

Research Article

HEMI SECTION OF MANDIBULAR MOLAR FOLLOWED BY PRF PLACEMENT FOR SOCKET PRESERVATION –A CASE REPORT

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ABSTRACT

Hemisection refers to sectioning of a mandibular molar into two halves followed by removal of the diseased root and its coronal portion. Hemisection of a mandibular molar may be a suitable treatment option when the persistent pain with calcification is restricted to one root and the other root is healthy. The retained root is endodontically treated and the furcation area is made self-cleansable. Retained tooth structure is restored as premolar which helps to reduce the masticatory load. The present case report explains the hemisection as one of the treatment modality in these type of cases and importance of PRF for preservation and enhancing the healing of extraction socket.

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INTRODUCTION

The loss of posterior molar can result in several undesirable sequelae which include shifting of teeth, collapse of the vertical dimension of occlusion, supra eruption of opposing teeth, loss of supporting alveolar bone and a decrease in chewing ability. The treatment options to replace severely damaged and possibly unrestorable teeth include removable partial denture, fixed partial denture and dental implants. This case report presents an alternative treatment option valid in cases of mutilated molars or symptomatic molars with calcifications that threaten the loss of the tooth i.e. root resection followed by PRF as socket preservation material.

Case presentation

A 25 year old male patient came to the Department of Conservative Dentistry and Endodontics, Vishnu dental college, Bhimavaram with a chief complaint of pain in the lower left back tooth region for the past one month. Patient's medical history was noncontributory and the extraoral findings were within normal limits. Patient experienced pain which was moderate, intermittent in nature, dull, throbbing type, aggravated with intake of hot and cold beverages and while there is change in posture. Patient gives history of previously initiated root canal therapy in lower left back tooth two years back.

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On intraoral examination, loss of mesioocclusal surface in left mandibular first molar with temporary restoration was evident (Fig.1A). It was diagnosed as previously initiated therapy with symptomatic apical periodontitis. After obtaining informed consent, temporary restoration was removed and the access cavity preparation was refined under rubber dam isolation. Under operating microscope (Carl Zeiss Inc, Oberkochen, Germany), the located canals were attempted for negotiation using ultrasonics (Woodpecker non LED ultrasonic, Woodpecker pvt ltd.) but couldn't be negotiated due to calcification (Fig.1B).

The canal was dried with paper points and calcium hydroxide was mixed with 2% chlorhexidine gluconate (Neelkanth Healthcare Pvt. Ltd, Safe Plus, Rajasthan, India) to form a paste and placed in the canal using a lentulo spiral. The access cavity was filled with a temporary restorative material, IRM (Dents-ply, Caulk, USA) patient was recalled after 1 week. In the second visit, the symptoms did not subside and calcium hydroxide dressing was flushed out using alternating irrigation with 3% NaOCl and 17% EDTA. Mesial canals were tried for complete negotiation. As the canals could not be negotiated and due to poor restorative prognosis of calcified canals,

Patient was given following treatment options

1. Extraction followed by fixed partial denture
2. Extraction followed by implant placement
3. Hemisection followed by fixed partial denture

Treatment plan

According to the patient's interest, hemisection was planned in following stages: 1. Root canal treatment for distal root followed by fiber post placement and core build up. 2. Surgical procedure – Hemisection followed by socket preservation with PRF. 3. Prosthetic rehabilitation using fixed partial denture.

Non surgical phase

The distal root was obturated with guttapercha (Protaper Universal, Dentsply Maillefer, Ballaigues, Switzerland) and AH plus (AH Plus, Dentsply De Trey GmbH, Germany) sealer after complete biomechanical preparation using 3% NaOCl (Sodium hypochlorite, Prime dental products Pvt. Ltd., India) and 17% EDTA (Desmear™, Deccan dental depot Pvt. Ltd, India) as the final irrigant. Post endodontic restoration was done using fibre post no.2 (DT light post, Bisco dental, U.S.A.) and dual cure resin cement (Paracore, Coltene Whaledent, Switzerland) for luting and core buildup (Fig. 2A,2B).

