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Case Report

Hemisection Is A Reliable Treatment Modality For Mandibular Molars With Poor Prognosis –A Case Report And Review

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ABSTRACT

A 56 year old male reported with grossly carious mandibular molar. The radiograph revealed a persistent apical periodontitis involving distal root and furcation area. However the mesial root had healthier bone support. Decision was made to save the healthier mesial root and resect distal root and placing the β-TCP along with PRF in distal socket. After initial therapy and endodontic treatment, periodontal flap was raised, followed by distal root resection and socket preservation. After 3 months fixed partial denture was placed. The case had been followed up for 6 months showed good prognosis, radiographic bone fill and patient acceptance.

INTRODUCTION

A dentist is expected to provide and maintain a functional dentition for lifetime and advances in dentistry has granted an opportunity for same. Increase patient's wish to retain their own teeth has led to treatment modalities that can even restore teeth with poor prognosis.(1) Moreover drifting of teeth, hampered masticatory function and deteriorated arch length which follow posterior teeth loss are undesirable and often needs prevention and maintenance measures.(2) Periodontal diseases and dental caries mostly are of bacterial origin with oral cavity harboring at least 600 different bacterial species.(3) Dental pulp and periodontium are anatomically interrelated creating a pathway for exchange of noxious agent between the two tissue compartments when either or both of the tissue are diseased .The treatment options of a tooth involved both endodontically and periodontally are limited which vary in complexity with extraction followed by implant placement, fixed partial denture and removable partial dentures being most common. However appropriate treatment strategy to retain such teeth involves endodontic, periodontal and prosthodontic assessment with certain basic consideration for case selection. Hemisection is a conservative allowing preservation of diseased free tooth structure and alveolar bone, relatively simple and economical along with predictable result and stronger chances of long-term survival.(1) It can be used when

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Figure-I Intraoral view

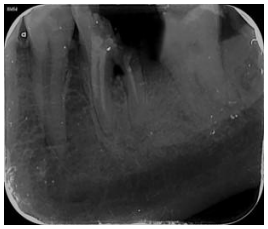


Figure II- Diagnostic Radiograph

only one root is involved and the remaining tooth structure (at least 1:1 crown to root ratio) can be used as an independent units of mastication or as abutments in simple fixed bridges. The overall survival rates of root resected molar was found to be 91.1% by Yuh et al 2014 (4), 93% by Carnevale et al 1991 (5). Thus it can be said that hemisection is a successful treatment modality and could be considered before every molar extraction.(6) Buhler defined hemisection as (removal of one root) removing significantly compromised root structure and the associated coronal structure through deliberate excision.(6)

CASE REPORT

A 56-year-old male was referred to the department of periodontics with a chief complaint of pain and food lodgement in the lower left back tooth region since last 15 days. Pain was mild, intermittent in nature, and aggravated on mastication. Furthermore the patient did not give any significant medical history and in previous dental history endodontic treatment of same tooth was done 3 year back. But since then, he had no problem where he neglected the crown restoration and there was no history of swelling. Extraoral examination revealed no abnormality. On intraoral

Figure-III crevicular incision

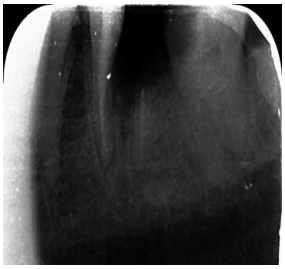


Figure IV- Intraoperative radiograph

examination (Figure-I), tooth #36 was found to be grossly carious with dislodged restoration involving distal as well as occlusal surface and it was tender on vertical percussion with the presence of a sinus tract and grade I mobility. On probing a clinical attachment loss of 6mm was found on distal root. Additionally carious 37, 46, missing 45, prosthesis with 26 were seen and overall oral hygiene of patient was poor. Radiographic examination (Figure-II), revealed improper root canal treatment with 36. A radiolucency extending to cervical third of the distal root and even approaching furcation area of the 36 was observed. Radiolucency involving enamel dentin and approaching pulp on mesial side of 37 was also seen. On the basis of history, clinical and radiographic examination, a diagnosis of Persistent apical periodontitis was made with respect to tooth #36. Since the extent of decay made the tooth nonrestorable, the patient was explained about the condition and prognosis of tooth with feasible treatment options including extraction and placement of dental implant. However, he opted for hemisection followed by fixed dental prosthesis over other treatment options. The treatment planned included

