

A CASE REPORT ON THE MANAGEMENT OF A GROSSLY DECAYED MANDIBULAR MOLAR AND PREMOLAR BY NON-SURGICAL ROOT CANAL THERAPY AND HEMISECTION FOLLOWED BY FULL COVERAGE RESTORATION

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PRESENTATION OF CASE

Advances in dentistry have increased the longevity of the dentition. The terms 'hemi-section' and 'root amputation' are known collectively as 'root resection'.¹ Hemisection refers to sectioning of a mandibular molar into two-halves followed by removal of the diseased root and its coronal portion. The retained root is endodontically treated and the furcation area is made self-cleansable.²

Misch stated that for replacing single posterior teeth a removable prosthesis, a resin-bonded fixed partial denture, three-unit fixed restorations, maintenance of the posterior space or endosseous implants are the available options.³

Hemisection can produce predictable results as long as proper case selection is followed by interdisciplinary approach with endodontic, surgical and prosthetic procedures. Weine has listed the following indications for tooth resection.

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.

Endodontic and Restorative Indications

1. Prosthetic failure of abutments within a splint. If a single or multi-rooted tooth is periodontally involved within a fixed bridge, instead of removing the entire bridge if the remaining abutment support is sufficient the root of the involved tooth is extracted.
2. Endodontic Failure: Hemisection is useful in cases in which there is 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: The prognosis of vertical fracture is hopeless. If vertical fracture traverses one root, while the other roots are unaffected the offending root may be amputated.
4. Severe Destructive Process: This may occur as a result of furcation or subgingival caries, traumatic injury and large root perforation during endodontic therapy.

Contraindications

1. Poorly shaped roots or fused roots.
2. Poor endodontic candidates or inoperable endodontic roots.
3. Patient unwilling to undergo surgical and endodontic treatments.^{4,5}

In this article, a case of hemisection is presented as a treatment option for a tooth where only the mesial root of a mandibular first molar was affected. The decision was taken to hemisect the mesial root, as the distal root and furcation bone was relatively unaffected. The treatment also involved root canal treatment of the distal canal of the affected mandibular first molar along with post and core of the grossly decayed adjacent mandibular second premolar followed by a Zirconium bridge. This procedure represents a form of conservative dentistry, aiming to preserve as much tooth structure as possible rather than sacrificing the whole tooth.

Conservation of tooth structure has always been the prime aim of the restorative procedures. Hemisection is a conservative treatment approach for multirooted teeth affected with caries, bone loss and furcation involvement. The term hemisection refers to the sectioning of a molar tooth with the removal of an unrestorable root which may be affected by periodontal, endodontic, structural (cracked roots) or caries. This case report describes a procedure of hemisection in a mandibular molar along with root canal treatment of a grossly decayed mandibular second premolar and subsequent restoration of the tooth with fixed prosthesis. This technique helps to maintain tooth structure in a compromised tooth with the ability to maintain proper function of the tooth.

CASE REPORT

A 54-years-old male patient had reported with a complaint of discoloured teeth in the right lower back teeth region. His medical history was non-contributory. Extraoral examination did not show any abnormality. Intraoral examination revealed grossly decayed 45 and decayed mesial aspect of 46. Probing depth of 46 was up to furcation area.

Radiographic examination revealed ill-defined non-homogeneous radiolucency involving the pulp on the distal

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aspect of 45 and on the mesial aspect of 46 extending up to the furcation area.

Root canal treatment of the distal root followed by surgical removal of the mesial root with respective crown of 46 and root canal treatment of 45 with post core followed by a Zirconium fixed partial denture involving 45 and 46 was decided as a treatment option.

Access was opened followed by canal location and working length determination under rubber dam isolation for 46 and 45. Root canal cleaning and shaping was carried out using ProTaper Next file system. Canals were irrigated with 2% Chlorhexidine. Obturation was done using Guttaflow 2 (Coltene/Whaledent Inc.). Post space preparation was done in 45 followed by impression taking with polyvinyl siloxane impression material for cosmopost (Metal Free Post and Core) followed by placement of cosmopost - a ceramic post system (Ivoclar Vivadent) of size 1.4 mm diameter in the subsequent visit. Post and core cementation were done using resin bonded composite.

In the subsequent visit, removal of mesial root of 46 was done. Under adequate local anaesthesia, gingival separation was done around mesial root of 46 followed by extraction with lower premolar forceps. The surgical site was irrigated adequately with normal saline and all bony fragments were removed. Suture was placed. Occlusal table of 46 was reduced to decrease the forces along the long axis of the distal root. Complete healing of the surgical site was observed after 10 days.

