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Hopeless to Hopeful: Hemisection of a Periodontally Involved Molar – A Case Report

Parkavi Arumugam[1], Mala Dixit Baburaj[2]

[1]Post-graduate student, Department of Periodontology, Nair Hospital Dental College, Mumbai, Maharashtra, India

[2]Professor and Head, Department of Periodontology, Nair Hospital Dental College, Mumbai, Maharashtra, India

Abstract: ***The term hemisection refers to the sectioning of a molar tooth, with the removal of an unrestorable root and part of the crown. Periodontally involved teeth with severe bone loss involving only part of the tooth, may well be retained by hemisection. This article describes and illustrates one such case of periodontally involved mandibular molar treated by a simple procedure of hemisection and socket preservation using bone graft and platelet rich fibrin and its subsequent restoration.***

Keywords: Hemisection, mandibular molar, root resection, platelet rich fibrin

1. Introduction

Loss of the posterior teeth is eventful and undesirable, often leading to teeth drifting, loss of masticatory function and loss of arch length, which requires prevention and maintenance measures [1],[2].

Management of periodontally involved molars with extensive decay is challenging and is limited to dental extraction and replacement with implants[1],[3]. Nevertheless, treatment strategy to retain such teeth involves periodontal, prosthodontic and endodontic assessment for appropriate selection of treatment to allow for stronger survival[1],[4]. The term tooth resection denotes 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[5]. Hemisection represents a form of conservative dentistry, aiming to retain as much of the healthy original tooth structure as possible[6],[7]. It is the removal or separation of root, with its accompanying crown portion, of mandibular molars [5].

Compiled results of several studies have shown that the average failure rate of hemisected tooth supported prosthesis is close to 13.1% which is comparable to the failure rate of implants. According to Buhler et al, hemisection should be considered an option prior to molar extraction, as this procedure can ensure cost savings with good long-term success[8],[9].

Weine[5],[10] has listed the following indications for tooth resection:

1.1 Periodontal indications

1) Severe vertical bone loss involving only one root of multi-rooted teeth.
2) Through and through furcation destruction.
3) Unfavourable proximity of roots of adjacent teeth, preventing adequate hygiene maintenance in proximal areas.
4) Severe root exposure due to dehiscence

1.2 Endodontic and restorative indications:

1) Prosthetic failure of abutments within a splint.
2) Endodontic failure in cases with perforation through the floor of the pulp chamber, or pulp canal of one of the roots of an endodontically involved tooth which cannot be instrumented.
3) Vertical fracture of one root
4) Severe destructive process with furcation involvement or sub-gingival caries, traumatic injury.

1.3 Contraindications

1) Strong adjacent teeth available for bridge abutments as alternatives to hemisection.
2) Inoperable canals in root to be retained.
3) Root fusion-making separation impossible

2. Clinical Presentation

A 59 years old, male patient came to the Department of Periodontics, Nair Hospital Dental College, Mumbai, India, with the chief complaint of pain in the lower right posterior tooth region since the past few months. The pain was dull, intermittent and non-radiating in nature. The patient did not give any significant medical history and he had no history of any deleterious habits. Extraoral examination revealed no abnormality.

On intraoral examination, a deep periodontal pocket was present on the distal surface of mandibular right second molar measuring 9mm. On radiographic examination, severe angular bone loss till the apex, circumscribing the distal root was evident. Periodontal support of the mesial root of 47 was good and the inter radicular bone in 47 did not seem to be affected. Periodontal prognosis with mesial half of 47 was good and the vitality test of 47 was positive. Thus, it was diagnosed as, Chronic generalised marginal gingivitis with localised periodontitis with respect to mandibular right second molar. As the patient did not wish to have the tooth removed, so a conservative treatment option was opted

which included hemisection of the distal root of 47 followed by prosthetic replacement.

Figure 1: (a) pre-operative deep periodontal pocket measuring 9mm with respect to the distal root of 47 (b) pre-operative IOPA of 47 revealing bone loss circumscribing the distal root

3. Clinical Management

3.1 Phase I therapy

The whole procedure was explained to the patient and a thorough scaling and root planing was done. Gingival and periodontal status was re-evaluated after 2 weeks. Intentional root canal treatment was done in 47.

3.2 Phase II therapy

Following the completion of the endodontic therapy the patient was kept on maintenance therapy for a duration of 2 months, at the end of which, deep periodontal pocket persisted with respect to the distal root of 47. Hence, hemisection of the distal root of 47 was planned. Under local anesthesia, a full thickness muco-periosteal flap was reflected, after giving a gingival crevicular incision, to provide adequate access for visualisation and instrumentation. Upon reflection of the flap, the bony defect along the distal root became evident, which was then curetted and debrided. A tapered fissure diamond bur was used to split the mesial and distal half of the tooth by giving a vertical cut facio-lingually towards the furcation area. The distal root was extracted. The socket was thoroughly debrided and irrigated and the mesial root, which now became accessible, was scaled and root planed. The defect was filled with a mixture of Sybograf^{TM} – Plus bone graft, and platelet rich fibrin that was prepared from the patient's own blood. The defect was covered using PRF membrane. The buccal and lingual flap were approximated to cover the graft. The flap was sutured with 3/0 black silk sutures and periodontal dressing was given to cover the surgical site. The occlusal table was minimized to redirect the forces along the long axis of the mesial root. The patient was prescribed medication, Doxycylcine 200mg stat followed by 100 mg twice daily for 3 days and an analgesic, Ibuprofen, thrice daily for 3 days. Suture removal was done after 1 week.

