



A PERIODONTAL APPROACH FOR ROOT RESECTION: A CASE REPORT

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ABSTRACT

Compromised teeth often pose a significant challenge to the clinician, complicating the treatment plan and compromising long-term prognosis. Upper molar teeth showing periodontal attachment loss, caries or fractures involving the furcation area are prime examples of such challenges. Treatment option for such multi-rooted teeth can be roughly divided into the maintenance of the tooth through root resection, or extraction and prosthetic replacement. Root resection procedure involves removal of the diseased root portion while retaining the relatively healthy parts.

In this case report attempt has been made to describe the indication, contra-indications and technique of root resection therapy of an upper molar in which combined root resection with the periodontal approach and prosthetic management resulted in a successful outcome.

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INTRODUCTION

Modern advances in all phases of dentistry have provided the opportunity for patients to maintain a functional dentition for a lifetime. Therapeutic measures performed to ensure retention of teeth varies in complexity. The treatment may involve combining restorative dentistry, endodontics, periodontics, and prosthodontics so that the teeth are retained in whole or in part. Such teeth can be used as independent units of mastication or as an abutment in simple fixed bridges. Tooth resection procedures are used to preserve as much tooth structure as possible rather than sacrificing the whole tooth.^[1]

The term tooth resection denotes the excision and removal of any segment of the tooth or a root with or without its accompanying crown portion. Various resection procedures described are root resection, hemisection, and bicuspidization. Root resection /amputation refer to removal of one or more roots of the multi-rooted tooth while other roots are retained. The most common root resection involves the distobuccal root of the maxillary first molar.^[2]

Hemisection denotes 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 or restored.^[3]

Bicuspidization is the separation of mesial and distal roots of mandibular molars along with its crown portion, where both segments are then retained individually.^[3]

Weine has listed the following indications for tooth resection^[4]

Periodontal Indications

- Severe vertical bone loss involving only one root of multi-rooted teeth.
- Through and through furcation destruction.
- The unfavorable proximity of roots of adjacent teeth, preventing adequate hygiene maintenance in proximal areas.
- Severe root exposure due to dehiscence.

Endodontic and Restorative Indications

- 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.
- 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.
- Endodontic failure: Hemisection is useful in cases in which there is perforation through the floor of pulp chamber or pulp canal of one of the roots or an endodontically involved tooth which cannot be instrumented.

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

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Contraindications

- Strong adjacent teeth available for bridge abutments as alternatives to hemisection.
- Inoperable canals in root to be retained.
- Root fusion making separation impossible.

Case Report

A 25 years old female patient reported to the Department of Periodontics, with the chief complaint of severe pain in upper left back tooth since 3 days. On intraoral examination, Miller's grade I mobility was seen with the presence of overhanging restoration in maxillary left first molar [Fig 1]. Past dental history revealed that patient had suffered from sharp, lancinating pain in maxillary left first molar one year back upon which patient had got root canal treatment done by a private clinical practitioner.



Fig 1 Preoperative view

IOPA showed horizontally fractured mesiobuccal root of maxillary left first molar with the presence of well-defined radiolucency around root apex [Fig 2]. The remaining tooth portion was stable with adequate bone support therefore resection of mesiobuccal root was planned with socket preservation followed by restoration with a fixed prosthesis.



Fig 2 IOPA showed fractured Mesio buccal root of 26

Under local anesthesia, full thickness triangular flap was reflected after giving a crevicular incision from the first molar to the second molar and vertical releasing incision was given from the distal line angle of second premolar [Fig 3].

A long shank tapered fissure carbide bur was used to make vertical cuts on the bone over the mesiobuccal root. The bone was removed over the fractured root to create a window and a periosteal elevator is used to remove the root.



Fig 3 Full thickness flap reflected

The extraction site was debrided and irrigated and the socket was filled with synthetic hydroxyapatite bone graft (Fig 6) and covered with a bioresorbable collagen membrane [Fig 7] to prevent the collapse of the soft tissue into the socket and flap was repositioned and sutured with 3-0 black silk sutures [Fig 8]. The surgical site was covered with a periodontal dressing (coe-pack). Four weeks following surgery, complete healing was observed at the surgical site and a fixed prosthesis was given [Fig 10]. Intraoral periapical radiograph was taken after 6 months, which showed complete bone formation at the grafted site [Fig 11].



