

THINKING BEYOND EXTRACTION: HEMISECTION WITH PRF AS AN ALTERNATIVE TREATMENT OPTION

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ABSTRACT

Background: The recent times have seen a changed perception in patients' outlook towards retaining their natural dentition. This has increased the number of root amputation procedure performed by dentists. Such procedures have led to a more conservative and definitive treatment option over radical treatments like extraction. **Case description:** The first case is of a 55-year-old female with pain and swelling in relation to 46 where root canal treatment was initiated somewhere else. The tooth was tender on percussion and Grade II mobile. IOPAR showed bone loss and furcation involvement pertaining to the mesial root only. The second case is of a 35-year-old male who reported with pain in relation to 36 that had an 8-mm deep periodontal pocket. IOPAR revealed severe vertical bone loss and external root resorption of the distal root. **Discussion:** Hemisection may be considered a viable treatment in many cases. Platelet Rich Fibrin, which a second-generation platelet concentrate has excellent healing properties and acts as a scaffold material. It has been used as an adjunct to healing of extraction sockets but its use in an extraction socket post hemisection has not been widely reported. This article discusses two such cases that have been performed successfully with hemisection and PRF scaffold. **Clinical significance:** Hemisection can be considered as a conservative treatment approach towards retaining the tooth and the alveolar ridge. PRF in such instances can be used as a valuable adjunct.

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INTRODUCTION

Advances in dental technology and imaging have led to a plethora of options to salvage a diseased tooth. Patients are now becoming more aware of the importance of preserving the natural dentition. However, retention of a severely mutilated tooth requires a thorough sequential treatment plan utilizing a multi-disciplinary approach.

As mandibular first molars are the first permanent teeth to erupt in the oral cavity, they are prone to maximum abuse. This makes them more susceptible to dental caries, vertical fracture of the tooth, attachment loss, or furcation involvement [1]. Though problems like these significantly complicate the treatment procedure and the final prognosis, extraction is not necessarily an option. In such cases, resection type of surgical therapy may be considered as a viable and a definitive treatment modality as it provides better access to the remaining tooth structure, thereby enabling subsequent periodontal and prosthetic rehabilitation [2].

According to the American Academy of Periodontology, hemisection is defined as the surgical separation of a multirooted tooth in such a way that the root and the associated portion of the crown may be removed [3]. Endodontic treatment of the retained root is done prior to hemisection and the furcation area is made self-cleansable by removing any irregularities on the sound root surface [4]. Several adjuncts have been tried to accelerate the process of bone healing following tooth extraction. Platelet rich fibrin (PRF) is one such autologous material, which was first described by Choukroun in 2001 [5,7]. PRF has been used as a scaffold to promote bone growth and maturation. It also has shown excellent wound healing and haemostatic properties. Since the mandibular permanent molar is subjected to high occlusal stresses, the hemisected tooth loses its ability to bear such high loads [1]. Hence, it is mandatory to adequately restore such teeth with an extracoronal restoration.

Hemisection is indicated [6] in cases with severe vertical bone loss involving only one root of a multi-rooted tooth, furcal destruction due to various causes, iatrogenic perforation through the floor of pulp chamber or vertical root fracture of one root to name a few.

It is contraindicated [6] when there exists anatomical aberrations like fused roots where separation is difficult and in cases where the root to be retained cannot be endodontically manipulated. In this article, series two cases are discussed where hemisection was considered as a treatment option. PRF was used to promote and expedite the process of bone healing.

CASE REPORT

Case 1

A 55-year-old female patient reported to the Department of Conservative Dentistry and Endodontics with pain and swelling in the right lower back tooth region. She gave history of initiating endodontic treatment few months back, which was discontinued. On clinical examination the tooth in question #46 was tender on percussion with grade II mobility. On radiographic examination the tooth showed furcation involvement with bone loss in relation to the mesial root extending upto the furcation and periapical rarefaction [Figure-1a]. Since the patient was keen to preserve the tooth, a thorough treatment planning was done explaining the patient the prognosis and the need for non surgical root canal treatment and hemisection to conserve the tooth.

Following working length determination and cleaning and shaping, Calcium hydroxide (Dentocal) was placed. Patient was recalled after 3 weeks. She was completely asymptomatic with no signs of swelling. The distal canal was obturated with guttapercha and AH plus sealer [Figure-1b]. The mesial canals were left unobturated. Hemisection was carried out in the subsequent appointment by sectioning the tooth with a long shank tapered fissure diamond bur using a high-speed airtorhandpiece (NSK-JAPAN) under water cooling. A vertical cut was directed towards the furcation area and the tooth sectioned into two halves [Figure-1c]. Following this, the mesial roots were extracted. The distal root was smoothed. Granulation tissue present in the mesial root socket was curetted with Universal GraceyCurrete no.2 and irrigated with saline. The PRF was obtained by the protocol given by Choukron et al. 10 ml of patient's blood was collected into dried monovettes (Vacuette, Greiner Bio-One, Austria). The collected blood was immediately centrifuged for 10 min at 3000 rpm. The entire clot without depriving it of the red thrombus was employed in the socket using thin sterile forceps. Figure of 8 sutures were placed at the wound site [Figure-2]. The retained tooth was relieved occlusally to reduce the forces acting along the distal root. The patient was kept under follow up for 3-4 weeks.

