

Hemisection: Resection For Conservation

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Abstract: Furcation defects represent a formidable problem in the treatment of periodontal disease, principally related to the complex and irregular anatomy of furcations. The presence and severity of a furcation lesion reduces the success rate of conventional periodontal therapy in these specific areas and therefore worsens the long-term prognosis of that particular tooth. While regeneration of the periodontium is an accepted treatment goal, not all furcation defects can be effectively treated using regenerative procedures. Hence, resective therapies like root resection, bicuspidization or hemisection for the treatment of furcation defects is an essential part of the periodontal treatment, which must be performed in order to attain a result which can eventually be considered more conservative. Here is a case report of a 38-year-old male with hemisection procedure performed in the right mandibular 1st molar with grade III furcation involvement followed by fixed partial denture. [Barot VNJIRM 2015; 6(4):118-122]

Key Words: Furcation defects, hemisection, root resection, resective therapy

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Introduction: Molars are the tooth type demonstrating the highest rate of periodontal destruction in untreated disease and suffer the highest frequency of loss for periodontal reasons.¹ Attachment loss in the furcation is one of the most serious anatomical sequelae of periodontitis.

The main goal of periodontal therapy is to provide patients with a dentition that functions in health and comfort for the remainder of their lives. Resective therapies like root amputation or resection remain important in an array of therapeutic procedures in periodontal therapy. Grossman² has referred to root amputation as dental adage that half loaf is better than none..!

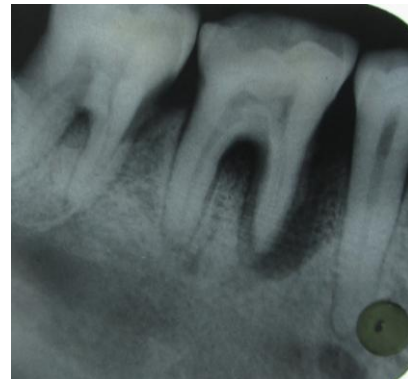
Case report

A 38-years-old male patient reported with the complaint of pain and mobility of right mandibular first molar. On clinical examination, the tooth was sensitive to percussion and revealed grade 1 mobility. On probing the area, there was 8 mm deep periodontal pocket and 14 mm clinical attachment loss (CAL) around mesial root of the tooth [Figure 1 and 2]. Mesial root hemisection was planned after completion of endodontic therapy of the tooth. The canals were obturated with lateral condensation method and the chamber was filled with silver amalgam to maintain a good seal and allow interproximal area to be properly contoured during surgical separation [Figure 3].

Figure 1: Grade 3 furcation involvement, 14 mm CAL and 8 mm probing pocket depth i.r.t mesial root of 46



Figure 2: IOPA showing radiolucency involving mesial root and furcation area of 46



Under local anaesthesia, full thickness flap was reflected after giving a crevicular incision from first premolar to second molar. Upon reflection of the flap, moat like bony defect along the mesial root was evident [Figure 4].

Figure 3: IOPA of 46 after root canal treatment

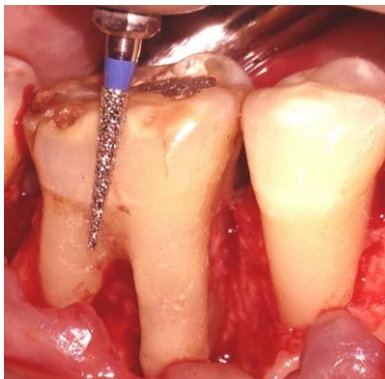


Figure 4: Full thickness flap reflection, moat like bony defect along the mesial root of 46



All granulation tissue was removed with Gracey curettes to expose the bone. The vertical cut method was used to resect the crown with mesial root [Figure 5].

Figure 5: A long shank tapered fissure diamond bur to make vertical cut toward the bifurcation area of 46



A long shank tapered fissure diamond bur was used to make vertical cut toward the bifurcation area. A fine probe was passed through the cut to ensure separation [Figure 6].

Figure 6: Immediately after hemisection of crown



The mesial half was extracted and the socket was irrigated adequately with sterile saline [Figure 7 and 8].

Figure 7: Immediately after removal of resected mesial root along with crown portion of 46

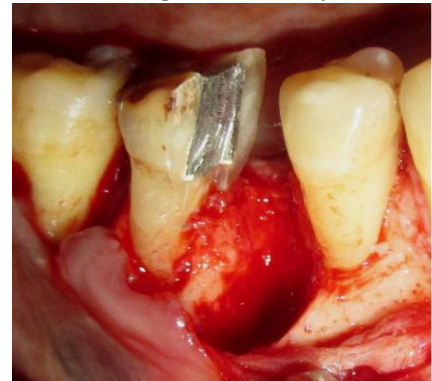


Figure 8: Resected mesial crown-root portion of 46

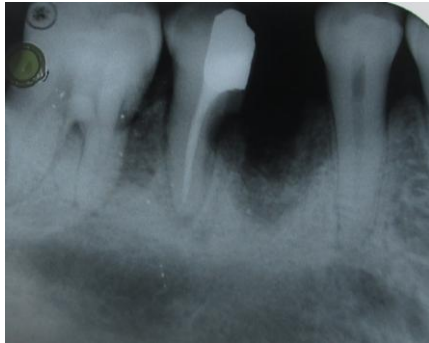


The extraction site was debrided and irrigated, then bony defect was grafted with perioglass[®]. The flap was repositioned and sutured with 3-0 black silk sutures [Figure 9]. The occlusal table was minimized to redirect the forces along the long axis of the distal root. IOPA shows the well retained distal root and extraction socket of the mesial root [Figure 10].

