

MANAGEMENT OF A MULTIROOTED TOOTH WITH 'QUESTIONABLE' PROGNOSIS THROUGH TOOTH RESECTION : A CASE REPORT

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BACKGROUND

Patient's desire to maintain his own dentition and advancements in the field of dentistry have led to a more conservative rather than radical approach. Presence of significant furcation involvement means a 'questionable' long term prognosis for the tooth¹. A combination of endodontic, restorative and periodontal techniques can be used to retain a tooth in whole or in part which may be useful either as independent units or abutments for fixed bridges. A case of conserving a part of a periodontally involved multirooted tooth with grade III furcation by using all the three disciplines has been presented.

INTRODUCTION

Treatment options for a multirooted tooth with furcation involvement vary between non surgical approaches consisting of scaling and root planing to surgical approach varying from furcationplasty, regeneration & bone grafting, tunnel preparation, tooth resection to finally extraction depending upon various local and systemic factors. Tooth resection², which is defined as 'excision and removal of any segment of tooth/root with or without accompanying crown portion', and root separation are two conservative treatment modalities to save a severely periodontally diseased multirooted tooth in total or in part. According to 1986 glossary of periodontal terms some of the related definitions are:

Root resection: Surgical removal of all or a portion of root before/ after endodontic treatment.

Root amputation : Removal of root from multirooted tooth.

Hemi section: Surgical separation of roots in a multirooted tooth, especially mandibular molar through furcation in such a way that a root/roots may be surgically removed with associated part of the crown.

Root separation: It is the sectioning of root complex and maintenance of all roots.³

Indications for root resection and separation⁴ are

A. Periodontal

- Severe bone loss around one root
- Grade II to IV furcations
- Roots of two adjacent teeth in close proximity that embrasure space is obliterated

B. Endodontic and restorative

- Endodontic failure due to non negotiable canal, irretrievable broken instrument, perforation
- Vertical root fracture in one root
- Periodontal failure within a splint/fixed bridge
- Root afflicted with untreatable caries
- Crown fracture extending to furcation
- Furcal perforations
- Non surgical endodontic procedure is not possible

Contraindications include the following

A. General

- High caries index
- Poor patient compliance and plaque control
- Systemic condition which contraindicates any surgical procedure

B. Local

- Fused roots
- All roots are periodontally involved and show severe bone loss
- Long root trunk and short root cones
- Anatomic factors that inhibit proper hygiene maintenance like flutes, grooves, concavities

C. Endodontic

- Untreatable by endodontic procedure
- Excessive instrumentation has been done and hence remaining root structure is not quite sound

D. Restorative

- Internal root decay
- Presence of post in remaining root and hence amenable to fracture

E. Strategic considerations

- Patient is willing for implants
- Patient wants removable prosthesis
- Adequate tooth available for conventional prosthetic rehabilitation

CASE REPORT

A 35 year old female patient visited the OPD periodontics at S.R.C.D.S.R, Faridabad with chief complaint of pain on right side of lower arch . On examination an ovoid elevation of gingiva red, edematous and soft in consistency, is seen in relation to right

mandibular first molar (46). Pus was expressed from pocket on distobuccal aspect of tooth on digital pressure. Grade I tooth mobility with radiating pain was present. Sensitivity to vertical and lateral percussion was there. No systemic feature or lymphadenopathy was present. Probing depth of 10 mm was found all around the distal root. Radiographic as well as clinical examination revealed a grade III furcation involvement. A diagnosis of acute periodontal abscess was made. Patient's medical, dental, and systemic condition was reviewed but no significant co-relation was found. Emergency treatment consisted of drainage through the pocket orifice using digital pressure after giving topical anesthesia, irrigation with betadine and saline was done, appropriate antibiotics were prescribed. Patient was recalled after three days. On recall, it was noted that the acute features had subsided. Complete periodontal charting was done and a diagnosis of generalized moderate chronic periodontitis was made.