During the follow up visit, radiograph was taken [Figure-2 g]. Wound healing was uneventful and the mobility of the retained tooth had reduced considerably. Tooth preparation for a metal ceramic fixed prosthesis involving 45, the remaining distal half of 46 [Figure-3] was done and the bridge was cemented using Type I GIC (GC Corp. Tokyo).

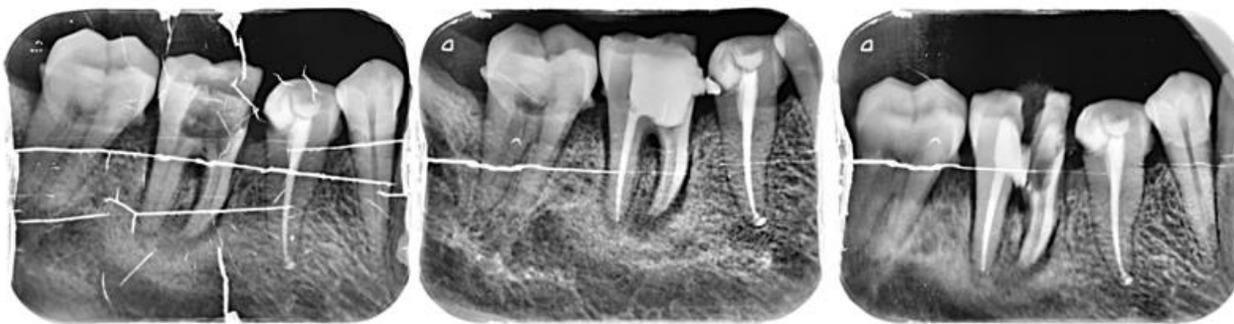


Fig: 1. a) Pre-op b) Obturation of the distal canal c) IOPA- vertical cut made

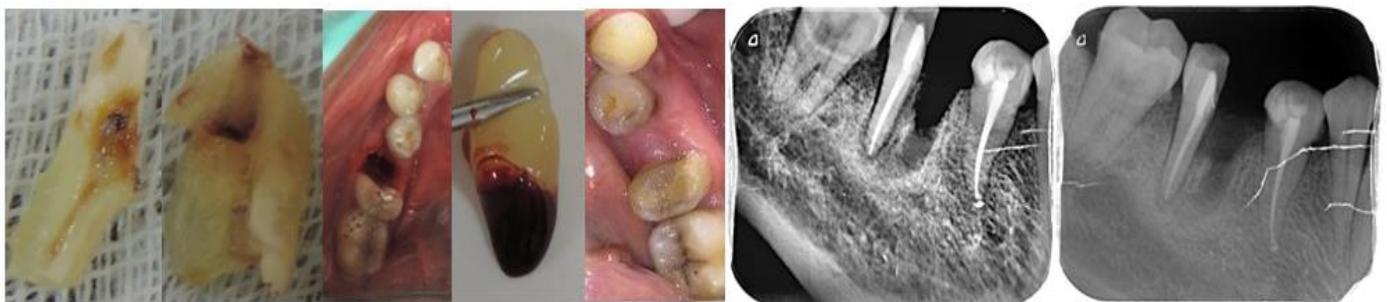


Fig: 2. a,b)Tooth fragments c) Hemisection d)PRF placement e)Post op photograph after 3 weeks f)Immediate Post op IOPAR, g) 3 weeks follow up IOPAR



Fig: 3. a ,b, c) Prosthetic rehabilitation with Bridge irt 45, 46

Case 2

A 30-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with pain in his left lower back tooth. On clinical examination, the tooth in question #36 looked intact, without any clinical signs of dental caries. An 8mm deep periodontal pocket was found on the distal side on probing. On carrying out vitality tests, there was a delayed response to both Electronic Pulp Vitality Tester (Digitest, Parkell Inc. New York) and cold tests using Endo-Frost (ColteneWhaledent).

Radiographic evaluation showed severe vertical bone loss in respect to the distal root with evidence of external root resorption. Since the patient was keen on preserving the tooth, a decision was made to perform root canal treatment and hemisection of the distal root, after the completion of endodontic therapy.

