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Case Report

Hemisectomy: A ray of hope for a periodontally and cariously involved mandibular first molar

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ABSTRACT

Hemisectomy refers to the removal of a root with the associated crown portion of two-rooted teeth, commonly the mandibular molars, due to its high predilection for extraction due to dental caries and periodontal disease. Hemisectomy of a mandibular molar may be an appropriate treatment option when caries or resorption is limited to one root, while the other is healthy; thus, preserving the tooth structure, and alveolar bone and promoting affordability over other treatment possibilities. This article entails a procedure for Hemisectomy in a mandibular first molar and its ensuing restoration with a fixed prosthesis. Hemisectomy and prosthetic reintegration yielded an acceptable result.

1. Introduction

Hemisectomy is the surgical division of a multirooted tooth into two segments, which is usually performed in mandibular molars and on rare occasions in maxillary molars.[1] When a root of a mandibular molar is affected by a vertical root fracture, therapeutic mishap, or resorption, Hemisectomy is typically the treatment of choice and can be deemed useful as abutments in simple fixed bridges or as independent units of mastication that can restore the masticatory purpose.[2]

Once a mandibular molar tooth has been adjudicated appropriate for Hemisectomy, it must undergo root canal therapy prior to complete crown coverage and to make the furcation area self-cleansable, followed by selected root removal to allow better plaque control and to encourage bone formation. Since hemisected teeth are prone to radicular fractures, an extra-coronal restoration is required to restore them adequately.[3]

2. Case Report

A 24-year-old male patient reported to the Outpatient department of the Dental College and Hospital with the chief complaint of pain during chewing food in the lower left back teeth region for the last 6 months. Pain was dull and intermittent in nature, which intensified on mastication. No abnormality was revealed in the extra-oral examination. The patient's medical history was non-contributing.

On intra-oral examination, the mandibular left first molar tooth (#36) was found cariously exposed and tender on percussion. Probation revealed a 6-7 mm deep periodontal pocket found around the distal root of #36 but around the mesial root, it was 2-3 mm. Intra-oral periapical (IOPA) (Figure 1a) radiograph and Cone Beam Computed Tomography (CBCT) Scan (Figure 1a & b(i-iii)) showed

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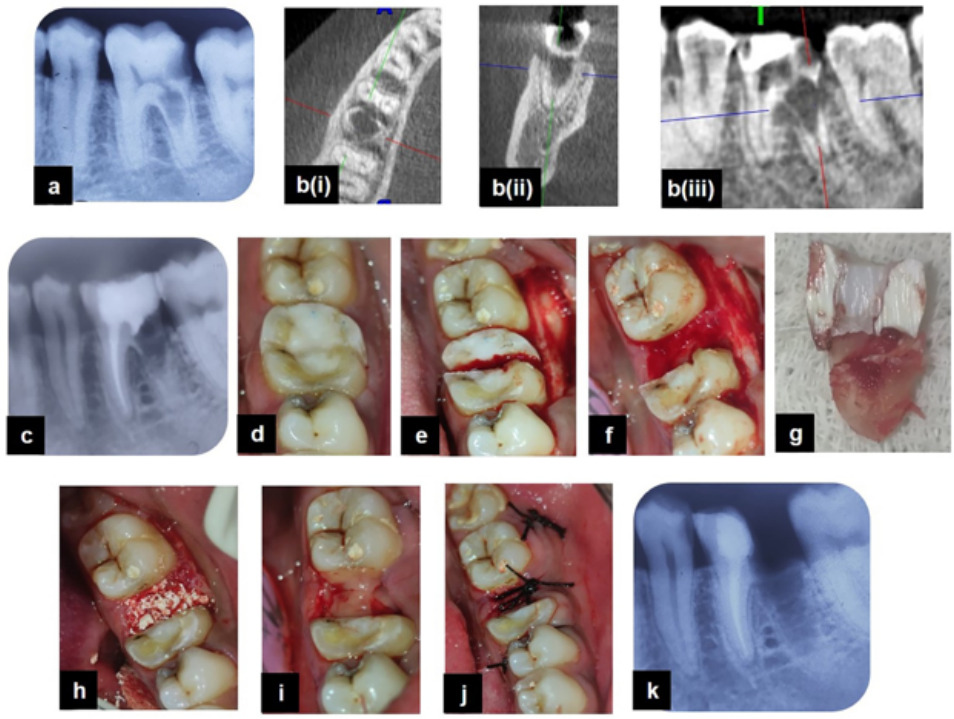