Fig 4 Resection of mesiobuccal root of 26



Fig 5 Resected root fragment.

DISCUSSION

The main aim of root resection therapy is to maintain a diseased tooth as an alternative to extraction and replacement. Dental implants, extensive bridgework, and custom-made tooth replacement can be expensive and time-consuming. Generally, root resection and the necessary crown work are less expensive and can be completed in 1-3 short visits.

Success of root resection procedures depend, to a large extent, on proper case selection. It is important to consider the following factors before deciding to undertake any of the resection procedures.



Fig 6 Graft placed into the mesiobuccal root socket



Fig 7: Placement of bioresorbable membrane



Fig 8 Sutures placed



Fig 9 Immediate post-op IOPA showing complete removal of the mesiobuccal root



Fig 10 Post-operative 6 months with prosthesis



Fig 11 Post-op 6 months

- Advanced bone loss around one root with an 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.
- The 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 favorable for resection than short, conical roots.

Case selection affects the outcome of root resection as a treatment of choice where endodontic complications affecting one root of the multi-rooted tooth. Factors such as occlusal forces, tooth restorability, and the value of the remaining roots must be examined before treatment.^[5] The success of root resection procedures depends significantly on proper case selection and definite treatment plan discussed together with the endodontist, periodontist, and the restorative dentist.

A number of authors have reported good results from root resections. More reliable results could be obtained if all cases were investigated and compared after post-operative periods of equal duration. Long-term follow-ups present more relevant information to help evaluate different therapy modalities. Hamp *et al.*^[6] re-examined 87 root resection cases five years after surgery and reported very good results regarding the periodontal conditions. On the other hand, Langer *et al.*^[7] investigated 100 root resections 10 years after surgery and reported a total failure rate of 38%.

Newell *et al.*^[8] examined 70 root resected molars in 62 patients for the quality of the resections. Twenty-one (30%) of the resections were considered faulty when subgingival, residual roots or ledges were present. Failures were more frequent in

maxillary molars (33.3%) than mandibular molars (22.7%). Buhler *et al.*^[9] reported a 32% failure rate at 10 years on 34 resected molars. Again, the main causes of failure were endodontic pathology and root fracture, while only one tooth was extracted due to periodontal breakdown. The same failure rate was found by Blomlof *et al.*^[10] in a follow-up 3 to 10 years later. Shin-Young Park^[11] performed root resection therapy on 691 molars in 579 patients and concluded root resection to treat periodontal problems had a better prognosis than for non-periodontal problems. To achieve a good result, it was important that the remaining roots had >50% bone support. This guideline may help to improve the predictability of root-resection therapy.

In this case report the socket was preserved with placement of hydroxyapatite graft and bioresorbable membrane. As the particles of the graft come in contact with tissue fluids, the surface becomes coated with Hydroxy Apatite (HA), incorporates organic ground proteins such as chondroitin sulphate and glycosaminoglycan and attracts osteoblasts. It has added advantages like hemostasis, chemotaxis for periodontal fibroblasts, gingival fibroblasts and easy manipulation. The space can be maintained under a barrier membrane with bone graft material, thereby facilitating the regeneration of increased bone volume within a confined space. Hoffmann *et al.*^[12] conducted a study to evaluate the effect of non-resorbable d-PTFE membranes in post extraction sockets and concluded that a significant regeneration of the volume of sockets could be noted by histologic evaluation, indicating that the newly formed tissue in extraction sites was mainly bone. The use of d-PTFE membranes predictably led to the preservation of soft and hard tissue in extraction sites. Horowitz *et al.*^[13] and Agarwal *et al.*^[14] reported that guided bone-regeneration techniques and the use of bone-replacement materials have been shown to enhance socket healing and potentially modify the resorption process. The prime indication for socket preservation is the prevention of alveolar-bone and soft-tissue collapse, which would cause unacceptable prosthesis esthetics. Root-resection therapy is still a valid treatment option for molars with furcation involvement. Root resection to treat periodontal problems showed a better prognosis than root resection performed for non-periodontal purposes.^[15]

CONCLUSION

Root resection can be considered a suitable alternative to extraction and should be discussed with patients, during consideration of treatment options. The results are predictable, and success rates are high if certain basic considerations are taken into account. Therefore in this case report placement of graft material along with resorbable membrane helps in regeneration of bone in the socket and preservation of natural tooth for better function and aesthetics and also cost effective.

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