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Hemisection: Resection for conservation – A case report

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ABSTRACT

This case report presents hemisection as a treatment option to save the extensively affected molars thereby preventing the undesirable consequences of tooth loss. Hemisection means the division of mandibular molar into two halves followed by removal of the diseased root with its accompanying crown portion. Careful case selection is necessary for long-term success.

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1. Introduction

Modern advances in all phases of dentistry have provided the opportunity for patients to maintain a functional dentition for lifetime. Therapeutic measures performed to ensure retention of teeth vary in complexity. A molar with extensive caries, periodontal problem or a root fracture may be unsuitable for restorative procedures. The treatment options in such cases are limited and may involve extraction of involved tooth followed by replacement of the missing tooth. Alternatively under specific conditions, only the diseased part of the tooth can be extracted.[1]

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.[2,3] The treatment goal is preservation of the remaining tooth structure and restoration of function. Its indications include various endodontic, periodontal and restorative causes such as perforations, separated instruments, non-negotiable canals, through and through furcation defects, severe bone loss limited to one root, severe destruction of one root structure due to deep caries, etc.[4]

Hemisection is often a means of retaining teeth needed for restorative abutments or occlusal support. This treatment can produce predictable results that include proper case selection followed by interdisciplinary approach with endodontic, surgical and prosthetic procedures.[5]

In this article a case of hemisection is presented as a relevant treatment option for a tooth where only mesial root of a mandibular molar was affected.

2. Case report

A 20 year old female patient reported to the Department of Conservative Dentistry and Endodontics of Sri Venkateswara Dental College and Hospital with the chief complaint of pain in her right lower back tooth region for the past 1 month. Past dental history revealed incomplete root canal treatment which

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Fig. 1 – Pre-operative photograph.

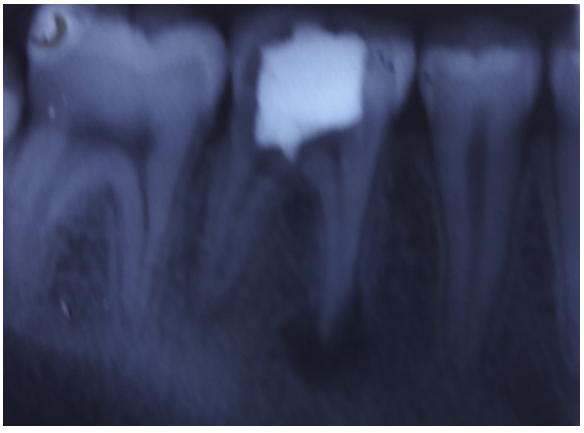


Fig. 2 – Pre-operative radiographs.

was initiated two years back in the same region. There was no contributing medical history. Extraoral examination revealed no abnormal findings.

Intra oral examination revealed an intermediate restoration in right mandibular first molar (46) (Fig. 1). The tooth was tender to percussion. Intra oral periapical radiograph of 46 (Fig. 2) revealed a radiopaque filling material occupying the entire coronal structure. The mesial root showed resorption with an ill-defined radiolucency in the periapical region in the mesial root and also on the distal aspect of the furcation area. The tooth showed no response to cold test (Roeko Endo-Frost, Coltene, Germany) and Electric Pulp testing (Digitest, Confident, Bangalore, India).

Clinical examination, radiographic examination and vitality tests led to the diagnosis of attempted root canal treatment in 46 with periapical pathosis and furcation involvement. Accordingly a treatment involving the resection of the mesial root with the associated crown structure (Hemisection) and retaining the distal half of 46 was planned. Following this a post endodontic restoration with the distal root of 46 as the distal abutment and right mandibular second premolar (45) as the mesial abutment was also planned.

Treatment was done in 3 phases.

2.1. *Phase 1: endodontic*

The tooth was anesthetized using 2% Lignocaine with 1:80,000 adrenaline (Lignox, Indoco Remedies Ltd., India). Endodontic access cavity was established using endo access bur (Maillefer, Dentsply, Ballaigues, Switzerland). Examination of the access cavity using endodontic probe DG 16 revealed the presence of two mesial and one distal canal. A perforation on the floor of the access cavity was also suspected. Canal patency was checked with number 10 K-file (Mani, Inc.; Tochigi, Japan). Working length radiograph was taken. Cleaning and shaping was performed using a crown down technique with Protaper files till F2 (Maillefer, Dentsply, Ballaigues, Switzerland) under abundant irrigation with 5% sodium hypochlorite solution (Prime Dental Products, Thane, India) in a 5 mL syringe and EDTA (Glyde, Maillefer, Dentsply, Ballaigues, Switzerland). The tooth was then temporized.