The patient was monitored regularly, postoperatively, to ensure uneventful healing and good oral hygiene maintenance. At 3 months, IOPA revealed good bone regeneration which indicated good uptake of the graft.

Figure 2: Infrabony defect seen with respect to distal root of 47 following flap reflection

Figure 3: Sectioning of 47 using aerator

Figure 4: Sectioning of 47 completed

Figure 5: Root resection of distal root of 47 completed

Figure 6: PRF plug obtained from the patient's blood and Sybograf™ – Plug bone graft

Figure 7: Defect site grafted with the mixture of Sybograf™ – Plus and PRF

Figure 8: Grafted defect covered with PRF membrane

Figure 9: (a) – Sutures placed (b) periodontal pack placed

3.3 Phase III therapy

A metal cantilever crown was made for the hemisected tooth. The missing tooth in the maxilla were replaced using a removable partial denture.

Figure 10: (a) Metal crown given (b) RPD given for maxillary missing teeth

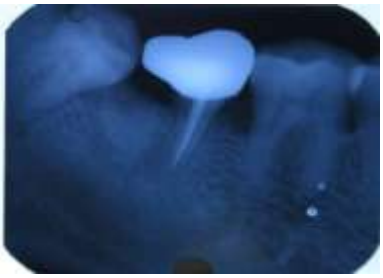

Figure 11: Post-operative IOPA of 47 showing significant bone fill.

4. Clinical Outcome

Patient was followed up by regular recall visits and oral prophylaxis. He had good masticatory efficiency with the prosthesis and was very satisfied with the treatment outcome.

5. Discussion

Regeneration of periodontal hard and soft tissues, including formation of a new attachment apparatus is the main aim of regenerative therapy. The management of a periodontic-endodontic defect includes debridement of root canals, as well as surgical approaches that provide better access to clean the root surfaces and apical lesions. Multirooted, periodontally involved molars can be maintained for long periods of time with hemisection depending on their extent of bone destruction. The necessity of periodontal surgical therapy is most likely because the periodontal bone loss was more advanced and less likely to resolve after non-surgical therapy alone[11],[12].

Hemisection is a technique sensitive procedure[11],[13]. One must be careful throughout the processes of case selection, and endodontic, periodontal, restorative and maintenance therapies[11]. The decision of hemisecting the tooth should be based on the extent and pattern of bone loss, root trunk and root length, ability to eliminate the osseous defects and endodontic-restorative consideration, which were all considered[11],[14]. Consideration should also be given to the morphology, clinical length, shape and divergence of the roots of a multirooted tooth[11],[15].

Objectives of hemisection[11]:
1) To facilitate maintenance
2) To prevent further attachment loss
3) To obliterate furcation defects as a periodontal maintenance problem

In the present case, there was bone loss till periapical region in the distal root of 47. Since, there was good bone support on the mesial root of 47 along with fair inter- radicular bone, extraction was not considered. Hemisection as a treatment option was perfectly suited to the case. Since the patient had multiple missing teeth, he wanted to conserve as much tooth structure as possible. Since 48 was mesially tilted, a crown with modified occlusal table and a sanitary pontic was prepared on the hemisected tooth.

The smaller size of the occlusal tables, under-contouring of the embrasure spaces and ensuring that the crown margin encompasses the furcation are all factors, in the high success rates observed with hemisection therapy[6],[16]. Cuspal inclines were made less steep to reduce laterally directed forces and eliminate the nonworking contacts[3].

Furthermore there are conflicting data about the survival of the remaining fragment (3-38% for ten years) and a wide range of reasons for failure of hemisection[11],[17]. Root fracture is the main cause of failure after hemisection, so occlusal modifications are required to balance the occlusal forces on the remaining root. Hence, the use of hemisection to retain a compromised tooth offers a prognosis comparable to any other tooth with endodontic treatment[11].

The keys to long term success include thorough diagnosis, selection of patients with good oral hygiene, careful surgical and restorative management. Hemisection may be a suitable alternative to extraction and implant therapy and should be discussed with patients during consideration of treatment options [3].

6. Conclusion

Advances in dentistry have made it possible to maintain a functional dentition for a lifetime. With the newer advents in dentistry happening daily, use of mutli-modality treatment approaches, for the restoration of such complex endodontically and periodontally involved teeth is now a reality. Hemisection has now received acceptance as a conservative and dependable dental treatment and teeth so treated have endured the demands of function.

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Author Profile

Dr. Parkavi Arumugam completed her B.D.S in 2012 from SRM University, Chennai and is currently a second year post-graduate student in the Department of Periodontology at Nair Hospital Dental College, Mumbai.

Dr. Mala Dixit Baburaj completed her graduation and Post-graduation from Government Dental College in 1988 and 1993 respectively. She has been the Head of Department of Periodontics at Nair Hospital Dental College since 2005. She has been in teaching since 1993 and has been a Post Graduate guide since 2003. She has been a speaker at several National and International Conferences and has 55 publications to her credit at various national and international journals.