Case Report

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Hemisection for the Successful Preservation of Hopeless Teeth: A Case Report

Dentistry Section

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ABSTRACT

Hemisection is conservative way of preserving tooth , which is defined as the surgical procedure that involves removal of a weakened root and compromised crown portion which may be affected by periodontal, endodontic, or structural failures. It aims to efficacious atternative modality in the extraced to save multirooted teeth. This treatment option should be considered when caries, resorption, perforation, or periodontal damage is confined to one root, whereas the other root is healthier. As long as, Expected results can be achieved with this treatment by following the proper diagnostic, endodontic, surgical, prosthetic, and maintenance procedures are followed, this treatment can produce. Present study describes the successful treatment two patients with severely damaged mandibular molars through hemisection. The procedure was successfully and the remaining portion of the tooth was restored with a prosthesis. The patients were followed-up for several months, and the outcome was satisfactory, with no recurrence of symptoms. Hemisection can be an effective treatment option for preserving a damaged tooth, and this case report demonstrates its successful application in a clinical setting.

Keywords: Furcation, Hyaluronic acid, Platelet-rich fibrin, Retreatment, Root resection

CASE REPORT

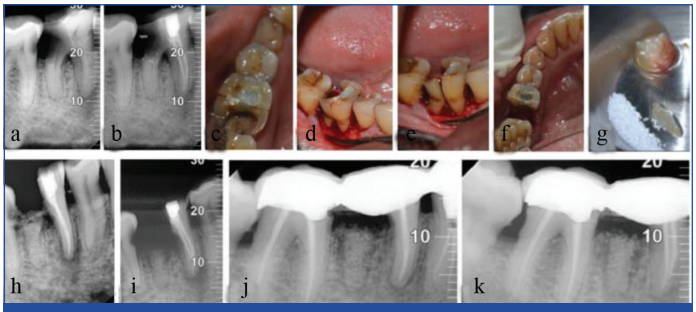
Case 1

A 53-year-old male patient presented to the Department of Conservative Dentistry and Endodontics since how long with a chief complaint of food lodgment and pain in the lower right back tooth region. The patient experienced intermittent dull aching pain which aggravated on chewing since 2 weeks. A periodontal pocket measuring 8-10 mm was detected on the buccal and distal surfaces of the right mandibular first molar (46), along with grade-II furcation involvement [1], without mobility. The tooth had a positive response to both horizontal and vertical percussion.

Radiographic examination revealed evidence of decay extending subgingivally at the distal aspect and a distinct radiolucency in the furcation region and involving the distal root [Table/Fig-1a]. The extent of decay rendered the tooth non-restorable on the distal aspect, leading to a diagnosis of hence the symptomatic apical periodontitis was the diagnosis made clinically. Initially, extraction and prosthetic rehabilitation were indicated due to the poor prognosis of the tooth. However, the patient was reluctant to lose the tooth. Therefore, an alternative approach was considered, since the tooth was firm with extensive crown damage at the distal aspect and grade-II furcation [1]. Thus hemisection of the distal root after endodontic therapy followed by a prosthetic replacement was was hence planned.

Conventional root canal treatment was performed on 46 after scaling and root planing in endodontic phase. Following endodontic access, working length was determined, bio-mechanical preparation was done, and obturation was performed [Table/Fig-1b,c]. The procedure was performed under 2% lignocaine and 1:200,000 adrenaline. A sulcular incision was given by using No. 15 BP Blade from 45 to 47 to elevate a full-thickness mucoperiosteal flap, using with a periosteal elevator [Table/Fig-1d]. Reflection of the flap, followed by the debridement of underlying bony defects was done. A vertical cut was made faciolingually towards the bifurcation area using a tapered fissure carbide bur (169L), and the distal root was atraumatically extracted [Table/Fig-1e,f]. Socket preservation was performed using BioOss Bovine Xenograft along with Platelet-Rich Fibrin (PRF), and an immediate post-operative radiograph was taken [Table/Fig-1g,h].

Subsequently, the buccal and lingual flaps were approximated to cover the grafts and the mesial root of 46 with a 3-0 Mersilk non-absorbable sutures. After placing the sutures, a Coe-PakTM surgical dressing was applied after sutures were placed. Follow-up recall after three months revealed good bone healing without mobility of the mesial root [Table/Fig-1i]. The restoration of the hemisected tooth was planned, with a metal ceramic fixed partial denture with on 45, the mesial root of 46, and 47. Radiographs were taken after six and 12 months displayed bone formation in the preserved socket, along with dissolution of the periapical radiolucency involving the mesial root [Table/Fig-1j,k].



[Table/Fig-1]: (a) Pre-operative radiograph (46). (b) Post-obtuation radoigraph. (c) Post-obturation clinical image. (d) Reflection of mucoperiosteal flap. (e) Vertical cut given (46). (f) Extraction of distal root. (g) Platelet-Rich Fibrin (PRF) and bone graft for socket preservation. (h) Immediate post-operative radiograph. (i) 3 months follow-up. (j) Post-operative radiograph 6 months. (k) Post-operative radiograph 12 months.