Patient was then recalled after a week. The root canals were then dried with paper points (Maillefer, Dentsply, Ballaigues, Switzerland) and obturated with Progutta gutta percha point F2 (Maillefer, Dentsply, Ballaigues, Switzerland) and AH plus resin sealer (Maillefer, Dentsply, Ballaigues, Switzerland). Coronal seal with Silver amalgam (DPI, Mumbai, India) was done and patient asked to report after 15 days.

2.2. *Phase 2: surgical*

Under local anaesthesia, flap was elevated to expose the furcation area. The tooth resection was initiated from buccal aspect towards lingual aspect. Grooves were placed on the buccal surface to act as a guide for resection (Fig. 3). A long shank tapered fissure bur (Mani, Inc.; Tochigi, Japan) was used to section the tooth in the buccolingual and in an apical direction (Fig. 4). Care was taken not to damage the root to be retained. Periodic radiographs were taken to ensure that the sectioning progressed in such a way that the tooth was split into two equal halves. Tooth separation was ensured by passing a probe through the sectioned halves. After ensuring that the separation was complete, a periosteal elevator was used to luxate the mesial half of the tooth from its socket (Fig. 5). Once the mesial half was completely mobile, it was removed by using an extraction forceps (Figs. 6–8). Tissue repositioning and suturing was done.



Fig. 3 – Grooves placed on the buccal and lingual surface.



Fig. 4 – Tooth sectioned ion the buccolingual direction.



Fig. 5 – Periosteal elevator luxating the mesial half.

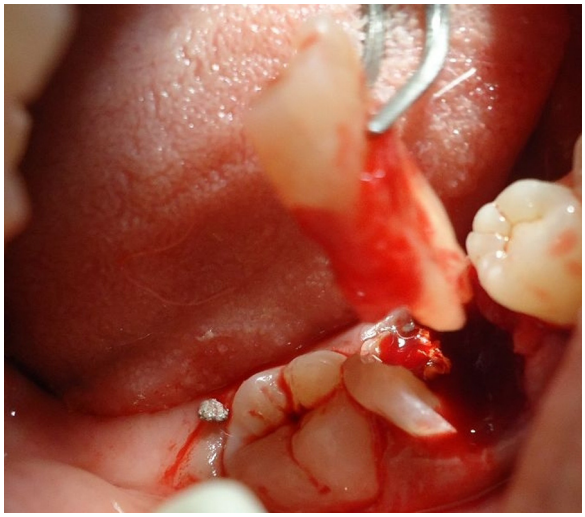


Fig. 6 – Extraction of the mesial half.

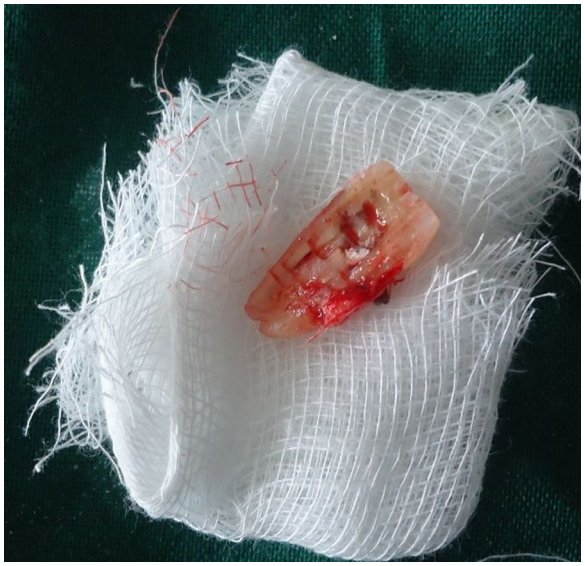


Fig. 7 – Extracted mesial half.



Fig. 8 – Retained distal half.



Fig. 9 – Tooth preparation on hemisected molar and second premolar.

2.3. *Phase 3: restorative*

After adequate healing of the tissues, tooth preparation of 45 and the retained distal half of 46 was done (Fig. 9). Impressions were recorded with Elastomeric impression material (Aquasil, Denstply, Germany). Casts were made and sent to laboratory for fabrication of final prosthesis. Final prosthesis was cemented with luting type glass ionomer cement (GC Corporation, Tokyo, Japan) (Figs. 10–12).