Figure 1: Procedural steps of hemisectomy in mandibular first molar: (**a**): Pre-operative radiograph, (**b**): Pre-operative CBCT views i): Axial, ii): Coronal; iii): Sagittal, (**c**): Post-obturation radiograph, (**d**) post-obturation clinical view, (**e**): Tooth sectioning, (**f**): Hemisectomised tooth, (**g**): Resected distal portion,(**h**): PRF and bone graft placement, (i): PRF membrane placement, (**j**): Sutures placed; (**k**): Post-operative radiograph

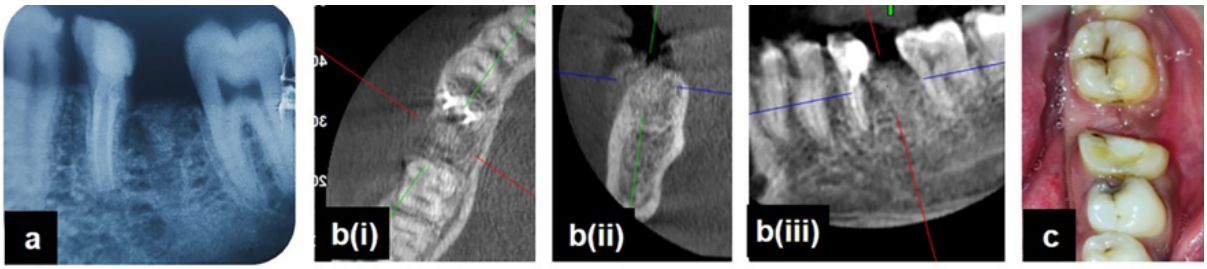

Figure 2: 1-month follow-up: (**a**): Periapical radiograph, (**b**): CBCT views; i): Axial; ii): Coronal; iii): Sagittal, (**c**) Clinical view.

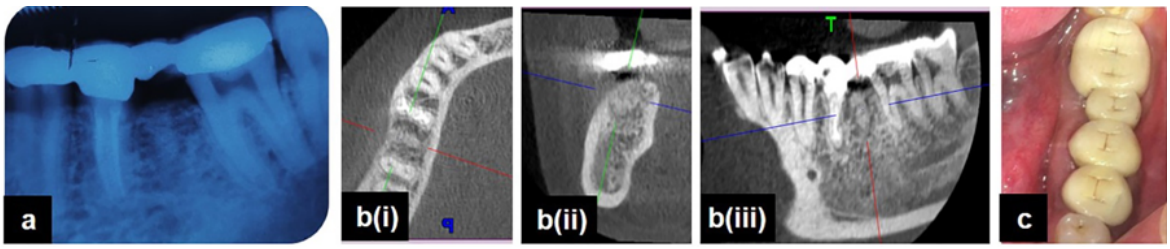

Figure 3: 9-months follow-up: (**a**): Periapical radiograph; (**b**): CBCT views; i): Axial, ii) Coronal; iii): Sagittal, (**c**): Clinical view

large internal resorption perforating the distal root surface of #36. Cold test and Electric Pulp testing showed no response. Horizontal bone loss along the distal root, furcation radiolucency, and good periodontal support along the mesial root of #36 was also evident on the IOPA radiograph. Based on both the clinical and radiographic examination, a diagnosis of pulpal necrosis with symptomatic apical periodontitis was made. Treatment options encompassed extraction of #36 followed by placement of a removable partial denture, fixed partial denture, or an implant. The patient did not wish to lose his tooth, so a conservative treatment option was chosen which included Hemisectomy of the distal root of #36 after completion of endodontic therapy followed by prosthetic rehabilitation.

After obtaining informed consent, tooth #36 was anesthetized and rubber dam isolation was achieved. Access cavity was prepared and bio-mechanical preparation was carried out in the mesial canals up to size 30/0.04 with Hyflex CM rotary files (Coltene, Whaledent) with frequent irrigation with 3% sodium hypochlorite (NaOCl) solution (Prime Dental Products Pvt. Ltd), maintaining activation of irrigants by Endoactivator (Dentsply Sirona, USA) throughout. Intra-canal medicament in the form of Calcium hydroxide paste (Ultracal, Ultradent Inc; South Jordan) was placed for 7 days.

On the second visit, a master cone radiograph was taken to ensure apical fit and final irrigation was performed using saline, 3% NaOCl, and 17% EDTA with activation, followed by obturation. To ensure a good seal, the canal orifices were sealed with light-cured glass ionomer cement (GC Fuji II LC, GC America), and the chamber was restored with composite resin (Brilliant NG, Coltene-Whaledent). Post-obturation IOPA radiograph and clinical view are depicted in Figure 1c & d. After 15 days of obturation, Hemisectomy was carried out.

