Hemisection - A Ray of Hope and Saviour of a Furcation involved Multirooted Tooth - A Case Report

Jaishri.N. Khed, Preeti Dodwad, Nithin Suvarna, Savita Dandakeri, K. Harish Shetty, Shilpa Dandekeri

Hemisection denotes removal or separation of root with its accompanying crown portion of mandibular molars. This procedure represents a form of conservative dentistry, aiming to retain as much of the original tooth structure as possible. The results are predictable and success rates are high. In this paper a case is presented in which hemisection was done because the tooth was grossly carious along with furcation involvement and external resorption with mesial root. Mesial half of tooth was resected and extracted and the remaining tooth was restored as premolar which helped to reduce the masticatory load.

Keywords: Hemisection, Mandibular Molars, Root Resection

Dr. Jaishri.N. Khed is Senior Lecturer, Dept of Conservative Dentistry and Endodontics, Yenepoya Dental College, Yenepoya University, Mangalore, Karnataka, India.

Dr. Preeti Dodwad is Professor & Guide, Dept of Conservative Dentistry and Endodontics, KLE VK Institute of Dental Sciences, KLE University, Belgaum, Karnataka, India.

Dr. Nithin Suvarna is Professor, Dept of Conservative Dentistry and Endodontics, Yenepoya Dental College, Yenepoya University, Mangalore, Karnataka, India.

Dr. Savita Dandakeri is Professor, Dept of Prosthodontics, Yenepoya Dental College, Yenepoya University, Mangalore, Karnataka, India.

Dr. K. Harish Shetty is Professor & Head, Dept of Conservative Dentistry and Endodontics, Yenepoya Dental College, Yenepoya University, Mangalore, Karnataka, India.

Dr. Shilpa Dandekeri is Senior Lecturer, Dept of Prosthodontics, A.B. Shetty Dental College, NITTE University, Mangalore, Karnataka, India.

Corresponding Author:
Dr. Jaishri.N. Khed
E-mail: drjaishreekhed@gmail.com
INTRODUCTION

There is a close ontogenetic relationship between endodontic and periodontal tissue structures, which is anatomically reflected in the apical foramen and accessory and lateral canals. Clinically, this relationship promotes the spread of infection, potentially resulting in typical manifestations of endo-perio osseous lesions. These endo-perio lesions often remain free of symptoms for long periods, as they are rarely diagnosed until the disease starts manifesting itself in the form of acute symptoms of inflammation and/or increased pain. Sometimes, the lesions are detected accidentally during a general check-up. Once symptoms occur, they tend to be so severe, and the periodontal aspect can seem so dominant, that dentists tend to settle for strictly symptomatic periodontal therapy whilst overlooking the endodontic aspect. The cumulative effects of carious and iatrogenic irritation acting on the tooth/pulp often do not get the attention they deserve in the diagnostic workup, and are not recognized as a potential cause of chronic pulpitis, frequently associated by sclerosed root canals. Teeth with endo-perio lesions typically have a history of deep caries, apical bone/root resorption.

Endo-perio lesions are difficult to classify, because they lack the characteristic manifestations of strictly endodontic or strictly periodontal lesions. Long-term preservation of the tooth seems an unlikely prospect in the presence of clinical and radiographic findings such as acute inflammation, isolated deep pockets and circumradicular/interradicular radiopacities. It is difficult to distinguish by hindsight which parts of the lesion are endodontic and which parts are periodontal in origin.

For the treatment of endo-perio lesions to be successful, it is helpful to understand the pathogenesis as well as the clinical and radiographic manifestations of endodontic and periodontal lesions. Endo-perio lesions that are primarily endodontic in origin characteristically expand to the periodontal structures via the apical foramen, resulting in an osseous defect that progresses relatively fast along the periodontal ligament from apical to coronal, or forms a sinus tract. The probing depths of the tooth remain normal until a closely circumscribed location.

Hemisection (removal of one root) involves removing significantly compromised root structure and the associated coronal structure through deliberate excision. Because of two roots present in mandibular molars, one half of the crown and associated root is removed. Thus tooth resection procedures are used to preserve as much tooth structure as possible rather than sacrificing the whole tooth. It differs from Bicuspidization, in which a separation is made between the two roots in the furcation area without removal of any root. The separated roots along with its crown part are then restored as premolars.

