Hemisection : Split to Save a Compromised Tooth- A case report.

Abstract:

Hemisection involves splitting of a mandibular molar into two halves, removing the damaged root with its accompanying part of crown and leaving the intact root along with crown in place. This form of treatment may be used when only one root has been affected by periodontal, resorption, perforation and caries involving furcation area while another root remains in good condition. Hemisection of the damaged tooth assists to maintain the tooth's structure and the alveolar bone surrounding it. The key element to ensuring the long-term success in such cases is the proper case selection. This case report shows the hemisection of a mandibulaÉ molar in a young patient, followed by an appropriate restoration

Key-words: Hemisection, mandibular molar, root resection, success rate, young patient

Introduction:

Improved treatment methods have emerged as a result of recent advancements in dentistry. Losing posterior teeth causes tooth migration, a reduction of the ability to masticate, and a decrease in the length of the arch. Therefore, maintaining posterior teeth is necessary.[1]

There are a few options for treating a severely damaged and compromised molar. The most usual method of treatment for such a tooth is extraction, followed by a removable partial denture, a fixed prosthesis and dental implant to fill the space created by the extraction of tooth.

Hemisection is such a treatment option which involves the principles of conservative dentistry and endodontics, periodontics, oral surgery and prosthodontics.[2] However, with proper case selection, hemisection can be an extremely simple, and conservative procedure with favorable outcomes.Before extracting any molars, it was suggested that hemisection be considered because it offers favorable long-term outcomes.[3]

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Indications:

Following are the indications for performing hemisection :

1. One of the root that has been affected by caries, fracture and perforation in a multirooted tooth
2. The retained root can be treated by endodontic treatment
3. The healthy root can sustain a post and core restoration
4. The remained root is properly positioned for the subsequent fixed prosthesis restoration
5. The root shape that enables optimal surgical accessibility and periodontal management of the final restoration.[4]

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Contraindications:

Following are the contraindications for performing hemisection :

1. Poorly shaped and insufficient bone support for the remaining roots
2. Root fusion or proximity which prevents root separation
3. Inability to complete endodontic treatment
4. Patient refusing to receive dental procedure performed.[4]

Case report:

A 21-year-old woman reported to the Departmeət of Endodontics with the chief complaint of pain in her lower right back tooth area for the past 2weeks. The sensation of pain in her lower right back tooth area for the past 2 weeks. The sensation of pain was persistent and dull in character, and it got worse upon chewing. She had no significant medical or dental history.

On clinical examination, the tooth revealed the presence of a large mesio-occlusal carious lesion involving the pulpal floor with furcation . Radiographical examination revealed grossly decayed mesial half of the tooth structure and radiolucency surrounding the apex of mesial root. (figure-1A). Following a periodontal probing of the tooth, normal sulcular depth, normal alveolar bone architecture, and mobility within physiological limits were found.

A diagnosis of symptomatic apical periodontitis was made with regard to tooth #46 based on the history, pulp sensibility tests, clinical and radiographic analysis. The severity of the decay prevented the tooth from being restored, thus the patient was informed of the status and prognosis of the tooth and appropriate treatment choices were given, including extraction followed by dental implant insertion. However, she chose hemisection among all treatment choices followed by fixed prosthesis involving second premolar and the distal portion of the lower right first molar.

Clinical procedure:

The written consent was obtained after the patient was informed of the treatment procedure. It was decided to partially save the tooth by performing hemisection by extracting the mesial root because the distal root was broad and straight, this makes it more suitable for use as an abutment.

Under rubber dam isolation, carious structure on the pulpal floor was removed and access opening was made for distal root using Endo Access Bur #2. There was only a single canal in the distal root. Apical patency checking and gliding path was obtained with # 10 K file. Working length was obtained using apex locator (J morita) followed by radiographic confirmation (figure - 1B). After apical enlargement was done upto # 20 k-file, biomechanical preparation was done by using step down technique with rotary files (ProTaper gold, Dentsply Maillefer, Switzerland) up to file size F1. Irrigation protocol consisted of 3% sodium hypochlorite solution (HYPOSOL; Prevest DenPro, India) followed by saline. The distal canal was medicated with calcium hydroxide (RC Cal; Prime Dental Products Pvt Ltd,India) for 1 week and the tooth was then temporized. At recall appointment after a week, paper points (Dentsply, Switzerland) were used to dry the distal root canal after which by using the lateral condensation technique, obturation was finished using the proper gutta-percha points and AH Plus sealer (Dentsply,Germany) (figure- 1C). For better sealing, the root canal orifice was sealed with glass ionomer restorative material (3M Ketac Molar), followed by composite restoration (NT Premium; Coltene, Altstätten, Switzerland) and the patient was informed to report after 15 days for hemisection procedure.

On the date,the flap was raised under local anesthesia to reveal the furcation region. The tooth sectioning process started from the buccal side and moved to the lingual side. A tapered fissure carbide bur was used to cut a vertical section after grooves had been made on the buccal side to serve as a guide for sectioning. Aperiosteal elevator was used to lift the mesial root from its socket after sectioning was finished (figure - 2B and 1D). Using surgical curettes, granulation tissue was removed from the mesial socket. Sterile normal saline was used to adequately irrigate the socket and 3-0 braided silk was used to approximate and suture the flap. The occlusal table was reduced to minimize the forces and final shaping of retained segment was done.

