Case Report :

Hemisection-A Hope for hopeless: A case report

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ABSTRACT

Every natural tooth must be given a chance to survive as long as possible. Teeth such as mandibular first molar are the major standpoint for occlusion, and also have a wide pericemental area. Under specific conditions, only the diseased part of thetooth can be extracted after an endodontic treatment. Hemisection may be a suitable treatment option when the decay is restricted to one root and the other root is healthy. This article describes a procedure of hemisection in mandibular molar with endodontically compromised distal root and its subsequent prosthetic restoration, which yielded a satisfactory result. The results obtained with this tooth offer possibility of a successful regeneration technique for this otherwise hopeless endodontic condition.

Keywords :hemisection, root resection, root caries.

INTRODUCTION

In present era, loss of the natural teeth is uneventful and undesirable often leading to teeth drifting, loss of masticatory function and loss of arch length, which requires prevention and maintenance measures. Likewise, management of endodontically involved molars with extensive decay is a challenging and is limited to dental extraction and prosthetic replacement. Alternatively, if extensive decay is limited to one root, hemisection procedure may be possible. Such procedures represents aform of conservative dentistry, aiming to retainas much ofthe original tooth structure aspossible. In such cases, the treatment goal is preservation of remaining tooth structure and restoration of the form and function. It gives predictable results and high success rates if certain basic considerationsare taken into account.

What is Hemisection ?

Hemisection is the surgical separation of a multi-rooted tooth especially a mandibular molar through the furcation in such a way that a root and the associated portion of the crown may be removed[1,2]. The treatment goal is preservation of remaining tooth structure and restoration of the function.Weine[3] has listed the following indications for tooth resection:

Endodontic and Restorative Indications:

1. Prosthetic failure of abutments within a splint: Periodontal involvement of single root in multirooted teeth; forming a part of prosthesis

2. Endodontic failure: In cases of presence of perforation through the floor of the pulp chamber, or pulp canal of one of the roots of an endodonticallyinvolved tooth which cannot be instrumented[4].

3. Vertical fracture of one root: Presence of vertical fracture of one root while the other roots are unaffected.

4. Severe destructive process: Presence of furcational or sub gingival caries.

Periodontal Indications:

1. Severe vertical bone loss involving only one root of multi-rooted teeth[5].

2. Through and through furcation destruction.

3. Unfavourable proximity of roots of adjacent teeth.

4. Severe root exposure due to dehiscence.

For appropriate case selection of such cases, periodontal, prosthodontic and endodonticassessment of cases is important. The procedure involves removing the compromised rootstructure and its associated coronal structure with some modifications of remaining tooth structure. Appropriate root canal therapy must be performed before these procedures to avoid intrapulpaldystrophic calcification and postoperative tooth sensitivity. Root fracture is the main cause of failure afterhemisection[6], so occlusal modifications are required to balance the occlusal forces on the remaining root.

This case report describes a patient who presented withpain and food lodgement in relation to mandibular right first molar. The treatment plan involved initial endodontic therapy, followed by hemisection of the distal half of the tooth due tosevere root caries and limited access in distal root. After 2 months, healing was found satisfactory; thereby a fixed dental prosthesis was given which served the dual purpose of acting as a splint as well as restoring the masticatory functionof tooth. Thus prognosis of tooth improved and need forextraction was eliminated.

CASE REPORT

A 29 year old female patient with non contributory medical history reported at Depatment of Conservative Dentistry &Endodontics, Government Dental College & Hospital, Ahmedabad with chief complaint of pain and food lodgement in lower right back teeth region since last two months. Pain was mild and intermittent in nature, whichaggravated on mastication. Clinical examination revealed fractured amalgam restoration withevidence of decay extending subgingivally with respect to mandibular right first molar. Tooth was tender on percussion, with no other detectable abnormality. Cold vitality testing was done with EndoFrost; which revealed tooth 46 was nonvital.

Radiographic examination revealed class 1 restoration of 46 which involved pulp and presence of deep caries on distal root extending subgingivally(figure 1). Periapical radiolucency was also noted in relation with both the roots. Diagnosis of pulpal necrosis with chronic periapical abscess was established. The extent of decay rendered the tooth nonrestorable.However, the patient was reluctant to lose the tooth. Because the decay was limited to thedistal root, hemisection following fixed partial denture was suggested. Patient's consent was obtained for the procedure.