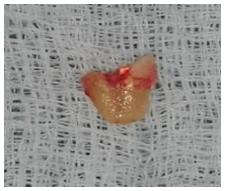


Figure V- Extracted root

Figure VI- Placement of β-TCP along with PRF

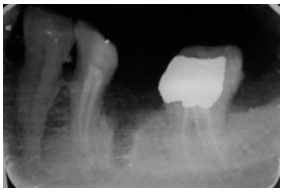


Figure VII- Immediate post-op

Figure VIII –Tooth Prepration

Figure IX- Occlusal View After Placement of FPD

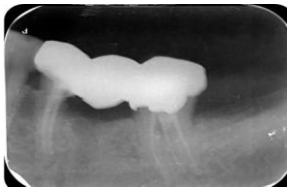


Figure X-6 Month Follow-up Radiograph

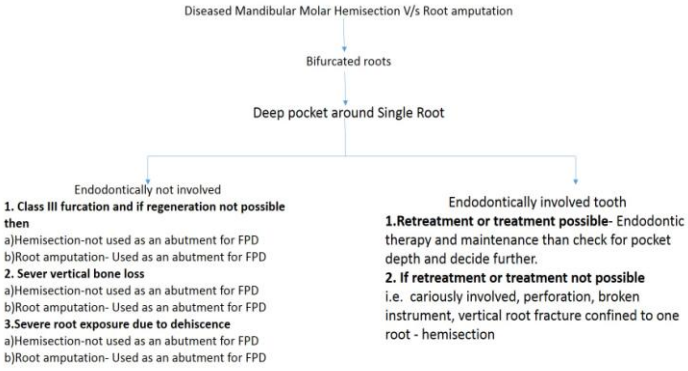
initial therapy, endodontic phase, surgical phase, and a prosthodontic phase. Scaling and Root Planing was done, Oral hygiene instructions were given to the patient in initial therapy followed by endodontic phase which included reroot canal treatment with 36 and root canal treatment with 37. After completion of endodontic treatment hemisection of distal root was performed under local anesthesia, with 2% Lignocaine containing 1:100,000 epinephrine (Ligno-Ad local anesthetic, Proxim Remedies, India). The mesial root was retained as the periodontal prognosis of the mesial root was fair with adequate bone support. A crevicular incision (Figure-III), from the second premolar to the second molar was given followed by the reflection of a mucoperiosteal flap on buccal and lingual aspects. Upon flap reflection degranulation was performed using curettes (Hu-Friedy, Chicago, IL, USA) to expose the bone. A slow speed long shank tapered fissure carbide bur was used to make vertical cut towards the bifurcation area. Once the bur had severed the floor of the pulp chamber, root was separated from the remaining portion of the tooth. A fine probe was passed through the cut and a radiograph (Figure IV) was also taken to ensure the separation. Now the distal root (Figure V) was extracted atraumatically and the socket was debrided and irrigated adequately with sterile saline to remove bony chips and filling material debris. The furcation area was trimmed, scaling and root planning of root surfaces, which became accessible on removal of distal root was done. Meanwhile platelet rich fibrin (PRF) was prepared using standard protocol and hydroxyapatite plus β-tricalcium phosphate granules (β-TCP-osteon) was mixed with PRF. Presuturing was performed and the mixture (Figure VI) was placed in socket. Flap was approximated and sutured with 3-0 braided silk (Mersilk - Ethicon, Division of Johnson & Johnson Ltd., Aurangabad, India). The occlusal interference if any were removed. Immediate postoperative radiograph (Figure VII) showed the well-retained mesial root and extraction socket of the distal root filled with bone graft and to ensure that no spicules

were present to cause further periodontal irritation. Sutures were removed after 10 days which showed uneventful healing. Three months following surgery, patient was completely asymptomatic, uneventful healing was observed at the surgical site and the extraction socket was epithelized. Mobility was reduced now the tooth preparation was performed of hemisected 36 and 37. Tooth preparation (Figure VIII) was done using round end taper diamond (chamfer) bur, occlusal reduction of 1 mm on functional cusps, and 1.5 mm on non- functional cusps. To get a compatible path of insertion a taper greater than 6–10 degree, less steeped cuspal inclines were given to the hemisected tooth which also reduced the laterally directed forces followed by this metal fixed partial denture was given (Figure IX). Radiographs (Figure X) at 6 months suggested progressive formation of bone in the extraction socket along with resolution of radiolucency around the mesial root of #36.

