions, oral hygiene capacity

C] Local anatomic factors:
a) Root trunk length: Once the furcation is exposed, teeth with short root trunks are more accessible to maintenance procedures.

b) Root length: Teeth with long roots and short to moderate root trunk length are more readily treated because sufficient attachment remains to meet functional demands.

c) Root form: The anatomy of the mesial roots of mandibular molars often leads to their extraction and the retention of the distal root to facilitate restorative therapy.

d) Interradicular dimension: The interradicular dimension between the two roots of a tooth to be hemisected is also important because teeth with widely separated roots present more treatment options and are more readily treated.

Hemisection has been used successfully to retain teeth with furcation involvement. However, there are few disadvantages associated with it. As with any surgical procedure, it can cause pain and anxiety. Root surfaces that are reshaped by grinding in the furcation or at the site of hemisection are more susceptible to caries. Often a favorable result may be negated by decay after treatment. Failure of endodontic therapy due to any reason will cause failure of the procedure. In addition, when the tooth has lost part of its root support, it will require a restoration to permit it to function independently or to serve as an abutment for a splint or bridge.

Unfortunately, a restoration can contribute to periodontal destruction, if the margins are defective or if non-occlusal surfaces do not have physiologic form. Also, an improperly shaped occlusal contact area may convert acceptable forces into destructive forces and predispose the tooth to trauma from occlusion and ultimate failure of hemisection. In the cases reported, various aspects of occlusal function such as location and size of contacts and the steepness of cuspal inclines may have played a significant role in causing mobility before treatment. During treatment, occlusal contacts were reduced in size and repositioned more favorably. Lateral forces were reduced by making cuspal inclines less steep and eliminating balancing incline contacts.

Park et al[8] have suggested that molars having questionable prognosis can maintain the teeth without detectable bone loss for a long-term period by hemisection but patient should maintain good oral hygiene. Mohammad Khalid Shafiq[9] hemisected the tooth and mesial root was

removed along with the dislodged part. A three unit bridge combining the hemisected root and adjacent second premolar was inserted which was successfully in service for more than a year. He concluded that the retention of a part of a tooth seems to extend the life of prosthesis; However, other investigators have defined the reasons for clinical failure of root-resected or hemisected teeth.[4,6]

Conclusion:

Hemisection is a simple procedure that is used for the treatment of periodontal disease in multi-rooted teeth having furcation involvement. Thus the patient should deserve an option of hemisection or root amputation over extraction.

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