CASE REPORT

Management of an endodontically compromised multirooted tooth with hemisection and platelet rich fibrin: A case report

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Abstract
Recent advances in dental imaging, dental materials and equipments have improved the prognosis of compromised teeth. Strategic locations of tooth, doctor’s and patient’s perception are the important factors, which determine the direction of treatment. In a tooth relatively indicated for extraction, if the patient is eager on salvation of a tooth, it is the dentist’s moral duty to put efforts in the direction to preserve the natural tooth. The second generation fibrin product, i.e., platelet rich fibrin (PRF) is widely used in the field of dental surgery. This case report puts light on management of endodontically compromised tooth with hemisection and use of PRF as a regenerative tool in such surgical cases.

Keywords
Abutment, hemisection, platelet rich fibrin

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Introduction
Many a times, we as clinicians would face situations, where patients demand a little more than what could be done. This patient’s right mandibular first molar was a relative indication for extraction. It had a poor prognosis due to fractured instrument and internal resorption.[1] The treatment was initiated upon patient’s request. The resorption was arrested successfully with multiple visit calcium hydroxide intra-canal dressings for 4 weeks. Only possibility was a hemi-section procedure if and when the resorption was arrested.[2] Treatment plan was to hemisection with removal of the distal half[3] where the extraction socket was to be filled with platelet rich fibrin (PRF),[4] followed by cementation of a modified full crown. The modified full crown was cemented as an interim prosthesis in order to observe the mesial half for an extended period to ensure success. It was important to put the tooth to function in this period to assess its ability to function as an abutment without endodontic complications or fracture of the root. Treatment was successfully completed with more than satisfactory results.

Case Report
A 24-year-old patient reported to the institute hospital with the chief complaint of pain in the right lower posterior region in the mouth. The pain was dull aching in nature, and patient could localize the pain to a particular tooth. The tooth was tender upon percussion and patient reported pain upon mastication. The patient also presented with the history of a previous dental treatment with the same tooth. The provisional diagnosis of failed endodontic treatment was formulated. Radiographic investigations were done to arrive at a final diagnosis. Radiograph
showed that the tooth was already endodontically treated and had a separate instrument in the distal root canal and internal resorption in all the three canals of the right mandibular first molar [Figure 1a]. It was a relative indication for extraction, which the patient did not prefer as he was apprehensive towards tooth preparation of the adjacent healthy teeth for a three unit fixed prosthesis. Hence, the treatment plan of hemi-section, use of PRF for regeneration of bone in extraction socket and cementation of a modified full crown was formulated for an interim period. Patient was educated about the importance of managing internal resorption. Internal resorption was the primary hurdle toward such a treatment procedure. The treatment was successfully done within 6 weeks with a modified full crown as an interim prosthesis. After achieving favorable response from the treatment rendered; with an observational period of over a year, the final two unit fixed prosthesis was cemented to restore and rehabilitate the concerned teeth.

**Investigations**

Intra oral periapical radiographs.

**Treatment**

Careful evaluation of the tooth clinically and radiographically revealed that it had severe internal resorption in all the three canals. There was a furcal perforation adjacent to the mesial orifices and a fractured instrument in the distal canal which was slightly jetting out of the apex [Figure 1a]. The only possibility was a hemi-section procedure to save the mesial half of the tooth. It was possible only when the resorption was arrested. Treatment plan was to arrest the resorption, followed by root canal treatment of the mesial half with hemi-section and removal of the distal half where the extraction socket was to be filled with PRF, followed by cementation of a modified full crown for an extended observational period to assess success.

The procedure was initiated by anaesthetizing the inferior alveolar nerve and the lingual nerve with 5 ml of 1:200000 lignocaine. After determining the working length [Figure 1b and c], cleaning and shaping of the mesial canals were performed. Intra canal dressing of calcium hydroxide was placed in order to arrest the resorption. These dressings were changed once every week for 4 weeks. The mesial canals were then obturated using gutta-percha and sealapex, followed by coronal restoration with resin composite [Figure 1d]. The patient was prescribed analgesic during this period. In the following visit, a hemi-section with placement of PRF was planned.

After anesthetization, a long shank tapering fissure bur was used to section the first molar [Figures 1e and f, 2c and 2d]. A confirmatory radiograph was taken to gauge the depth and evaluate the remaining thickness of the tooth structure to the furcation. The tooth was then sectioned into two (mesial and distal) halves, and the distal half was extracted out of the socket along with the separated instrument [Figures 1g, 2e and f]. The mesial half was contoured, and the area was irrigated with normal saline. PRF was obtained from the patient’s blood, which was used to fill the extraction socket [Figures 1g and 2h] and

*Figure 1*: (a) Pre-operative showing internal resorption and separated instrument. (b) Trying bypass technique for negotiating the canal to the apex. (c) Working length determination. (d) Obturation of the mesial canals. (e) Sectioning of the crown (depth gauge). (f) Hemi-sectioning. (g) Post hemisection with platelet rich fibrin. (h) with temporary crown. (i) Post-operative. (j) Intraoral periapical (IOPA) after 3 months. (k) IOPA after 6 months. (l) IOPA after 9 months

**Radiographic Images**

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sutures were given to approximate the soft tissues with 3-0 silk thread [Figures 2g and 2h].