Selected root removal allows improved access for homecare and plaque control with resultant bone formation and reduced pocket depth. This procedure is indicated:

- If there is severe bone loss limited to one root or involvement of a Class III furcation that could produce a stable root after hemisection.
- If the patient is unable to perform appropriate oral hygiene in the area.
- Extensive exposure of the roots because of dehiscence is another indication for excision of one root.
- Indicated for failure of an abutment within a fixed prosthesis, provided a portion of the tooth can be retained to act as the abutment for the prosthesis.
- Untreatable endodontic failure due to perforations and broken instruments.
- Vertical root fracture confined to a single root of a multirooted tooth or any severe destructive process that is confined to a single root, including caries, external root resorption and trauma.

CASE REPORT

A 18 years old male patient reported to the department with a complaint of pain in left mandibular first molar. On intraoral examination, the tooth was tender to percussion, had grade II mobility and was grossly carious. On probing the area, there was a deep
periodontal pocket of 8-10 mm around the mesial root of the tooth. On radiographic examination, Grade III furcation involvement and periodontal bone loss was evident and external resorption in relation with mesial root. The bony support of distal root was completely intact (Fig. 1).

**Treatment Procedure**

*Endodontic Phase:*

Biomechanical preparation was done within the distal root only (Fig 2a, 2b). The root-canal treatment was continued using rubber dam and intensive irrigation and intracanal medication. The root-canal filling was introduced by lateral condensation with gutta-percha and AH-Plus Sealer (Fig 2c), following which post space preparation and prefabricated metal post placement and composite core (luxa core) build up given (Fig 3a, 3b, 3c) and hemisection was performed 1 week later. It was decided to resect the mesial half of the tooth after the completion of endodontic therapy of the tooth.

*Periodontal Phase:*

After appropriate local anaesthesia, a crevicular incision was made from 1st premolar to 2nd molar region, a full thickness mucoperiosteal flap was reflected to provide adequate access for visualization, instrumentation and to minimize surgical trauma.

Hemisection of the mesial root and crown was done with a vertical cut method faciolingually towards the bifurcation area. The crown was cut with a long shank, tapered fissure carbide bur till the furcation is reached (Fig.4a).

Once the separation was complete, the mesial half was extracted (Fig. 4b). The empty socket was thoroughly debrided, irrigated along with root planning of distal root was performed. Odontoplasty was performed to remove the developmental ridges and mesial aspect of distal root was contoured in such a way so as to facilitate oral hygiene measures. Socket preservation was done by grafting the extraction site with “Fisiograft” and the buccal and lingual flaps were approximated and sutured back into its position to cover the graft (Fig. 4c) and the retained half of the tooth was ground out of occlusion which allowed the surgical site to heal with no occlusal stresses. After the complete healing of the extraction socket(Fig. 4d) , the crown of the remaining tooth

![Figure 1: Pre Operative Radiograph- grade III furcation involvement, periodontal bone loss, External resorption in relation with mesial root of 36](image1)

![Figure 2a: Working Length Determination](image2a)

![Figure 2b: Master cone placement](image2b)

![Figure 2c: Obturation of distal canal](image2c)
was restored with Fixed Partial Denture on 35, pontic in hemisection mesial of 36, distal of 36,37 so as to distribute the occlusal stresses.(Fig. 4e).

**Prosthodontic Phase:**

Diagnostic impression was made with irreversible hydrocolloid impression material and face bow transfer record was made and transferred to a semi adjustable articulator and maxillary and mandibular diagnostic cast were mounted using the interocclusal record, to check for any occlusal prematurities and interferences and necessary occlusal correction were carried out.

Tooth preparation was done in relation to 35, distal root of 36,37 to receive a porcelain fused to metal restoration and the final impression was made using putty reline technique and master cast was obtained and sent to ceramic laboratory for fabrication of FPD. Final prosthesis was cemented using glass ionomer cement (Fig. 4e).

**DISCUSSION**

Hemisection of multirooted teeth may be a viable treatment option when widespread periapical lesion and bone loss reaching furcation has occurred at one root and the other root is healthy. There are many reports of successful hemisection cases aimed at preserving multirooted teeth in the literature. This treatment option will maintain the natural dentition by preserving the health of the teeth with similar endodontic and periodontal problems.

