CASE REPORT

Hemisection: A ray of hope for the management of periodontally compromised mandibular molars - A case report and review

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Abstract

Advances in dentistry and increased awareness of the patient have led to a shift in various treatment modalities such as hemisection, root amputation, and bicuspidization of teeth which would have been extracted few years back. Molars are the first permanent teeth to erupt in the oral cavity and are most commonly extracted due to caries and periodontitis. The loss of posterior molar teeth can result in several undesirable sequelae including mesial migration of teeth, loss of vertical dimension of occlusion, supraeruption of opposing teeth, alveolar bone loss, and a decrease in chewing ability. Hemisection is one of the treatment options for patients with severe bone loss and compromised periodontium. Under specific condition, only the diseased root is removed and the remaining part of the tooth is preserved to support a fixed prosthesis, thus increasing the pericemental area.

Keywords: Class III furcation defect, hemisection, mandibular molar treatment

Introduction

Periodontal destruction and caries are the major reasons behind tooth loss in the oral cavity. There are around 600 different bacterial species in the oral cavity, of which more than 150 species may be present in any given patient.¹ ² Management of these severe periodontal problems and extensive decayed lesions is challenging and later leads to dental extractions and replacement with either removable prosthesis or implants. Based on the extent of the disease, there are various other treatment strategies to save the tooth. These treatment strategies often involve the periodontist, endodontist, and prosthodontist.

Treatment of multirooted teeth is one of the challenging problems in periodontal therapy. The prevalence of furcation involvement in maxillary and mandibular molars ranges from 25% to 52% and from 16% to 35%, respectively.³ There are various treatment options for these teeth such as non-surgical treatment including scaling and root planing as well as surgical treatment. The surgical treatments are undergone following unsatisfactory results of non-surgical therapy which involves the tunneling technique, root resection, root amputation, root separation, and hemisection.

In the current literature, there is no uniformity in the terms used. Root amputation, root resection, root separation, and hemisection are frequently used terms. These are generally used as follows:⁴

Hemisection is defined as the removal of half of a tooth performed by sectioning the tooth and removing one root with crown portion. It is frequently used with reference to lower molars.

Root amputation is defined as "surgical removal of the defect root and adherent soft tissues leaving the crown of the tooth intact and supported by remaining root(s)". It is frequently used with reference to maxillary molars.

Radisection is a newer terminology for the removal of roots of maxillary molars.⁵

Bisection/bicuspidization is the separation of mesial and distal roots of mandibular molars along with its crown portion.⁶ According to Weine, hemisection is indicated in patients with severe vertical bone loss involving only one root of multi-rooted teeth, through and through furcation destruction, unfavorable proximity of roots of adjacent teeth preventing adequate hygiene maintenance in proximal areas, and severe root exposure due to dehiscence. Endodontic and restorative indications include...
prosthetic failure of abutments within a splint, endodontic failure, and vertical fracture of one root. Contraindications for hemisection are calcified canals, root perforation in roots to be retained or fused roots making root separation almost impossible.\[5\]

**Case Report**

A 35-year-old male patient reported to the department of periodontics with the chief complaint of pain and mobility of teeth on the left side of the face. On examination, the tooth 37 was Grade I mobile. On probing the area, there was a 15-mm deep periodontal pocket around the distal root of the tooth and Grade III furcation involvement with no gingival recession [Figure 1]. The probing pocket depth around the mesial root was 4 mm. On further inquiry, the patient did not give any medical or previous dental history.

On radiographic examination, Grade III furcation defect, external root resorption w.r.t. distal root with severe arc-shaped bone loss, was seen more along the distal roots involving the periapical area [Figure 2]. Pulp tested negative to vitality test. Interproximal bone loss was seen between 37 and 38.

Thus, the patient was diagnosed to be a case of localized aggressive periodontitis. Therefore, systemic doxycycline was prescribed as an adjunct to scaling and root planning. There was no improvement after Phase I therapy. The patient did not want the tooth to be removed, so the conservative management of the tooth was opted which included hemisection of the distal roots. It was decided that the distal root should be hemisected after completion of endodontic therapy of the mesial root followed by prosthetic replacement.

