



ORIGINAL RESEARCH PAPER

Dentistry

HEMISECTION - HOPE FOR A HOPELESS TOOTH: A CASE REPORT

KEY WORDS: Mandibular molar, Root canal treatment, Separated instrument, Hemisection, Fixed prosthesis

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ABSTRACT

In the modern era of dentistry and patients' desire to retain natural teeth has led to the conservative approach. Earlier extraction of hopeless teeth followed by replacement with fixed partial dentures, removable partial dentures or implants was the only option. Hemisection is one of the excellent treatment modalities where clinicians can preserve the original tooth structure (especially molars) rather than complete removal of a tooth, the fixed dental prosthesis was delivered to restore proper form and function. This case report describes and illustrates the treatment of the first mandibular molar with irretrievable and unable-to-bypass separated instruments in the mesiobuccal canal of the mesial root. After sectioning the tooth, the mesial root with the crown portion was extracted, and the remaining part of the tooth was restored as a premolar. Restorative rehabilitation was done by cementing a three-unit metal ceramic bridge. Hemisection and prosthetic rehabilitation yielded a satisfactory result

Introduction

The motive of a clinician is to provide a functional dentition for a lifetime. The treatment most commonly used for decayed teeth or periodontally involved teeth or an endodontically treated mishap teeth is extraction followed by a removable partial denture, fixed partial denture, or a dental implant to replace the missing tooth. Recently there are various new treatment modalities to ensure the retention of teeth that involve an interdisciplinary approach. Interdisciplinary treatment includes combining restorative dentistry, endodontics, and periodontics so that the teeth are retained in whole or in part. Retained teeth can be functional as independent units of mastication or as abutments in simple fixed bridges. Appropriate case selection plays a beneficial role in tooth resection procedures used to preserve as much tooth structure. Tooth resection involves the excision and removal of any segment of the tooth or a root with or without its accompanying crown portion. Various resection procedures described are: root amputation, hemisection, radisection, and bisection.^{1,2}

Weine has listed the following Indications for tooth resection^{3,6}

Periodontal Indications:

1. Involvement of only one root of multi-rooted teeth with severe vertical bone loss.
2. Grade III and grade IV furcation defect.
3. Unfavourable proximity of roots of adjacent teeth, halting adequate hygiene maintenance in proximal areas.
4. Severe root exposure due to dehiscence.

Contra indications

- a. Strong adjacent teeth were available for bridge abutments.
- b. Roots to be retained with Inoperable canals
- c. Fused roots

Root amputation refers to the removal of one or more roots of a multirouted tooth while other roots are retained. Bisection / bicuspidization is the separation of mesial and distal roots of mandibular molars along with their crown portion, where both segments are then retained individually.

Hemisection is the surgical separation of multi-rooted teeth

through the furcation area in such a way that the root with an irreparable pathology may be surgically removed along with the associated part of the crown. Hemisection has emerged as an alternative to extraction and a conservative way that allows the preservation of tooth structure as well as the alveolar bone. This approach is comparatively pocket friendly to the patients. Although dental implants have emerged as new options but retaining a healthy natural dentition is always superior to any form of prosthesis functionally as well as esthetically. Hemisection has proven to be a lifesaver procedure in retaining endodontic treatment failure teeth. The teeth to be hemisected should have a high furcation level, roots should be divergent and there must be good periodontal status and more than 50% level of alveolar bone available.⁴

Mandibular molars are the most commonly extracted teeth due to caries and periodontal disease. Separation of an instrument within the root canal hinders root canal procedures and affects the prognosis. Cases with separated instruments show a 19% reduction in the rate of healing of apical tissue Studies done on removing mesial or distal roots in hemisection of mandibular molars showed good results in either case.

This case report illustrates the hemisection procedure in which the mesial root with a separated instrument in the mesiobuccal canal is extracted and the distal root of the mandibular left second molar is retained.

Case report

A 20-year-old female patient reported to the Department of Periodontics in K.D. Dental College and Hospital with the chief complaint of pain in the mandibular right back tooth region. The patient gave a history of previous root canal treatment 1 year back. The pain was dull aching and intermittent, which aggravated mastication and was temporarily relieved by taking analgesics. Clinical examination revealed mild pain on percussion and palpation. Radiographic examination showed a separated instrument in the mesial root of a mandibular right first molar with periapical radiolucency. No significant medical history was found. Extra oral examination revealed no significant

findings. The patient was explained the various treatment option available along with their prognosis including extraction and placement of the dental implant. However, she opted for hemisection followed by a fixed dental prosthesis over other treatment options. It was decided that the mesial root should be hemisected after the completion of endodontic therapy of the tooth followed by the prosthesis.