The procedure was performed as follows:Excavation of old restoration was done with possible excavation of caries with respect to 46. The access opening was done and working length was estimated with apex locator (Root ZX, J Morita) and confirmed radiographically. Biomechanical preparation was done with rotary Protaper Next files upto X2 (DentsplyMaillefer, Switzerland) with 5.25% sodium hypochlorite being used for irrigation. After completion of biomechanical preparation, irrigating

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solution was agitated by placing #15 K file within the canal and activating it ultrasonically. Calcium hydroxide paste was introduced within the canal with paste carrier and the cavity was sealed with temporary filling material (IRM, Dentsply). Next appointment was scheduled after 7 days. Of the canals which were prepared, only the mesial canals were obturated with corresponding gutta-percha cone and epoxy resin based sealer (AH Plus sealer, Dentsply) and the access cavity chamber was restored(figure 2,3).

On the next day, hemisection was planned. After appropriate local anesthesia, a full thickness mucoperiosteal flap was elevated, extending from distal half of second premolar to mesial half of second molar(figure 5) to provide adequateaccess for visualization and instrumentation and minimize surgical trauma. A tapered fissure, long shank, carbide bur was used to make vertical cut on facial surface towards the bifurcation area. The bur was moved in lingual and apical direction until the furcation area was reached(figure 6); with extreme care. Oncethe bur had severed the floor of the pulp chamber from furcation area, distal root was separated from the remaining portion of the tooth and was extracted(figure7,8). Care was taken notto traumatize bone and adjacent tooth. Odontoplasty was performed to contour and smoothen distal aspect of mesial root so as to facilitate oral hygiene measures and occlusal table was modified to redirect the forces along the long axis of tooth. Socket debridement was performed with povidone iodine solution, following whichbuccal and lingual flaps were approximated and socket compressed with digital pressure.Antibiotics and analgesicswere prescribed for one week.

The patient was recalled on weekly basis, for 1 month(figure9,10), postoperatively, to ensure good oral hygiene in the surgerized area. Fixed partial denture from mesial root of first molar to second molar(figure11,12) was fabricated after 2 months.Patient had good masticatory efficiency with the prosthesis and was very satisfied with thetreatment outcome.

DISCUSSION

The hemisection has proved to be an appropriate alternative for extraction to save the multi-rooted teeth by endodontic approach; including root canal treatment of endodontically and periodontally sound roots(the roots to be retained), restoring them with suitable restorative material &splinting it with the adjacent tooth by a fixed dental prosthesis to maintain the occlusal balance. Dental conditions which requires hemisection are prosthetic failure of abutments within a splint[7], endodontic failures[8], vertical fracture of one of the root[9], non-restorable portion of amulti-rooted tooth.

In present case, hemisection of distal root followed by fixed partial denture was decided as the treatment modality because the tooth was nonrestorable due to extensive caries on distal surface extending subgingivally and patient was reluctant to loss the tooth. The periodontal support of the mesial half of the tooth was good enough for optimum force loading. Extraction of whole tooth followed by implant therapy is a predictable option with good functionality[10].However, hemisection allows for physiologic tooth mobility of the remaining tooth structure, which is thus a more suitable abutment for fixed partial dentures compared to an osseointegratedcounterpart[11]. The smaller size of the occlusal tables, under-contouring of the embrasure spaces and ensuring that margin of prosthesis

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encompasses the furcation are all factors associated with high success rates forhemisectiontherapy. Also, the quality of the endodontic treatment in the retained roots is equally important. However, before selecting a tooth for hemisection, patient's oral hygiene status, caries index and medical status should be considered[12]. Also, accessibility of root furcation for easy root separation and good bone support for the remaining root should be assessed.

