

Alternative approach for preservation of hopeless mandibular molar through hemisection with its different restorative modalities: a case series.....

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Abstract: Introduction : Hemisection of a mandibular molar is a treatment modality when the decay is constrained to one root and the other root is healthy. In this, a mandibular molar is sectioned into two halves followed by removal of the diseased root along with its coronal portion. The retained root is endodontically treated and its furcation area is made self-cleansable by proper cleaning and debridement. Case report: This case report contains 3 cases with periodontally compromised mandibular molar which is not restorable by root canal treatment alone, which was managed by hemisection and with the various prosthetic treatment option. Result: The patients were followed for a period of 1 year .Adequate healing was seen with reduction of mobility. Conclusion: This treatment can produce predictable results as long as proper case selection is followed by an interdisciplinary approach with endodontic, surgical and prosthetic procedures.

Keywords: Fixed-Movable Bridge, Fixed partial denture, furcation involvement, hemisection, Inlay

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I. Introduction

Today in this modern dental era where everybody wants its dentition to retain for longer periods so it is necessary for us to provide an alternative way to maintain a functional dentition even for a severely compromised tooth. The terms 'hemisection' and 'root amputation' are together known as 'root resection'. [1] Hemisections have been used in cases of advanced bone loss with furcation involvement. Hemisection is a procedure of sectioning of a molar into two halves followed by removal of the diseased root and its coronal portion. The endodontically treated, retained half tooth and the furcation area is made self-cleansable. The anatomical characteristics of furcation area which interferes with the adequate instrumentation determine the success rate of this type of endo-perio furcation lesions. The main type of failure associated with hemisected teeth is by root fractures so it is important to restore them adequately by an extra-coronal restoration. [2]. Predictable results are produced if certain criteria's are followed like, proper case selection followed by the interdisciplinary approach with endodontic, surgical and prosthetic procedures. [3] Weine has listed the following indications for tooth resection [4]

Periodontal indications

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

Endodontic and restorative indications:

1. 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.
2. 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.
3. 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

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

Contraindications

1. Poorly shaped roots or fused roots
2. Poor endodontic candidates or inoperable endodontic roots
3. Patient unwilling to undergo surgical and endodontic treatments

In this article, 3 cases are presented as a treatment option for a hopeless tooth with different restorative treatment plans. This procedure represents a form of conservative dentistry, aiming to preserve as much tooth structure as possible rather than sacrificing the whole tooth. [5]

II. Case report

Case 1: Hemisected Tooth Acts As Abutment To Support A Pontic

A 46 year old male patient, reported in the Faculty of Dental Sciences, IMS, BHU, Varanasi, Uttar Pradesh, India with the chief complaint of pain in left, lower, posterior region, since 3 months. The pain occurred on mastication and was relieved, once the stimulus was removed. The patient did not give any significant medical history, but he was a tobacco chewer since 15 years. On intraoral examination, the probing depth of 16 mm was found on buccal and distal surfaces, along with grade III furcation involvement in tooth 36. Also, the tooth showed grade I mobility and was tender to percussion and non vital. IOPA radiograph revealed periodontal bone loss with respect to distal root as compared with mesial root and periapical radiolucency associated with both the roots along with the secondary caries involving the pulp beneath the restoration in 37. Periodontal prognosis with 36 was good wrt to mesial root.. Treatment options included extraction of 36, followed by placement of implant, a fixed partial denture or a removable partial denture. The patient did not wish to have the tooth removed, so conservative treatment was selected, which included hemisection of the distal root of 36, followed by prosthetic replacement. The whole procedure was explained to the patient and a thorough scaling and root planing was done. Gingival and periodontal status was re-evaluated after 2 weeks. Root canal treatment was done in 36 and 37. After local anesthesia, a full thickness mucoperiosteal flap was reflected to expose the area of hemisection via sulcular incision was given wrt 35 to 37. Granulation tissue was removed. Using long shank-tapered fissure carbide bur, the vertical cut was made from occlusal surface towards the furcation area, and the mesial root along with crown portion was separated. The separation was confirmed by passing a fine probe. A straight elevator was used to luxate and remove the distal root of 36 from the socket. The exposed root surface were scaled and root planned. The socket was debrided and irrigated with plenty of normal saline. The flap was repositioned and sutured with 3-0 silk non-resorbable interrupted sutures. The occlusal table of the retained portion was minimized to reduce the masticatory forces along the long axis. Antibiotics and analgesics were prescribed for one week. The sutures were removed 7 days later. The patient was monitored on a weekly schedule, postoperatively, to ensure good oral hygiene in the surgerized area. The tooth had good bone support after 6 months and it was decided to give him a fixed prosthesis involving 36,37. with the formation of premolar of hemisected root which acted as abutment to support a pontic along with the help of 37 as there was a huge gap was there in between them. The tooth 36 was contoured as a premolar on hemisected tooth, which provided less surface area for occlusal table to reduce stress, lateral forces were reduced by making cuspal inclines less steep and eliminating balancing incline contacts. Patient was followed up by regular recall visits and oral prophylaxis. He had good masticatory efficiency with the prosthesis and was very satisfied with the treatment outcome.(figure 1)