After administration of local anesthesia, disocclusion and isolation, an access was prepared. Following orifice location and determination of working length, glide path was established with #10 and #15 hand K-files (Mani). The mesial canals were prepared up to 25-6% while the distal canal was prepared up to 30-6% using Hyflex files, using a lubricant (Endoprep-RC, Tamil Nadu, India). Copious irrigation was done using 2.5 % sodium hypochlorite. 2 ml of saline was used as a final irrigant and the fit of the cones verified with a radiograph. Obturation was done in both the mesial canals using AH Plus sealer. The distal canal was not obturated [Figure-4]

In the next appointment, post space preparation was done in the mesiolingual canal and a light transmitting post of 1.1 mm diameter (Reforpost, Angelus) was luted using dual cure resin (ParaCore, ColteneWhaledent). Core build up was done using composite resin [Figure-5].

Hemisection was carried out in the subsequent appointment by sectioning the tooth with a long shank tapered fissure diamond bur using an airtorhandpiece under water cooling. A vertical cut was directed towards the furcation area and the tooth sectioned into two halves. Following this, the distal root was extracted. The defects present on the sound mesial root were smoothed [Figure-6]. The granulation tissue was curetted and socket irrigated with saline. PRF was obtained and placed in the extraction socket in a similar manner as described previously. Figure of 8 sutures were given to stabilize it [Figure-7].

Patient was recalled for a definitive prosthetic rehabilitation. Tooth preparation was done with respect to the 36 and 37 for a Metal ceramic bridge. The three unit fixed partial prosthesis [Figure-8] was cemented using Type I GIC. (GC Corp., Tokyo).

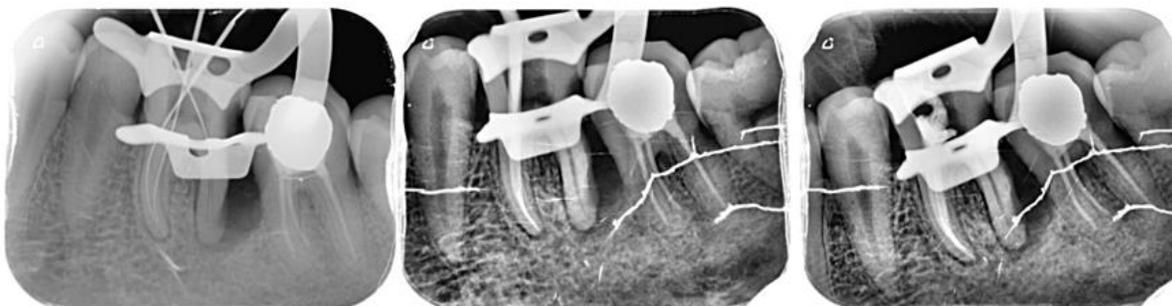


Fig: 4. a) Working length determination b) Master cone selection c) obturation of the mesial canals