In the prosthodontic phase of therapy, Zirconium fixed partial denture involving retained distal half of mandibular first molar and mandibular second premolar was planned. 46 and 45 were prepared with supragingival shoulder finish line to receive a Zirconium retainer. Putty-light body impression was taken using polyvinyl siloxane impression material. To enhance the oral hygiene maintenance, sanitary pontic design was selected. Zirconium bridge was fabricated subsequently and cemented in place.

DISCUSSION OF MANAGEMENT

Surgical hemisection of a tooth involves the excision of one or more roots and their associated coronal structure. This procedure generally is performed as an alternative option to complete extraction of molars when their prognosis can be improved by removing roots that are significantly compromised. Decisions to restore these teeth were primarily based on the fact that "fixed" teeth are typically better functionally than "removable" teeth and better aesthetically than "no" teeth.⁶

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 bony defects and post endodontic restorative consideration which were all taken into consideration.⁷

When choosing to perform a hemisection procedure, consideration should be given to the morphology, clinical length and shape of the roots of a multi-rooted tooth. Root divergence should also be considered while making a case selection. Affected teeth with roots spread apart facilitate the clinician's ability to carry out root resection.

In this case hemisection was chosen as treatment option, because the mesial root of the mandibular first molar (46)

was affected and the distal root and furcation bone was relatively unaffected.

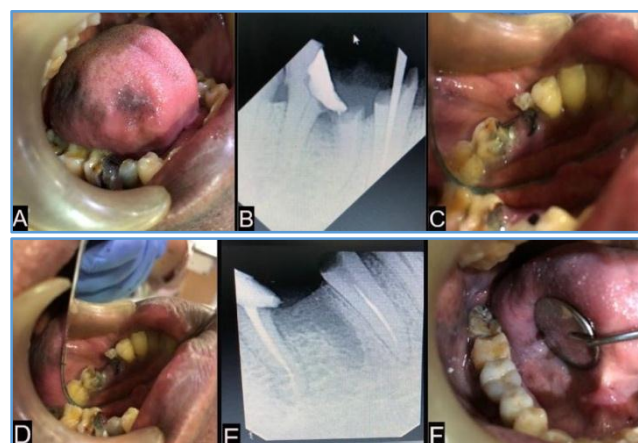
The tooth had to be endodontically treated before hemisection. Appropriate endodontic therapy must be performed before hemisection to avoid intrapulpal dystrophic calcification and postoperative tooth sensitivity.⁸

Mesial root was removed since it was the diseased half. Retention of distal half has various advantages. It is broader and straighter and accepts the load better.⁹ Mesial root has a longitudinal groove, which decreases the surface area and makes adequate post placement a challenge.¹⁰ A bridge was provided to restore occlusal function that involved the adjacent second premolar and retained distal root of mandibular first molar. In-vitro studies have proven a near normal return of biting force when such a prosthetic design is chosen.¹¹

This design along with retention of distal part of the tooth helped in keeping the size of the prosthesis (fixed bridge) small, since the second molar was spared.¹² Smaller sized prostheses are better and preferable, as they accumulate less plaque than bigger prosthesis and have better survival rates. Adequate plaque control is one of the biggest determinants in ensuring long-term success of this prosthetic design.¹³

According to Shin-Young Park, resected molars used as intermediate abutments of a fixed bridge had a higher survival rate. This might be because the occlusal loads on the intermediate abutment are smaller than on terminal abutments and single abutments. Amount of occlusal forces is significant for the long-term success of the fixed bridge, and root fractures were frequently reported in resected molars with higher occlusal loads. Furthermore, there are conflicting data about the survival of the remaining fragment (3 - 38% for ten years).¹⁴

With recent refinements in endodontics, periodontics and restorative dentistry, hemisection has received acceptance as a conservative dental treatment. This article presents a technique to maintain tooth structure in a compromised tooth. The keys to long-term success appear to be thorough diagnosis, selection of patients with good oral hygiene, careful surgical and restorative management. It was shown that such teeth can function successfully.



(A) Pre-operative Image of 45 and 46. (B) Radiographic Image (IOPA) depicting grossly mutilated mesial aspect of 46. (C) and (D) Hemisection of 46 done. (E) Radiographic Image (IOPA) after obturation of distal root of 46 and 45 and removal of mesial root of 46. (F) Post-operative Image after placement of Zirconium fixed partial denture involving 45 and 46.

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