Since the patient wanted to save the tooth, option of hemi section was suggested as there was severe bone loss around distal root with grade III furcation involvement and yet mesial root had sufficient bone which is one of the periodontal indications for hemi section. It was decided that endodontic treatment of affected tooth would be accomplished prior to root resection and final prosthetic restoration would be done after sufficient healing period.

Endodontic treatment: Working length was established (fig 1) and canals were prepared using step back technique which were later obturated using gutta percha points by lateral condensation method.

Tooth resection surgery : After achieving appropriate local anesthesia full thickness mucoperiosteal flaps were elevated on both facial and lingual aspects from mandibular right first premolar to second molar(45 to 47) for adequate access, visualization and instrumentation(fig 2,3). Thorough debridement of effected area was done followed by horizontal resection of distal root with high speed cross cut fissure carbide bur just apical to contact point through the tooth and to the facial and distal orifices of the furcation. This process is called root amputation which is otherwise contraindicated in mandiblar molars but has been done here to save distal part of the crown that acts as a natural space maintainer (complete crown was saved as patient was unable to afford cost of bridge subsequent to hemisection for the time being) to prevent drifting of other teeth and distal tilting of mesial half⁶ since all the teeth in the segment were periodontally involved to varying degrees. After sectioning root was elevated and removed (fig 4,5,6). Removal of root provides visibility to furcation and makes further debridement easy and exact. Once the debridement was complete and healthy tissue was encountered , odontoplasty and osseous recontouring were done. Flaps were approximated and sutures were placed. The unsupported part of the tooth was relieved from occlusion and

temporarily splinted to second molar through composite for patient comfort as mesial half is grade I mobile and patients with advanced attachment loss may benefit from temporary stabilization of resected tooth to prevent movement⁵.

Prosthetic phase: A three unit fixed PFM bridge is planned on 47 and mesial half of 46. Final restoration would be given in 4-6 months time according to patient convenience. The distal unsupported part of the crown will be removed and the salvaged mesial segment of 46 as well as 47 will be prepared to restore them with a PFM bridge consisting of a premolar shaped sanitary pontic in place of extracted portion of 46.

DISCUSSION

Most critical indication in undertaking the decision of a resective surgery is the comparison of expected efficacy and cost benefit ratio of root resection & separation in relation to other treatment options. Regenerative techniques like GTR and bone grafts should be weighed against resective techniques and extraction of either a part/total tooth or replacement by removable/ fixed prostheses.

Resection Vs alternative treatment procedures: Root resection may have more advantage in maxilla because it has been seen that regenerative techniques like GTR are no better than open flap debridement due to difficult accessibility and risk of membrane exposure⁶. Higher rate of fracture in mandibular molars, however, treated by root resection and separation⁷ and better success of GTR technique in moderate grade II furcations⁸ compel to take the latter as a treatment option wherever possible.

Success of root separation and resection therapy depends primarily upon proper case selection.

GENERAL CONSIDERATIONS

- Amount of bone present in relation to all the roots
- Angulation and position of tooth in arch
- Good spread/divergence of root so that separation is easier
- Length and curvature of roots. Long and straight is more favourable
- High furcation entrance which means short trunk and long root
- Low caries index as root surface reshaped by grinding is more susceptible to caries
- Patient compliance

Specific Considerations have to be given to the following ENDODONTIC PHASE

- Feasibility of endodontic procedure
- Small access opening to conserve maximum tooth structure.
- Optimal canal preparation. Overzealous preparation of canals which remove more tooth structure make it liable to fracture.

- Filling with chemically cured composite using dentin adhesive to improve retention as amalgam may detach more easily after root separation if endodontic therapy fails because of any reason.