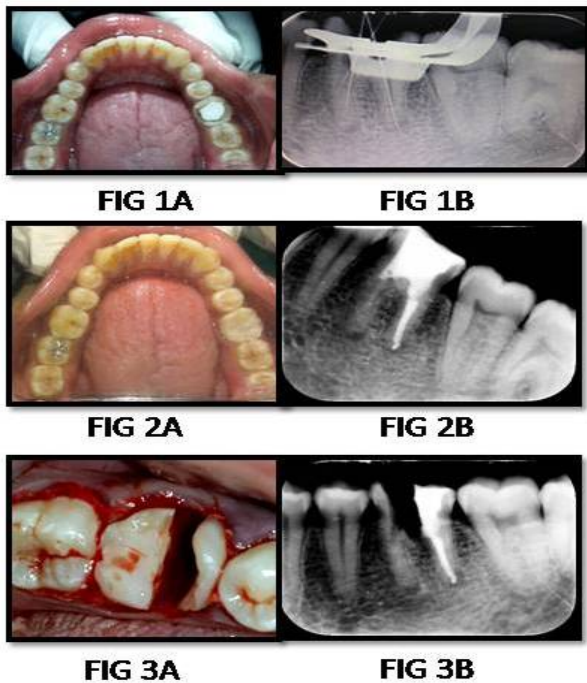


Figure 1 Preoperative photographs: A. preoperative clinical photograph, B. preoperative radiograph and C. Radiographs showing incompletely negotiated canals.

Figure 2 Post endodontic restoration using fiber post and dual cure composite resin: A. clinical photo graph, B. Radiograph

Figure 3 Vertical groove placement: A. Clinical photograph, B. radiograph

Surgical phase

Local anaesthesia was administered using 2% lignocaine with 1:80,000 epinephrine as a vasoconstrictor (Xicaine, ICPA Health Products Ltd, Gujarat, India) left side of the mandible. On using sharp no.15 scapel blade, envelope flap elevation was done on buccal and lingual aspects extending from distal aspect of 34 to mesial aspect of 37. Vertical groove was placed up to the furcation area using straight slow speed handpiece and a long shank tapered fissure carbide bur was used to make vertical cut toward the bifurcation area (Fig 3A). A fine probe was passed through the cut to ensure separation and was confirmed with radiographs (Fig 3B). Throughout the

procedure, continuous flooding of the surgical field was done using saline as an irrigant. After complete separation of the two halves the mesial part of root was removed using lower root forceps (Fig. 4A,4B). Immediately after extraction, PRF preparation was done by taking 10ml of patient venous blood, centrifugated at 1300rpm for 14 minutes in centrifugation machine (A-PRF™ 12). After sectioning of the RBCs from the fibrin plug the obtained PRF was used to prepare PRF membrane and PRF plug. Using a PRF box (A-PRF™ 12), part of PRF was placed on the plate and part of it in the chambers to prepare PRF membrane and PRF plug respectively by compressing under load provided by manufacturer.

PRF plug was placed in extraction socket and PRF membrane was placed above the plug to seal the socket. The flap was repositioned and interrupted sutures were placed using 3/0 black silk sutures (Mersilk - Ethicon, Division of Johnson & Johnson Ltd., Aurangabad, India). Occlusion was verified and adjusted to remove the occlusal interferences. At a follow-up appointment one week later, satisfactory healing was noticed and sutures were removed. When the patient returned after one month, patient was completely asymptomatic. Clinically, satisfactory healing was noticed at the extracted socket. The teeth were then prepared for fixed partial denture (FPD) and fabricated FPD was luted with resin modified glass ionomer cement (Relyx™ luting plus, 3M ESPE) (Fig 5A,5B). Six month follow up revealed good amount of clinical and radiographic healing without subjective and objective symptoms (Fig 6A).

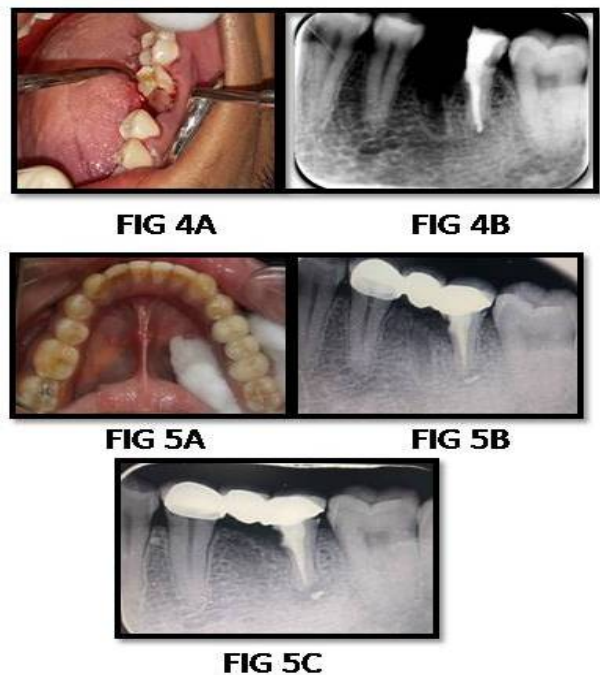


Figure 4: A. PRF plug and PRF membrane placement in extraction socket, B. immediate post operative radiograph.