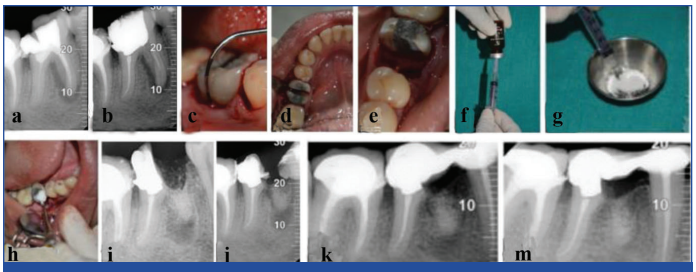
Case 2

A 38-year-old female presented to the Department of Conservative Dentistry and Endodontics with a chief complaint of severe and spontaneous pain in the lower right mandibular molar area, which had been ongoing for past 2-3 days. The patient gave history of root canal treatment on 46, eight months ago. Clinical examination revealed a fractured composite restoration, painful response to tender on percussion, no swelling, and no response to the cold test. Periodontally, no deep pocket was found, but there was grade-II furcation involvement [1]. Radiographic examination revealed

previous root canal treatment with apical radiolucency on the mesial root extending to the furcation area and radiopaque root canal filling [Table/Fig-2a]. Hence, the diagnosis of formerly treated tooth with symptomatic apical periodontitis was made. Re-endodontic treatment was planned followed by the hemisection of the mesial root, Due to the furcation involvement and the extensive damage around the root.

On access, four obturated canals were identified while doing access, protaper universal NiTi. ProTaper universal NiTi rotary files (Tulsa Dental, Tulsa, OK) were used to remove the root fillings. The working length was estimated using an electronic apex locator (Dentsply) and periapical radiographs, followed by the obturation with gutta-percha and sealed with AH Plus sealer [Table/Fig-2b].

The mesial root was hemisected, as described in Case 1 [Table/Fig-2c-e]. However, the socket was preserved with BioOss bovine Xenograft along with 1% Hyaluronic acid [Table/Fig- 2f-h], and an immediate post-operative radiograph was taken [Table/Fig-2i]. A follow-up radiograph after three months revealed adequate healing [Table/Fig-2j]. The restoration of the hemisected tooth was planned with a fixed partial denture with 45, distal root of 46. Radiographs taken after six and 12 months showed good healing [Table/Fig-2k,l].



[Table/Fig-2]: (a) Pre-operative radiograph (46). (b) Post-obtuation radoigraph. (c) Reflection of mucoperiosteal flap. (d) Vertical cut given (46). (e) Extraction of mesial root. (f) Hyaluronic acid. (g) Hyaluronic acid added to bone graft. (h) Socket preservation after extracion of mesial root. (i) Immediate post-operative radiograph. (j) 3 months follow-up. (k) Post-operative radiograph 6 months. (l) Post-operative radiograph 12 months.

DISCUSSION

Hemisection is multidisciplinary approach which incorporates the concepts from prosthodontics, oral surgery, endodontics, periodontics, and restorative dentistry [2]. It is a surgery in which the healthy crown and related root of a multi-rooted tooth are left in place at the furcation, keeping their integrity within the socket [3]. Weine has classified the following reasons for tooth hemisection as follows: if only one root has vertical bone loss, furcation involvement, close proximity of adjacent teeth's roots are too close together, root exposure due to dehiscence endodontic failure, and vertical root fracture [4]. This case report presents two cases where hemisection was chosen as an alternative to tooth extraction.

Resective therapy has been used for over a century to treatment of furcation defects. Park suggested that hemisection of molars with a questionable prognosis can maintain the teeth without a detectable bone loss over the long term [5]. Shafiq MK et al., also concluded that hemisection of a mandibular molar can be a viable treatment option when decay is restricted to one root and the remaining portion of the tooth can serve as an abutment [6].

In both cases presented, hemisection was chosen to save teeth that would have otherwise been extracted. In the first case, extensive tooth structure loss on the distal aspect and a large periapical lesion made the tooth unsuitable for a successful post-endodontic restoration. Hemisection was planned to discard the compromised aspect of the tooth. On the contrary, the second report was a case of endodontic re-treatment where the mesial root was compromised due to involving the furcation area with a questionable prognosis of the mesial root. Finally, a fixed prosthesis was planned involving the adjacent bicuspid to retain functionality.

In both cases, the extraction socket was preserved in both the cases to minimise post-extraction bone loss which aid in serving good function and aesthetic after prosthetic rehabilitation. Steps taken for successful socket preservation included using atraumatic extraction techniques to minimise damage to the alveolar bone, using a barrier membrane and Steps taken for successful socket preservation included using atraumatic extraction techniques to minimise damage to the alveolar bone, using a barrier membrane and bone grafting material [7].

Hemisection is a well-documented treatment choice for grade-II and grade-III furcation involvement and mandibular teeth with advanced vertical bone loss in one root [8]. Yuh DY et al., literature review shows high survival rates of root-resected molars were 91.1% [9] and long-term survival rates of approximately 93% were reported by Carnival G et al., over a 10-year follow-up [10]. A similar case to ours was reported by Gupta P et al., where hemisection was used to save an advanced endo-perio involved tooth with socket preservation using PRF. The case showed favourable outcomes with healing of the periapical lesion and healthy periodontal condition up to one year of follow-up [11].

The use of PRF in the first case was based on its well-known property of releasing growth factors and the widespread use of Choukroun's PRF [12]. In the second scenario, hyaluronic acid was combined with xenograft to preserve the socket after hemisection. Hyaluronic acid is essential for collagen production, which promotes better ridge preservation, especially in damaged extraction sockets [13].

By following strict case selection criteria, hemisection can be considered as a reliable treatment option for molar teeth that were previously deemed unsalvageable.

CONCLUSION(S)

Hemisection is a conservative treatment modality for teeth that present with both periodontal and endodontic issues, as it allows for the preservation of the healthy segment of the tooth. The success of this procedure depends on factors such as the strength of the surrounding bone, the planned restoration, and regular maintenance and care. In our cases, the use of hemisection combined with socket preservation resulted in positive outcomes and satisfactory results.

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