Fig. 10 – Cemented prosthesis.



Fig. 11 – Final prosthesis in occlusion.

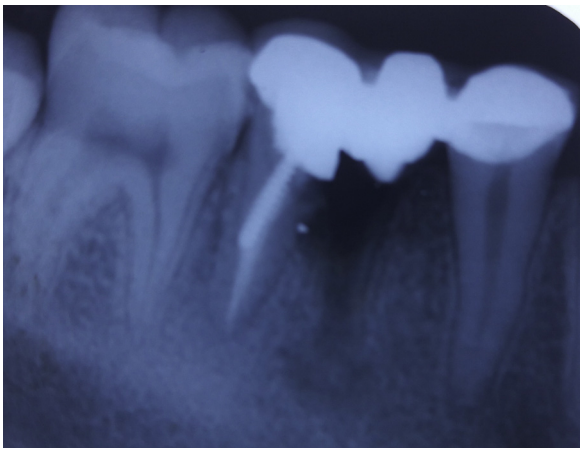


Fig. 12 – Post-operative radiograph.

3. Discussion

The treatment options to replace severely damaged, possibly unrestorable teeth and teeth with periapical lesions include periapical surgery, removable partial denture, fixed partial denture, and dental implant. A guiding principle should be to try and maintain what is present.[6] Success of root resection procedure depends to a large extent on the case selection. A proper case selection is mandatory for long-term success that includes cases with adequate access and visibility to the root furcation and good bony support of the root to be retained.[7] The various factors to be considered before deciding to undertake any resection procedure are extent and pattern of bone loss, angulation and position of the tooth in the arch, divergence of roots and length and curvature of roots.[2] In the present case, the position of the tooth in the arch was ideal and the roots were also not closely approximated. Saad et al.[8] have also concluded that when only one root is decayed, and the other half is healthy, hemisection of a mandibular molar may be a suitable treatment option. Jain[3] reported a case of excessive destruction of the mesial root due to the external root resorption and fair amount of the distal root remaining with adequate bone support, managed successfully with hemisection and removal of the mesial root and crown. Shafiq[9] reported a case managed successfully by hemisection followed by a three unit bridge. He concluded that the retention of a part of a tooth seems to extend the life of prosthesis; the patient certainly deserves the option of hemisection or root amputation rather than extraction.

Thus hemisection was concluded to be a viable option for the present case as the distal half was healthy with adequate bone support. The mesial half of the tooth was resected and the distal half retained. The distal root is broader and straighter, making it more suitable as an abutment.

The success rate is quite high when resections are performed by careful diagnosis and the procedures are appropriately performed.[10,11] Likewise the reasons for failure are equally well-known.[1,12] The various factors responsible for the failure of this procedure include unfavourable restoration with defective margins, improperly shaped occlusal contact area that may convert acceptable forces into destructive forces and predispose the tooth to trauma from occlusion.[13] To avoid this, in the present case occlusal contacts were reduced in size and occlusal clearance with the opposing tooth was ensured to minimize the forces along the long axis of the retained distal root. In addition to this the retained distal root was modified to a premolar that helped to reduce the masticatory load on the root.

Literature shows that aesthetics permitting sanitary pontic is the best design for posterior region.[14] Thus final prosthesis was designed as a three unit fixed partial denture extending from the hemisected molar to the second premolar in the form of three premolars.

Root fracture is one of the complications following hemisection, so occlusal modifications are required to be done for balancing the occlusal forces on the remaining root. The occlusal table is reduced in size to decrease the forces on hemisected tooth and the sanitary pontic is the best design for posterior region. As the hemisection requires careful planning and execution, patient cooperation with good oral hygiene is a requirement. If all these criteria are fullfilled, hemisection becomes a viable alternative for tooth extraction and its replacement.

4. Conclusion

Hemisection may be a suitable alternative to extraction and it should be discussed with patients during consideration of treatment options. The prognosis of hemisection is same as the any other endodontic procedure provided, the case selection is ideal. The results of hemisection are predictable, and success rates are high if certain basic considerations are taken into account. Thus, present case report demonstrated the successful management of hemisection of lower mandibular molar with occlusal rehabilitation.

Conflicts of interest

The authors have none to declare.

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