Figure 9:Flap closure with 3-0 black silk sutures placement



Figure 10:IOPAradiograph after removal of resected mesial root along with crown portion



Post-operative after 1 and a half month showing complete healing of the tissues [Figure 11 and 12].

Figure 11:Post-operative 45 days, showing complete healing of the tissues, buccal view



Figure 12:Post-operative 45 days, showing complete healing of the tissues, occlusal view

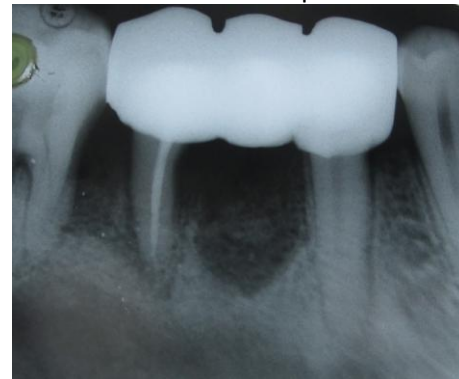


After 2 months, fixed metal prosthesis involving retained distal half and mandibular second premolar was given [Figure 13 and 14].

Figure 13:Fixed partial denture involving retained distal half and mandibular second premolar given, occlusal view



Figure 14:IOPA radiograph showing fixed partial denture involving retained distal half and mandibular second premolar



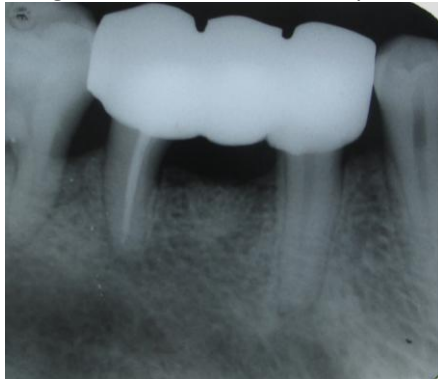
After 1 year, a well retained functional prosthesis can be appreciated [Figure 15 and 16].

Discussion: Various resection procedures described are: root amputation, hemisection, radisection and bisection/ bicuspidization. Root amputation is characterized as removal of a root without removal of the overhanging portion of the crown. Hemisection is defined as the removal of half of a tooth performed by sectioning the tooth and removing one root. It is frequently used with reference to lower molars. Radisection is a newer terminology for removal of roots of maxillary molars. Bicuspidization is the separation of mesial and distal roots of mandibular molars along with its crown portion, where both segments are then retained individually.

Figure 15: Post-operative 1 year, showing well retained functional prosthesis, occlusal view



Figure 16: Post-operative 1 year, radiograph showing well retained functional prosthesis



Root amputation procedures are a logical way to eliminate a weak, diseased root to allow the stronger to survive, whereas if retained together, they would collectively fail. Selected root removal allows for improved access for home care and plaque control with resultant bone formation and reduced pocket depth. The disadvantage is that the remaining root must undergo endodontic therapy and the crown must undergo restorative management.

Before selecting a tooth for hemisection, patient's oral hygiene status, caries index and medical status should be considered. Also, accessibility of root furcation for easy separation and good bone support for the remaining roots should be assessed.

Weine's³ indications for tooth resection are as follows:

Periodontal Indications:

Severe vertical bone loss involving only one root of multi-rooted teeth.

Through and through furcation destruction.

Unfavourable proximity of roots of adjacent teeth, preventing adequate hygiene maintenance in proximal areas.

Severe root exposure due to dehiscence.

Endodontic and Restorative Indications:

Prosthetic failure of abutments within a splint: If a single or multirooted 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.

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.

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.

Severe destructive process: This may occur as a result of furcation or subgingival caries, traumatic injury, and large root perforation during endodontic therapy.

Contraindications:

- Adjacent teeth available for bridge abutments as alternatives to hemisection.
- Inoperable canals in root to be retained.
- Root fusion-making separation impossible.
- Factors to be considered before undertaking any of the resection procedures:
- Advanced bone loss around one root with acceptable level of bone around the remaining roots.
- Angulation and position of the tooth in the arch. A molar that is buccally, lingually, mesially or distally tilted, cannot be resected.
- Divergence of the roots- teeth with divergent roots are easier to resect.
- Closely approximated or fused roots are poor candidates.

- Length and curvature of roots- long and straight roots are more favourable for resection than short, conical roots.
- Feasibility of endodontics and restorative dentistry in the root/roots to be retained.

Hemisection allows for physiologic tooth mobility of the remaining root with good preservation of tooth, alveolar bone which is thus a more suitable abutment for fixed partial dentures. In contrast, the combination of an osseointegrated all-implant with natural teeth in the same prosthesis causes a number of problems. Buhler stated that hemisection should be considered before every molar extraction, because it provides a good absolute and biological cost saving alternative with good long term success.³

The long-term results of root resection are well described in periodontal literature.^{4,5} The success rate is quite high when resections are performed by careful diagnosis and the procedures are appropriately performed.^{6,7} Likewise the reasons for failure are equally well-known.^{3,8} The primary causes for failure after root resections are root fracture, caries, endodontic complications, cement washout, restorative failures and periodontal attachment loss. The majority of studies indicate that failure rate of resection procedures ranges from 3% and 26% and most periodontal failures occur after 5 to 10 years.⁹

Conclusion: Thus, hemisection being a relatively simple, inexpensive treatment with a good chance of success given appropriate case selection, it should always be considered as an option before molar extraction and implant therapy.

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