Figure 5: Prosthetic rehabilitation of hemi sectioned tooth. A. Clinical photograph, B. 1 month follow up radiograph and C. 6 months follow up radiograph.

DISCUSSION

Tooth resection denotes the excision and removal of any component of the tooth or a root with or without its accompanying crown portion. Various resection procedures

include, root amputation, hemisection, radisection and bisection. Case selection is an important factor in success of root resection procedures. It is important to consider morphological factors, length, width, contour of roots, furcation location, curvature, position of tooth in the arch, feasibility of restorative and endodontics in the root/roots to be retained before deciding to undertake any of the resection procedures. Successful hemisection case reports with good prognosis were reported previously. 1, 2

Platelet rich fibrin (PRF), a platelet concentrate lacking coagulation factors was developed due to its properties in tissue regeneration and wound healing. PRF (also termed leukocyte-PRF or L-PRF) additionally contains more white blood cells (WBCs); necessary cells important during the wound healing process. Furthermore, since WBCs including neutrophils and macrophages are one of the first cell-types found in wounded sites, their role also includes to phagocytize debris, microbes and necrotic tissue thereby preventing infection. Macrophages are also key cells derived from the myeloid lineage and are considered one of the key cells implicated in growth factor secretion during wound healing including transforming growth factor beta (TGF-beta), PDGF and vascular endothelial growth factor (VEGF). These cells, together with neutrophils and platelets, are key players in wound healing and in combination with their secreted growth factors/cytokines are capable of facilitating tissue regeneration, new blood vessel formation (angiogenesis) and prevention of infection .3,4 A new protocol for PRF was introduced (termed Advanced PRF or A-PRF) whereby centrifugal forces were decreased and total spin times increased. By decreasing the rpm while increasing the centrifugation time in the A-PRF group, an enhanced presence of neutrophilic granulocytes in the distal part of the clot was found contributing to monocyte differentiation to macrophages, a cell responsible for inducing new bone formation.3

It has long been observed that PRF releases an array of growth factors to the surrounding micro-environment that contributes to soft tissue wound healing. Kobayashi *et al.* quantified by ELISA, growth factors including PDGF-AA, PDGFAB, PDGF-BB, TGF-beta, VEGF, and IGF. Each of these growth factors have specific roles in tissue regeneration.5 Sundhar *et al.*, in their series of case reports found that enhanced clinical success outcomes in Pulpotomy and apexification procedures with PRF, an enhanced cellular metabolism with laser biostimulation in combination with the sealing ability of MTA. It was concluded that vascular endothelial growth factor released from PRF matrix was primarily responsible for endothelial mitogenic response via extracellular signal regulated protein kinase activation pathway. This could be the reason for the biological repair of irreversible pulpitis with PRF as matrix over the inflamed pulpal tissue.6

Del Fabbro M., *et al* in their meta-analysis suggested that platelet concentrates increase new bone formation in post-extraction sockets, but due to the limited amount and quality of the available evidence, these results need to be cautiously interpreted. It was reported that a standardization of the experimental design was necessary for a better understanding of the true effects of the use of platelet concentrates for enhancing post-extraction socket healing.7 Earlier healing of

soft tissue within one week and improved quality and quantity of bone healing within 6 weeks of surgical procedure was observed with PRF instead of 8 to 12 weeks of normal healing. These results are in accordance with previous studies where in microcomputed tomography of PRF placed socket showed better quality of bone with good architecture and early healing.8,9 Gupta KS *et al.*, observed rapid healing in extraction molar socket preserved using PRF. They concluded that socket preservation procedure at the time of tooth extraction helps in better maintenance of the width and height of remaining bone, as in present case report where the dimensions of extraction site were maintained.10

Early healing helps in better prognosis and ability to withstand excessive forces on resected tooth. In the present case report PRF was used as a socket preservation material as it was proved as a enhancer of soft tissue and hard tissue healing.

CONCLUSION

PRF enhances healing of the alveolar bone for early rehabilitation and hence can be considered as a novel approach for socket preservation. Hemisection method combined with the novel approach has better potential when compared to the older treatment alternatives.

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