**Endodontic phase**

The access opening was done in tooth 37, and the working length was determined in mesial canals (19 mm). The canals were cleaned and shaped using I RACE rotary file system (30/04) and obturated with single cone technique, and the post-endodontic restoration was done with amalgam to maintain a good seal and allow interproximal area to be properly contoured during surgical separation.

**Periodontic phase**

Under 2% lidocaine local anesthesia, hemisection was started from the coronal aspect of the tooth till the gingival margin.

Later, a full thickness mucoperiosteal flap was reflected by giving a crevicular incision from the first molar till the mesial of third molar to provide adequate access for visualization and instrumentation and minimizing surgical trauma.

A long shank-tapered fissure carbide bur was used to make vertical cut buccolingually toward the bifurcation area, and distal roots were extracted. Care was taken not to traumatize the bone, adjacent tooth, and soft tissue. Debridement and irrigation of the socket along with thorough root planning of mesial root were performed.

Platelet-rich fibrin coagulum a second-generation platelet concentrate was placed immediately in the extraction socket. Interrupted suturing was done and surgical dressing (Coe-Pak,) was given. Post-operative instructions were given, and the patient was recalled after 7 days for suture removal. The socket was allowed to heal for 3 months. The patient was recalled at 3 and 6 months’ post-treatment, and radiographs were taken to evaluate new bone formation in distal socket. Temporary removable partial denture was given in the interim period to avoid space closure by mesial migration of distal teeth [Figure 3].

**Prosthetic phase**

The prosthetic phase was done 6 months after completion of hemisection. Tooth 37 was restored by metal fused to porcelain crown taking into consideration the crow-root ratio and the remaining mesiodistal space w.r.t. 37 and 38 [Figures 4 and 5].

**Discussion**

This case presentation shows an alternative treatment option to the extraction or implant placement and thus preservation of vital periodontal structures when the patient did not want
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removal of his tooth. A successful treatment plan depends on careful case selection and post-operative maintenance and care by the patient. In this case, the distal root had a poor periodontal support with 15-mm deep pocket, and radiograph showed severe bone loss, furcation radiolucency, and external root resorption w.r.t. distal root. The mesial root showed good bone support with good periodontal support and was a good candidate for saving the mesial root.

Three-dimensional imaging techniques based on computed tomography (CT) and cone-beam CT are useful for visualization of root resorption, furcation radiolucency, and bone support in a non-invasive manner using less radiation. However, cost and access to them are said to be the limiting factors.\(^{[6,7]}\)

Implant therapy is a predictable option with good functionality.\(^{[8]}\) However, in this case, the patient chose an alternative treatment option because of financial considerations as well as desire to save the natural tooth. Furthermore, implant placement would have required ridge augmentation. Hemisection allows for proprioception of the remaining root, which is thus a more suitable abutment for fixed partial dentures than an osseointegrated counterpart.\(^{[9]}\)

During surgical hemisection, the mesial root was retained and the distal root was extracted. All occlusal contacts on mesial root were reduced in size and repositioned more favorably for adequate healing and new bone formation postoperatively. At 6 months postoperatively, radiographs were taken to confirm new bone formation in distal root area. Fixed metal ceramic prostheses were fabricated on retained mesial root as the extraction space was partially covered by mesial migration of 38.

### Conclusion

This case report shows the treatment of a periodontally compromised tooth by multidisciplinary treatment approach. With recent advancements in endodontics, periodontics, and restorative dentistry, hemisection has received a considerable acceptance as a conservative dental treatment and teeth so treated have endured the demands of function.

The success of the hemisection procedure depends on the supporting bone, the restorative treatment plan, and the oral hygiene of the patient. The prognosis for hemisection is the same as for routine endodontic procedures provided that case selection has been correct, the endodontic treatment has been performed adequately, and the restoration is of an acceptable design relative to the occlusal and periodontal needs of the patient.

### Clinical Significance

Hemisection can be considered a suitable alternative to extraction and should be discussed with patients, during consideration of treatment options.
References