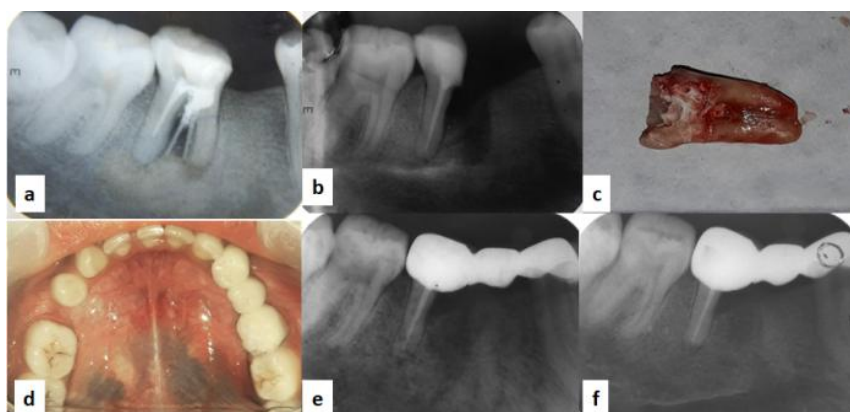
Figure 1:(a)preoperative IOPAR,(b)IOPAR after RCTof 36,(c)after hemisection of 36,(d)1 month after hemisection,(e)hemisected root,(f)post operative photograph after hemisection,(g)crown preparation photograph,(h)photograph after prosthesis placement,(i)prosthesis in occlusion,(j)IOPAR after 6 months,(k) IOPARafter 12 months.



Case 2: Hemisected tooth act as abutment tooth to replace a congenitally missing premolar

A 24 year old female patient came to our department with pain in left lower back tooth. On radiographic examination it was found there was furcal perforation and calcified mesial canal along with obturation done in the furcation area with furcal and periapical radiolucency with respect to 36. Retreatment was planned for the patient with the removal of gutta percha and to negotiate calcified canal but was not accessible so hemisection of the mesial root was planned. All the procedure was done like in the above case. The patient was recalled after 1,6 months before giving final prosthesis. The final prosthesis includes hemisected tooth contoured to a shape of a molar with minimal cuspal inclines and smaller occlusal table to reduce stress which would act as an abutment to support a congenitally missing premolar pontic along with the support of 34. (figure 2)

Figure 2:(a)preoperative IOPAR ,(b)IOPAR after RCT and hemisection of 36,(c) hemisected root,(d) photograph after prosthesis placement,(e) IOPAR after 6 months (f) IOPAR after 12 months.

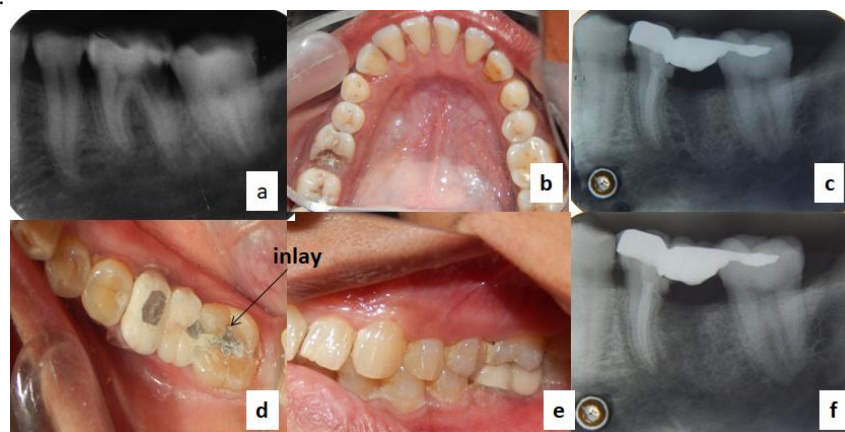


Case 3: Prosthetic Rehabilitation of Resected Mandibular Molar using Inlay Supported Fixed-Movable Bridge

A 48 year old female reported to our department with the chief complaint of carious tooth. On examination the tooth was found to be non vital and the carious portion was subgingival, reaching the furcation areas. There was grade 2 mobility with respect to 46, as the distal carious portion was not restorable so it was decided to remove the distal root and prepare inlay as a conservative approach in 47 to support the hemisected root as splint. After hemisection, the patient was recalled after 1 and 6 months to see signs of healing before giving final prosthesis after preparation. Being conservative a Fixed-Movable Dental Bridge was fabricated,

also known as Fixed Movable Partial Denture, it is a dental prosthesis where the artificial tooth or teeth is rigidly supported on one side, usually on the distal end by one or more abutment teeth. On the other side, one abutment will have an intracoronal or extracoronal attachment which allows a small degree of movement between the rigid component and the other abutment. **(Figure 3)**

Figure 3:(a)preoperative IOPAR,(b)preoperative photograph showing carious lesion below CEJ,(c)post operative IOPAR after 6 months(d)photograph after prosthesis placement,(d)prosthesis in occlusion,(e)IOPAR after 12 months.