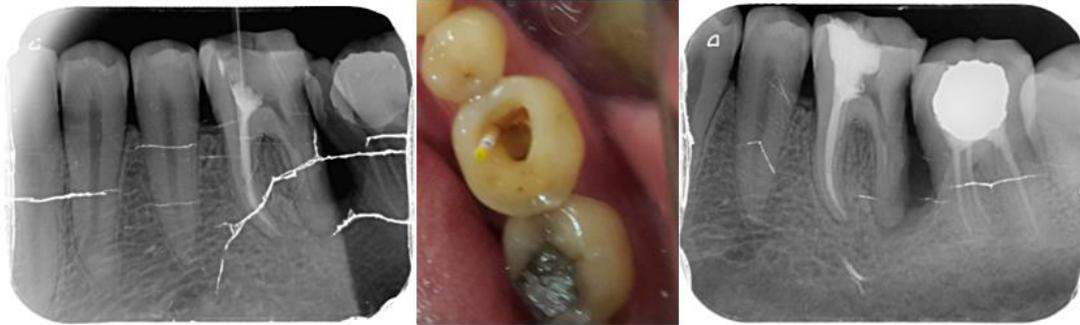


Fig: 5. a,b) Post selection c) post-and-core build up done

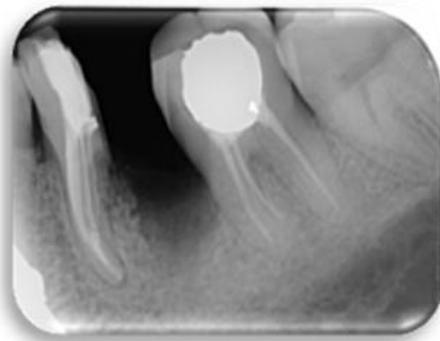


Fig: 6. Immediate post-op IOPAR

DISCUSSION

The success of a clinical procedure is based on thorough clinical knowledge, diagnosis and a multi disciplinary treatment plan. Various root amputation procedures have been carried out to retain a multirouted tooth with a questionable prognosis. While hemisection involves the removal or separation of a root with its accompanying crown portion in mandibular molars, radisection is the terminology given for removal of roots in maxillary molars. Another term that is frequently used is bicuspidization, which is the separation of mesial and distal roots of mandibular molars along with its crown portion, which are both retained individually[8]. However, this procedure was found to have a very poor long-term prognosis and is rarely recommended as a treatment option nowadays. Since, root amputation procedure on mandibular molars poses multiple difficulties to the operating clinician; hemisection is a more predictable treatment procedure. Another advantage of retaining one half of a mandibular molar is to provide occlusion and prevent the supra-eruption of the opposing maxillary tooth and maintain the proprioceptive ability of the tooth.



Fig: 7. a) Hemisection and suturing and b) PRF placement



Fig: 8. Three unit fixed partial denture irt 36, 37.

The mesial root of a mandibular molar shows more predictable outcome as it has more surface area making it more stable periodontally. However, the distal surface of the root presents a concavity making it more difficult to restore and cleanse with a dental floss and a toothbrush. Retaining the mesial root requires the fabrication of a self-cleansable prosthesis like a hygienic/sanitary pontic. The distal root on the other hand, is generally more conical in shape and easier to maintain [9]. For a faster and an uneventful healing to occur, platelet concentrates like Platelet Rich Fibrin (PRF) can be used. It contains growth factors and cytokines that play a key role to combat inflammation and aid in bone healing. Furthermore, it acts as a scaffold or matrix for regeneration of bone cells [10]. A recent study evaluated the effects PRF on bone regeneration after extraction. The authors concluded that there was a definite improvement in bone regeneration pertaining to cases treated with PRF when compared to the control group, where no PRF was placed, at immediate post-op, 1, 3 and 6 months [11].

In both the cases discussed above, a three-unit bridge with hygienic/sanitary pontics was used to rehabilitate the missing halves and restore the function and esthetics. According to Stein [12] and Essman [13], sanitary pontic is the pontic of choice in hemisection cases because it is self cleansable. The occlusal table was reduced in size in both the cases to further minimize the forces acting on the retained abutments.

CONCLUSION

Hemisection can be considered as conservative approach towards retaining the tooth and the alveolar ridge. A thorough knowledge of the indications and contraindications albeit to proper diagnosis and case selection is essential. The use of PRF as an adjunct to the healing of extraction sockets can provide additional benefits of faster healing and bone regeneration.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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REFERENCES

- [1] Cohen S, Hargreaves KM. Pathways of the Pulp 9th ed. Elsevier, St.Louis, Missouri 2006. [2] Kurtzman GM, Mahesh L, Qureshi I. [2012] Hemisection as an alternative treatment for the vertically fractured mandibular molar J PakDentAssoc. 21(03) :177 – 181.

- [3] American Academy of Periodontology Glossary of periodontal terms. 3rd ed. Chicago, Illinois 1992
- [4] Carnevale G[1995]. Management of furcation involvement. *Periodontology* 2000 9(1):69–89.
- [5] Choukroun J, Adda F, Schoeffler C, Vervelle A.[2001] Une opportunité en paro-implantologie: Le PRF. *Implantodontie*. 42:55–62.
- [6] Weine FS. Endodontic therapy, 5th ed.
- [7] Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, et al. [2006]Platelet-rich fibrin (PRF): A second generation platelet concentrate. Part I: Technological concept and evolution. *Oral Surg Oral Med Oral Path Oral Radiol Endod* 101:e37–44.
- [8] Carranza and Newman. Clinical Periodontology, 10th ed. WB Saunders Co., Philadelphia 2006.
- [9] Saraf AA, Patil AC.[2013] Hemisection. *World J Dent*;4(3):182–187.
- [10] Naik B, Karunakar P, Jayadev M, Marshal VR. [2013;]Role of Platelet rich fibrin in wound healing: a critical review. *J Cons Dent* 16(4):284–293.
- [11] Girish Rao S, Bhat P, Nagesh KS, et al. Bone Regeneration in Extraction Sockets with Autologous Platelet Rich Fibrin Gel. *Journal of Maxillofacial & Oral Surgery*. 2013;12(1):11-16.
- [12] Stein SR. Pontin residual ridge relationship: a reseach report.[1966] *J Prosthet Dent*; 16:251–285.
- [13] Essman H, Radke R, Noble W.[1971] Physiologic design criteria for fixed dental restorations. *DCNA*; 15:543–568.

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