After 1 week, patient was recalled for sutures removal. The healing of the socket was found to be good at the 1-month follow-up visit. The second premolar and distal segment of the first permanent molar were prepared for fixed prosthesis and impression was taken using putty impression material with light body (President; COLTENE, Altstätten, Switzerland) (figure - 2C). After removal of temporary crown, porcelain-fused-to-metal prosthesis was given (figure

- 2D). Radiographs taken at 3 month and 9 months later showed that radiolucency had resolved and bone appeared to be forming in the extraction socket (figure - 1E and 1F).

Discussion:

Hemisection is a tooth saving procedure for multi-rooted teeth , especially furcated molars of the lower jaw that are otherwise indicated for extraction.[5] Long-term success requires appropriate case selection, which must include cases with excellent bone support for the root to be kept and good visibility as well as access to the furcation area.[6] From a periodontal point of view, the severity of furcation involvement and amount of bone support are key factors in case selection and prognosis.[7]

As a result, it was decided that hemisection was an effective treatment for the current case because the distal segment was in good periodontal health and had sufficient bone support. The distal half of the tooth was kept while the mesial half was removed. Because the distal root is broad and straight, this makes it more suitable for use as an abutment.[8] A study by Park et al. hemisection is a viable option for treating molars with a poor prognosis since it preserves the teeth without any apparent bone loss for a long time, providing the patient practice regular oral hygiene.[6]

The long-term viability of a resected molar depends on a variety of related factors, including the surgical process, the periodontal health of the tooth, anatomy of the root, maintenance therapy, endodontic and restorative treatment.[9] If all of these requirements are met, hemisection is a feasible treatment option compared to extraction and replacement of tooth. Several factors, include an unsatisfactory restoration with poor margins, an improperly established occlusal contact points that could transform favorable stresses into detrimental stresses.[10]

To minimize the occlusal forces on resected tooth, the occlusal table is reduced. Since, the hygeinic pontic is the ideal design for posterior area.[11]Therefore, a three unit fixed partial denture (FPD) covering the sectioned molar and second premolar in the form of three premolars was created as the final prosthetic replacement. According to Shafiq, a case successfully treated by hemisection and a three unit fixed prosthesis.[12] In cases where hemisection was performed for the management of furcated molars, Carnevale et al. found an overall survival rate of roughly 93% after a 10 year follow-up.[13]

In a different study, Basten et al. found that 92% of all hemisected molars sustained over a period of 12 years, with failures attributed to recurrence of caries, endodontic and strategic issues.[14]

In the current case, favourable outcomes was reported through the healing of periapical radiolucency, functional occlusion, and a healthy periodontal state up to 9 months of follow-up. Therefore, using specific endodontic, surgical, and restorative protocols as well as a strict set of guidelines for selecting the right cases, hemisection can be a helpful treatment approach to preserve multi-rooted teeth that were previously recommended for extraction.[15,16]

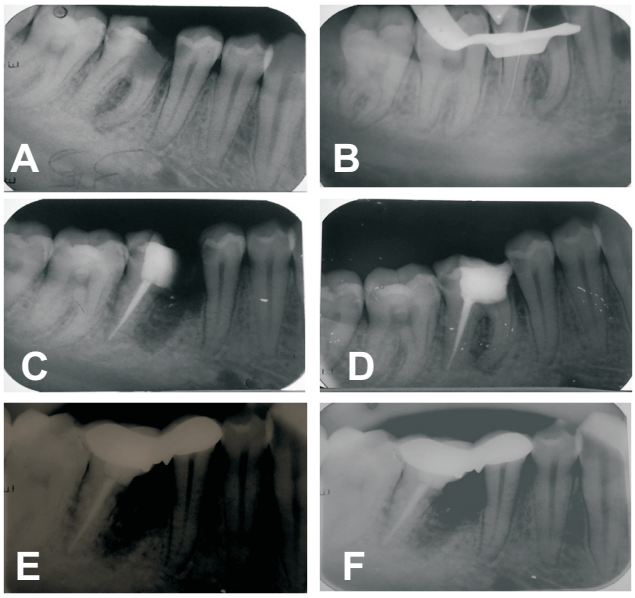

Figure 1: (A) Preoperative radiograph showing the extent of carious lesion and periapical radiolucency. (B) Working length estimation. (C) Radiograph after completion of obturation.(D) Radiograph after hemisection. (E) 3- month follow-up. (F) 9-month follow-up showing healing of bone.

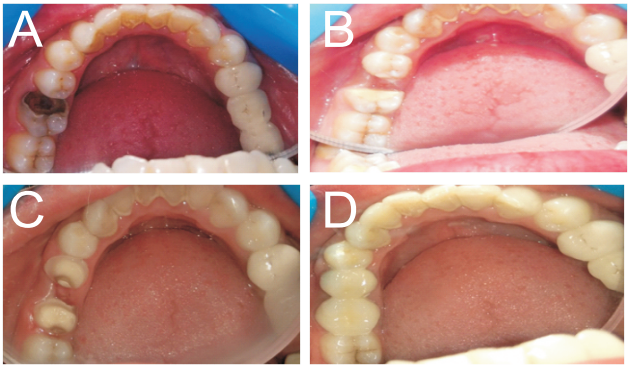

Figure 2: (A) Clinical photograph showing a carious tooth #46. (B) Tooth after hemisection. (C)Teeth after preparation

for fixed partial denture. (D) Occlusal view of porcelain fused to metal prosthesis.

Conclusion:

Hemisection can be a feasible alternative to extraction for the conservation of remaining tooth structure and rehabilitation of function in young age patients. If appropriate case selection is put into consideration, the success rates of hemisection are high and outcomes are predictable in compromised molars.

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