III. Discussion

Molar tooth plays a very important role in our day to day life, its loss can result in several undesirable sequelae including tilting of adjacent teeth, a collapse of the vertical dimension of occlusion, supra-eruption of opposing dentition, loss of supporting alveolar bone and a decrease in chewing ability. Hemi-section of the affected tooth helps in the preservation of tooth structure, its alveolar bone and cost (time and money) over other treatment options. Bühler stated that hemisection should be considered before every molar extraction because this procedure can provide a good absolute biological cost saving with good long-term success (6) The prognosis of root resection has been well-documented. Some investigators (7, 8) reported a >90% survival rate in hemisected molars, whereas with other investigators(9,10,11,12), reported a 30% failed cases of resected molars over a 10-year-period.

Hemisection allows for physiologic tooth mobility of the remaining root, which is thus a more suitable abutment for fixed partial dentures than an osseointegrated counterpart. To observe a high success rate in hemisection therapy there should be smaller size of the occlusal tables, under-contouring of the embrasure spaces and be ensuring that the crown margin encompasses the furcation (13)

The hemisection is a technique sensitive procedure. One must be careful throughout the processes of case selection, and endodontic, periodontal, restorative and maintenance [14], for such cases of a mandibular molar, the clinician's decision to choose one treatment plan over another is influenced by various factors.

These may be enumerated in three areas:

- a) Local factors-tooth anatomy, tooth mobility, crown: root ratio, the severity of attachment loss, interact and intra-arch occlusal relationship, strategic dental value for retention or removal;
- b) Patient factors-systemic health/host resistance, the emotional value of the tooth to the patient, involvement, and commitment in time and money;
- c) Clinician factors-diagnostic and treatment planning skills, awareness of therapeutic options and clinical acumen or skill in providing service. (15)

In our case1, there was bone loss till apical third in the distal root of 36. Since there was good bone support on the mesial side of 36 along with fair inter radicular bone, extraction was not considered. Hemisection as a treatment option was perfectly suited to the case. Due to periodontal bone loss, there was a gap between 36 and 37 which needed prosthetic replacement. The patient wanted to conserve as much tooth structure as possible. The patient was followed for signs of healing before placement of the prosthesis. The hemisected 36 could be used as an abutment for replacement of gap along with 37 with a fixed prosthesis. In case 2 there was a faulty RCT done wrt 36 in which there were furcal radiolucency and inapproachable calcified mesial canal. Due to patient's keen desire to save the tooth hemisection was planned and thereby replacing missing premolar. In case 3 there was tooth caries below the CEJ which was not restorable in 46 so hemisection was a treatment option chosen for the patient. the prosthetic rehabilitation of resected mandibular molar was done using Inlay Supported Fixed-Movable Bridge as a conservative treatment option.

During treatment, occlusal contacts were reduced in size and repositioned more favorably. Lateral forces were reduced by making cuspal inclines less steep and eliminating balancing incline contacts.

Hemisection has been used successfully to retain teeth in the arch. However, there are few disadvantages associated with it as with any surgical procedure that is it can cause pain and anxiety. Surfaces formed after are more susceptible to caries. Often a favorable result may be negated by decay after treatment. Any type of endodontic failure will cause failure of the procedure itself. In addition, when the tooth has lost part of its root support, it will require a restoration to permit it to function independently or to serve as an abutment for a splint or bridge, moreover if there are defective margins of restoration, Unfortunately, a restoration if the margins are defective, or if non-occlusal surfaces do not have physiologic form this may contribute to periodontal destruction,. Also, a tooth may be predisposed to trauma from occlusion if there is an improperly shaped occlusal contact area which may convert acceptable forces into destructive forces which causes an ultimate failure of hemisection...

Park J et al suggested by maintaining oral hygiene and proper follow up molars with questionable prognosis can be maintained for a long time by hemisection without further bone loss. (16) Hence, hemisection as a treatment alternative to retain a compromised tooth offers a prognosis comparable to any other tooth with endodontic treatment.

IV. Conclusion

As a conservative dental treatment, hemisection has received as an acceptable treatment option for a hopeless tooth. This article presents a technique to maintain a compromised tooth in a healthy state with its various prosthetic treatment alternative. The keys to long-term success appear to be thorough diagnosis, selection of patients with good oral hygiene, careful surgical and restorative management which can lead to the functioning of such hopeless cases successfully for long periods

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