Endodontic & Periodontic Phase

The working length was determined and the canals were biomechanically prepared using the stepback technique. The separated instrument was irretrievable and unable to bypass small files (6, 8, and 10 k-type) in the mesial canal. The distal canal was obturated with the lateral condensation method and the chamber was filled with composite to maintain a good seal and allow the interproximal area to be properly contoured during surgical separation.¹⁰

The periodontal prognosis of the distal root was fair with good bone support. Hemisection of the mesial root was performed under local anesthesia. Under adequate local anesthesia, a crevicular incision was made from the premolar to the second molar region. Full-thickness flaps were elevated on the buccal and lingual aspects of the involved tooth. Degranulation was performed using surgical curettes, to expose the bone were done. A long tapered-fissure carbide bur was used to make a vertical cut buccolingually from the occlusal surface, keeping the buccal groove as a reference guide, towards the furcation area to section the entire tooth into two halves. A periodontal probe was used to ensure the complete sectioning of a tooth. After completion of the sectioning, the root was elevated from its socket using a periosteal elevator and removed. Mesial root with accompanying crown portion was atraumatically extracted. A diamond-coated tip was used to smoothen and contour the remaining distal root. Granulation tissue was curetted out of the mesial socket using surgical curettes. The socket was irrigated adequately with sterile normal saline. Socket preservation was done by placing xenograft and PRF. The flap was approximated and sutured with 3-0 braided silk. The occlusal table was minimized to redirect the forces along the long axis of the distal root. The postoperative radiograph showed the well-retained distal root and extraction of the mesial root.

The patient was instructed to avoid chewing from the treatment side and oral hygiene instructions were given. They were informed about mild discomfort and swelling. The patient is recalled after seven days for suture removal. At the 1-month recall visit, healing was found to be satisfactory

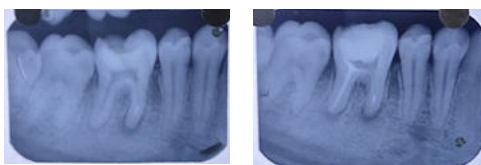


Figure.1 Pre-operative

Figure.2 Post RCT



Fig.3 Intraoperative view 46 Fig.4 Intraoperative picture showing the bisected halves



Fig.5 Intraoral view after hemisection

Fig.6 Mesial view of extracted root Distal view of the extracted root



Fig.7 Socket preservation by placing bone graft

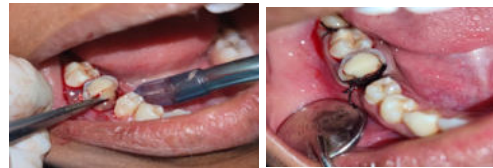


Fig.8 PRF Membrane placed in the socket

Fig.9 Sutures placed



Fig.10 Coe pack placement

Fig.11 Radiographic view of mesial root after extraction



Fig.12 Intraoral view after 1 month

Prosthodontic Phase

After tissue healing Tooth preparation was done followed by a fixed metal ceramic bridge involving retained distal half of the mandibular first molar and second premolar with a sanitary pontic. The final prosthesis was cemented using luting type 1 glass ionomer cement. Occlusal interferences were checked in centric and eccentric relations Post cementation instructions regarding periodontal maintenance were given. The recall was done periodically to assure the healing and success of the restoration.

After one year of follow-up, the tooth was asymptomatic, occlusion was stable, periodontal health, and alveolar bone, status was in a good condition and the patient was satisfied with the treatment.¹¹



Fig.13 Tooth preparation

Fig.14 Final prosthesis cemented

Discussion

Recent advancements in dentistry and patient awareness to retain natural teeth have led to certain therapeutic measures. This includes an interdisciplinary approach that involves endodontics and periodontics and prosthodontics. Among all the modalities Hemisection is a practicable approach to have opted for before the extraction of molars.⁷ This procedure is indicated when there is severe vertical bone loss (one root of multirouted teeth is involved), furcation involvement, and

inappropriate proximity of roots of adjacent teeth. Various studies done by Sharma S et al(2018) and Rajasekar P et al (2019) showed very good results for hemisected teeth and are in favor of this treatment procedure.^{5,8,9}

Adequate endodontic therapy, recontouring of the remaining segment, quality and quantity of remaining alveolar bone, and status of patient oral hygiene are important criteria for the success of the hemisection procedure. In this case, the patient came with a history of root canal treatment with a broken instrument in the mesial canal and radiographic findings show periapical radiolucency. The patient was informed about various treatment options but the patient opted for a fixed partial denture instead of implants due to financial reasons.

A 3-unit, extending from the hemisected molar to the premolar, was fabricated. The mesial root was resected because of a broken instrument and the distal root was retained. A distal root is preferable as an abutment as it is straight and broad. Hemisection has an advantage that allows for physiologic tooth mobility of the remaining root, which is thus a more suitable abutment for fixed partial dentures than an osseointegrated counterpart.

Conclusion

Among all the treatment modalities Hemisection has proven to be an effective as well as conservative treatment modality over conventional procedure or extraction of periodontally and endodontic affected teeth. This type of conservative method not only preserves dentition but also reduces the psychological trauma and occlusal dysfunction associated with tooth loss as well as a reduced financial load on the patients. A good prognosis can be achieved by careful examination, proper diagnosis, and appropriate case selection through unique anatomical features, such as tooth root length, curvature, shape, size, the position of adjacent teeth, and bone density may also determine the success of the treatment.

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