DISCUSSION

Treatment option for an unrestorable tooth should be decided on the basis of certain factors like the patient's age, medical history, and the ability to maintain oral hygiene. The clinician should also consider treatment cost and success rate of different treatment modalities.(7) Successful treatment of endo–perio lesions depends upon their timely and accurate diagnosis. In this case looking at the decay which was limited to distal root and considering four critical factors which affects the prognosis and long-term success of the tooth i.e. root form, root divergence, the location of the furcation and the remaining root attachment, treatment options were explained to the patient, including hemisection.(8) Hemisection can be considered as a treatment option for diseased molar as given in chart -1

Chart-1(9,10)



The patient was reluctant to lose his tooth, he rejected the option of a dental implant due to financial restrains. The use of hemisection to retain a compromised tooth offers a prognosis comparable to any other tooth which is endodontically treated.(11) In order to be treated by hemisection endodontic therapy should be performed first because in case the tooth could not have been treated endodontically or if there was an endodontic failure, the case would have been contraindicated for hemisection. Other contraindications include unfavorable bony support, fused roots, short thin roots, poor patient motivation and plaque control.(10) Following hemisection distal socket preservation with bone graft are reasonable choice to preserve sufficient volume of bone, to prevent the collapse of the soft tissue into the socket and to maintain the original topography of alveolar ridge to permit subsequent prosthetic restoration.(12) In this case β-TCP along with PRF was used as β-TCP has osteoconductive property(13), which facilitates bone formation whereas PRF can be easily manipulated and slow release of growth factors (GFs) from the platelet granules play a role in replacing lost tissue, resurfacing of the wound, and restoring vascular integrity.(14) Hemisected tooth requires a

restoration to permit it to function independently or serve as an abutment for fixed partial denture in order to stabilize occlusion. In this case, there was significantly decreased in mobility after the treatment. Initially, mobility must be because of occlusal prematurities, defective margins or non-occlusal surfaces didn't have physiologic form contributing to further periodontal destruction converting acceptable forces into destructive forces. The sanitary type pontic was choose assuring conservation of healthy tooth structure, easily cleansable margins, wide embrasures and least gingival involvement, which would enable the patient to maintain oral hygiene. Hemisection is a boon as it allows physiologic tooth mobility of the remaining tooth, being a conservative approach it helps to restore healthy periodontium. It's economical, and helps to a patient to maintain oral hygiene.(15) There were complications in this case. Complications have been reported to occur include are root fracture (most common), root surfaces that are reshaped are more susceptible to caries and failure of endodontic therapy due to any reason will cause failure of the procedure and as with any surgical procedure, it can cause pain and anxiety.(8) Zafiropoulos et al (2009)(16) in a 4 year follow up retrospective study evaluated the occurrence and timing of posttreatment complications after hemisection to that occurring after placement of dental implants. The majority of hemisected teeth (68%) and implants (89%) remained free of complications. For both groups, the percent clinical attachment loss per year was greater for the teeth/implants that experienced complications than in those that remained complication free. It has been also reported in the literature that mainly failure of the hemisected tooth is because of endodontic complication rather than a periodontal complication so we have tried to preserve as much as tooth structure possible.(17) There is paucity in the literature regarding the long-term prognosis of the hemisected tooth and even there is no study comparing hemisected mesial root with the distal roots. In the present case, the prognosis was good observed with proper occlusion, an absence of mobility and healthy periodontal condition up to 6 months of follow-up and patient is still on follow-up. The result obtained in our case was in accordance with other case reports in literature where authors concluded favorable prognosis of the retained root.(18–20) Thus, in this case, hemisection mainly obliterated furcation defect, prevented further attachment loss while aiding oral hygiene maintenance

CONCLUSION

Hemisection is the reliable treatment modality mandibular molars having considerable prognosis which requires proper case selection, clinician’s skill and patient motivation and oral hygiene maintenance.

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