Under local anesthesia, a full-thickness mucoperiosteal flap was reflected following a crevicular incision from tooth #34 to #37. The crown with the distal root was vertically resected facio-lingually towards the bifurcation area of #36, using a long shank tapered fissure carbide bur (Figure 1e). A fine probe was passed through the cut to confirm separation. After separation, the severed portion of the distal root was removed with extraction forceps, taking care not to traumatize bone & adjacent tooth (Figure 1f & g). The remaining portion of the mesial root of #36 was trimmed to remove any sharp spicules, as these structures are potentially unfavorable for periodontal maintenance, followed by profuse irrigation of the socket with sterile saline solution. Grafting of the extraction site was done with a mixture of hydroxyapatite bone graft (G-Bone, Surgiwear Ltd., India) and platelet-rich fibrin (PRF) (Figure 1h) and finally covered with PRF membrane (Figure 1i) prepared from patient's blood following the Choukroun's Protocol.[4] Then the flap was repositioned and sutured with 3-0 silk non-resorbable sutures (Figure 1j), and a post-operative IOPA radiograph was taken (Figure 1k). The surgical site was then allowed to heal with no occlusal stress on the mesial root of #36 for 4 weeks.

The patient was recalled after 1 month & 9 months. At 1 month follow-up, satisfactory healing was observed and therefore prosthetic rehabilitation was done in the form of a fixed-partial denture spanning from #35 and #37 involving the retained mesial root with a crown of #36, using a sanitary pontic. The respective follow-up IOPA radiographs & CBCT scans revealed good bone regeneration indicating a favourable uptake of the graft. Figure 2a, Figure 2b(i-iii), and Figure 2c reveal the IOPA radiograph, CBCT scan, and clinical view respectively at 1 month of follow-up and Fig 3a and Figure 3b(i-iii) and Figure 3c reveal the IOPA radiograph, CBCT scan, and clinical view respectively at 9 months of follow-up.

3. Discussion

Hemisectomy is a viable treatment option to save those multi-rooted teeth indicated for extraction. Park et al. suggested that hemi-section of molars with uncertain prognosis can preserve the teeth without noticeable bone loss for the long term, provided that the patient maintains optimal oral hygiene.[5] Saad et al. have also concluded that Hemisectomy of a mandibular molar may be an appropriate treatment option when the caries is restricted to only one root and the remaining healthy tooth portion can act as an abutment.[6]

The literature is sparse documenting distal root resection owing to its anatomical structure when compared to mesial root in the case of mandibular molars.[6] In the present case, because of large internal resorption in the distal root with horizontal bone loss with a fair amount of the mesial root remaining with acceptable bone support, Hemisectomy was chosen as a treatment option.

To ensure better bone support and faster bone healing, a mixture of hydroxyapatite crystal and PRF was placed inside the socket of the extracted distal root as well as on the distal surface of the mesial root of #36 and finally covered with PRF membrane. PRF is a second-generation platelet concentrate that contains numerous growth factors. Clinical trials suggest that the combination of bone graft along with the growth factor in the PRF may be suitable to enhance bone density, besides graft stabilization, and hemostasis, promoting wound healing, bone growth, maturation, and improving handling properties of the graft materials.[7] In the present case, a PRF membrane was used not only to protect the blood clot and/ or the graft material but also to endorse the induction of a thick and strong periosteum and gingiva, to serve as a true blockade between the soft tissue and the bone. This has been recognized to constitute an optimum protection and regenerative barrier for the intra-bony defects.[8]

Failures in Hemisectomy cases have been attributed to endodontic pathology and root fracture while some authors (70-75%) have shown greater success in Hemisectomy cases in long-term studies.[9,10] However, in the present case, a favorable treatment outcome was observed with a healthy periodontal condition up to 9 months of follow-up. The use of Hemisectomy offers a prognosis analogous to any other tooth with endodontic treatment, in case of a compromised tooth.

4. Conclusion

Hemisectomy can be considered a suitable and effective substitute for extraction. Optimum oral hygiene maintenance and an appropriate coronal restoration of the root resected tooth are important pre-conditions for long-term survival. The results of Hemisectomy are predictable and can warrant the long-term success of the procedure when complemented with a careful case selection.

5. Source of Funding

None.

6. Conflict of Interest

None.

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