The results of several studiesreport successrates ranging from 62% to 100% with follow-up periodsof 1 to 23 years. The combined data from these studiesindicates that an overall success rate of approximately 88% can be expected with these procedures.The literature available on distal root hemisection is limitedas compared to mesial root in mandibular molars; most probably due to its anatomical structure. The distal root is broader and straighter which makes it more suitable as an abutment; whereas the mesial root contains a longitudinal groove, whichdecreases its surface area and contraindicates the use ofposts. Park et al.[12] studied the factors influencing the outcome of root resection therapy in molars: A 10 year retrospectivestudy and suggested that hemisection of molars with questionable prognosis can maintain the teeth without detectable bone loss for a longer time period, provided that the patient has optimal oral hygiene. It was concluded by Saadet al[7] also that hemisection of a mandibular molar may be a suitable treatment option when the decay is restricted to one root and the other root is healthy and remaining portion of tooth can very well act as an abutment.

Furthermore there are conflicting data about the survival of the remaining fragment after hemisection(38% for ten years) and a wide range of reasons for failure of hemisection[13.] Amongst them, root fracture is the main cause of failure after hemisection, so occlusal modifications are required to balance the occlusal forces on the remaining root. Present case report discussed herein had good prognosis with proper occlusion, absence of mobilityand healthy periodontal condition up to 6 monthsof follow-up(figure13).

CONCLUSION

With recent refinements in endodontics, periodontics & prosthetic dentistry, hemisection has been the appropriate alternative as a conservative dental treatment for a hopeless tooth. Present article presents such a technique to maintain tooth structure in a compromised tooth and reestablish its form & function. It is an efficient treatment modality, which allowsthe preservation of tooth structure, alveolar bone andcost savings over other treatment options.

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Figure:1Preoperative radiograph showing root caries wrt distal root of 46

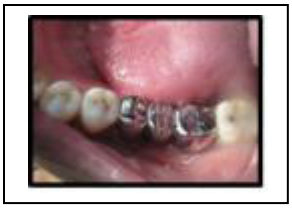

Figure:2Master cone IOPA

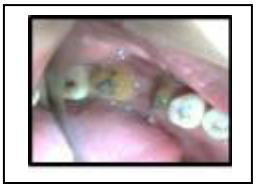

Figure:3IOPA showing well obturated mesial canals &completed root canal treatment in mesial root of 46

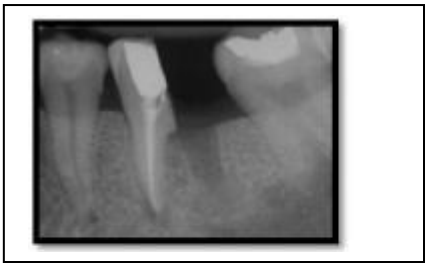

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Figure:4 Pre-operative view showing amalgam restoration in relation to 46

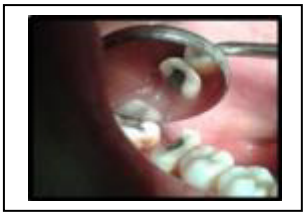

Figure:5 Flap reflection; flap extending from distal of 45 to mesial of 47

Figure:6 A vertical cut made toward the bifurcation area for hemisectionirt 46

Figure:7 Hemisected root irt 46

Figure:8Extracted distal root

Figure:9 Healing of surgical site after 4 weeks showing good soft tissue response and no other complications.

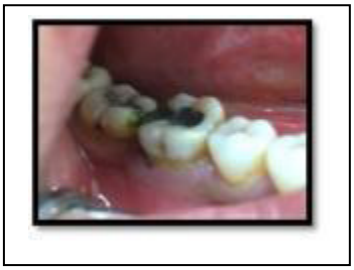

Figure:10Post operative IOPA at 4 weeks

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Figure:11 Tooth preparation done irt mesial root of 46 and 47 for FPD

Figure:12 Cemented final prosthesis in relation to 46& 47

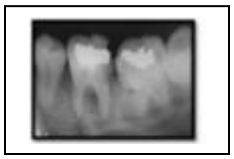
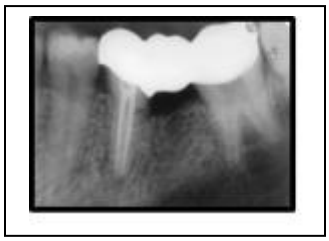


Figure:13 Radiograph at 6 month follow up showing considerable bone regeneration wrt 46



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