RESTORATIVE PHASE

- Feasibility of restorative procedure, bony support, crown root ratio, occlusal relations all determine the success of final outcome.
- Tooth preparation should follow the profile of root complex thus creating concave shape of root trunk and crown⁹. But since a concave surface makes maintenance impossible a combined technique was given by Di Febo et al¹⁰. The prepared surface should be convex and not concave. Root shape should be modified at emergence from bone. To obtain the convex surfaces, chamfer is prepared on convex part of root without touching concave part, thereby flattening the surface. Final preparation is knife edge thus making it mandatory to have a metallic margin of restoration.
- Length of apical extent of crown preparation is important¹¹ because the marginal area of crown that extends onto tooth structure apical to the foundation material creates a ferrule effect. Less than 1.5mm of this ferrule effect increases the risk of failure and becomes liable to fracture.¹²
- A restorative dilemma presents when a residual pulp chamber is located less than 3mm above root separation. Assuming a distance of 2mm for biological width and 1.5 mm for solid tooth structure necessary for ferrule effect of crown a minimum of 3.5 mm of available tooth structure between pulp chamber and above the residual root separation is required¹³
- Presence of post in a root does not increase fracture resistance rather decrease it. Hence case selection should be done accordingly.
- If margins of final restoration do not have physiologic form then the disease recurs.
- Improper and excessive occlusal contact may convert normal forces into destructive one which can cause fractures. Hence occlusal table should be narrow.

PERIODONTAL AND SURGICAL PHASE

- Advanced bone loss around one root/through and through furcation involvement with good bone support around both or all roots in case of maintenance of all roots¹⁴. Failure ensues if case selection is not proper.
- Vestiges of furcation vault can act as overhang and attract plaque accumulation and hence should be removed properly.

Sequence of treatment¹⁵ at root resection and separation therapy.

- Treatment planning for endotherapy and its completion along with crown build up - It is usually desirable to

complete endodontic treatment before removing the root^{16,17,18}. When it is not possible to evaluate extent of furcation involvement until flap is elevated should the RCT be performed later.

- Construction of provisional restoration.
- RSR may be performed as a part of the preparation of segment for prosthetic rehabilitation prior to surgery¹⁶
- Periodontal surgery
- Final prosthetic restoration.

Hemisection without associated crown removal that is root amputation, as in this case, cannot be done without a flap elevation⁵. Hence resection is done during surgery in cases where all or anyone situation is true

- Cause of resection is periodontal/non periodontal¹⁹ and crown portion of resected root has to be salvaged for some time due to economic reasons till a permanent restoration is constructed
- It is not possible to decide about resectable root by examining the radiograph and a flap elevation is necessary.

Tooth resection may be performed as a part of preparation of segment for prosthetic rehabilitation that is prior to periodontal surgery¹⁶, mainly, where

- Indication for resection is periodontal and crown portion need not be salvaged
- Sectioning cut has to pass through amalgam restoration which will cause amalgam tattoos later since hemisection/bicuspidisation necessitate a vertically oriented cut made faciolingually through lingual and buccal developmental groove, pulp chamber and finally furcation.

The term 'questionable' prognosis has been proposed in a new prognostication system¹ based on probability of disease progression and predictability of future stability of supporting tissues which is more useful in patient management as compared to the traditional prognostication system. A tooth with questionable prognosis according to it is the one in which periodontal status is influenced by local/systemic factors that may/may not be able to be controlled. However, periodontium can be stabilized with comprehensive periodontal treatment and maintenance.

It is generally emphasized that successful root resection/separation therapy requires careful multidisciplinary approach including endodontic treatment, periodontal surgery and prosthetic rehabilitation. Complications mainly of non periodontal nature seem to occur^{20,21}. Although long term prognosis and efficacy of the procedure is controversial, 1989 world workshop stated that 'root resection is a procedure which will still remain as a part of periodontal armamentarium to treat very specific cases which cannot be solved by any other therapeutic approach and where tooth in question has a high strategic value'.

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Acknowledgement:

Thanks to Dr. Ashima garg, MDS Endodontics and Dr. Prason Shukla, MDS Prosthodontics.