Buhler stated that hemisection should be considered before every molar extraction, because it provides a good, absolute, and biologic cost saving alternative with good long term success. The treatment options to replace severely damaged and possibly unrestorable teeth include removable partial denture, fixed partial denture, and dental implant. A guiding principle should be to try and maintain what is present.

Before selecting a tooth for hemisection, patient's oral hygiene status, caries index and medical status should be considered. Also the accessibility of root furcation for ease of operation as well as good bone support for the remaining roots should be assessed. The furcation region is carefully smoothed, to allow proper cleansing and thus to prevent accumulation of plaque.

Root fracture is the main cause of failure after hemisection, so occlusal modifications are required to balance the occlusal forces on the remaining root. Contraindications include the presence of a strong abutment tooth adjacent to the proposed hemisection, which could act as an abutment to prosthesis. The remaining root may be inoperable for the necessary root canal treatment.
Also, fusion or proximity of the roots may prevent their separation\(^1\). The ultimate aim of hemisection surgery is to salvage a viable part of the tooth to be used as a prosthetic abutment or for occlusal support. Favorable predictors for carrying out hemisection surgery of a multi-rooted tooth include adequate bone support to maintain the sectioned ‘healthy’ root, a high furcation level to reduce the amount of tooth tissue to be cut and achieving a supra-gingival restoration margin (preventing encroachment upon the biological width)\(^1\). A predictable endodontic treatment is also of paramount importance and it is necessary to have adequate residual coronal tooth tissue after crown sectioning, caries removal, and preparation to provide adequate resistance and retention for the definitive restoration. As the hemisection procedure for a tooth requires careful planning and execution of treatment, a highly motivated patient with good oral hygiene is a prerequisite. If all these criteria are met, hemisection surgery is an alternative to extraction of the tooth and its replacement with either a dental implant or a conventional fixed/removable prosthesis\(^12\).

**Endodontic Phase**

Endodontic treatment was considered first because in case, if the tooth cannot be
treated endodontically or if there is an endodontic failure, the case will be contraindicated for hemisection and primarily to seal the access to periapex.

**Periodontic Phase**

Four critical factors in selecting molar for hemisection are following:13

1. **Root Divergence.** Ideally the resected root should have generous root divergence, as close root proximity will make surgery difficult.

2. **Root Form.** Roots of mandibular molars show concavity, mostly on distal root. Therefore, Odontoplasty should be performed to provide a proper contour.

3. **Location of Furcation.** Closer the furcation opening to the cemento-enamel junction, better the prognosis for retained root.

4. **Remaining Root Attachment.** Is critical to evaluate; as cylindrical, ovoid, and long root serves as an excellent abutment.

**Prosthodontic Phase:**

When the tooth loses part of its root support, it will require a restoration to permit it to function independently or serve as an abutment for fixed partial denture. Thus, restoration is required for function and stabilization of occlusion.

Critical factors to be considered while fabricating the prosthesis:

- Restoration can contribute to periodontal destruction, if margins are defective or if nonocclusal surfaces do not have physiologic form.

- An improperly shaped occlusal contact area converts acceptable forces into destructive forces leading to ultimate failure of hemisection. Hemisected abutment are given a taper greater than 6-10 degree to have a path of insertion compatible with the anterior abutment and to compensate for this buccal and lingual grooves are placed in the abutment. Occlusal table is reduced in size in order to decrease the forces on the retained hemisected root. Cuspal inclines are made less steep to reduce laterally directed forces and eliminate the nonworking contacts. Retained root is restored as premolar which helped to reduce the masticatory load. Stein noted that “esthetic permitting, the sanitary pontic is the best design for posterior region” 14.

**CONCLUSION**

For the endo-perio lesions to be treated successfully, an accurate diagnosis is mandatory. This diagnosis must cover both the endodontic and the periodontal component of the lesion. Where the primary aspect cannot be evaluated, endodontic treatment should be given precedence, followed by a wait-and-see approach until a decision for any additional endosurgical and/or periodontal procedure can be focused. Hemisection may be a suitable alternative to extraction and implant therapy and should be discussed with patients during consideration of treatment options.

**REFERENCES**


9. Rapoport RH, Deep P. Traumatic


For More Information Log on to www.ijhrs.com