The sutures were removed after an observational period of 1 week [Figure 2]. Crown preparation was done in regard to the mesial half of the first molar [Figure 2], followed by rubber base impressions for the fabrication of a modified full crown (porcelain fused to metal). The tooth was restored temporarily with a modified acrylic crown for a period of 2 weeks to ensure complete healing before loading it for regular functioning [Figure 2]. Modified full crown was cemented using zinc phosphate luting cement, after verifying for complete healing of the extraction site [Figures 1h-l and 2k and 2l]. This modified full crown was placed to determine the prognosis of the treatment rendered and to serve the purpose of the function as the observational period was extended. It was done in order to assess the success of endodontic treatment rendered and to ensure whether it could take up the masticatory load in order to serve as an abutment for a two-unit bridge. The final treatment plan included an implant placement without disturbing the adjacent healthy teeth. Implant would have been the only option if the quest to save the natural tooth had failed.

However, the final two unit fixed prosthesis was cemented with glass ionomer cement after obtaining desired results from the treatment rendered with an extended observational period.

**Outcome and follow-up**

Three, 6 and 9 months post-operative clinical and radiographic evaluations suggested no complications [Figures 1j-l]. A two unit fixed prosthesis was cemented in order to re-establish normal occlusion and function of concerned teeth. It was performed after an observational period of over a year to ensure success.

**Discussion**

Clinicians can end up in dilemma regarding prognosis of a particular case in many clinical situations. When in doubt, the clinician should always attempt a conservative and less extensive approach. A favorable prognosis may be achievable in many situations due to the introduction of newer materials and techniques in dentistry.\(^5\) It is all about postponing the inevitable extraction as long as one can, keeping in mind good oral health of the patients. The patient’s faith and the clinician’s job satisfaction would be increased many folds. One such effort was done in this case presented here.

Resorption is a difficult and time-consuming process to arrest in order to treat clinical cases presented with it.\(^6\) Calcium hydroxide preparations are used to arrest the resorption process. It takes as less as 4 weeks to show promising results. Further treatment in a clinical circumstance where the resorption process is arrested, is often challenging. A calcium hydroxide based sealer sealapex was used to suppress the dentinoclastic activity in the areas of resorption and because of the better handling properties of Sealapex, it was applied in areas of resorptive defects also.

Hemi-section is now a common clinical method. One-half of the tooth is saved in order to use it as an abutment to provide permanent prosthesis to restore function and aesthetics. It is usually performed on mandibular molars where either the mesial or the distal half is preserved.\(^7\) Hemi-section is always thought as the last of all the treatment modalities. Instead, it should be thought as a treatment option where the results could give drastic and dramatic improvement in some inevitable situations where prognosis is poor.

Figure 2: (a) Post obturation. (b) After endodontic treatment. (c) Sectioning into two halves. (d) Extraction of the distal half. (e) Extraction socket. (f) Platelet rich fibrin (PRF) prepared. (g) Insertion of PRF. (h) Suturing. (i) Post healing. (j) Crown preparation. (k) Temporary crown. (l) Porcelain-fused-to-metal crown (interim prosthesis)
PRF is an autogenous graft material which has tremendous potential whenever used for regenerative procedures.\textsuperscript{[9]} It helps in faster healing of the hard tissues like bone by co-ordinating healing process than in regular conditions.\textsuperscript{[9]} It also acts as a scaffold or matrix for regeneration of bone cells. Platelet based growth factors induce regeneration of bone and promote healing. It is a second generation autogenous graft, which can be obtained chair-side and has better patient compliance.

A modified full crown cemented to restore aesthetics and function in such a scenario is considered compromised. The masticatory load on the mandibular first molar is very high.\textsuperscript{[10]} Half of the mandibular first molar with support from the alveolar ridge should be able to resist these masticatory forces. This can produce desirable longevity for proper functioning of the tooth to consider it as a successful treatment method for an interim period. This could be an option when one requires extended observational period, to assess proper functioning as well as to rule out complications.

Tooth preparation of the mesial half and fabrication of the interim restoration was designed in such a way that the mesiopalatal (centric cusp) of the maxillary first molar occludes in the central fossa of the mandibular first molar. This type of design aided in dissipation of masticatory forces along the long axis of the mesial half of the hemi-sected tooth. The design of the distal pontic was taken care by the existing scheme of occlusion. The patient was instructed and motivated for oral hygiene maintenance by various methods like correct brushing technique, inter-dental brushing and use of dental floss. Demonstrations of these methods were given to the patient. In addition, patient was recalled on a regular basis for constant check-ups and intervention if required to ensure complete oral hygiene; especially in the affected quadrant. Modified full crown would serve the purpose of functionality for the extended observational period to predict success or failure of the treatment rendered. It was important to follow the thumb rule of “wait and watch” as the tooth involved had multiple complications. In the case of failure, extraction and implant placement would have been an ideal option without harming the adjacent healthy tooth.\textsuperscript{[11]} The modified crown was fabricated and cemented in order to protect and preserve the mesial aspect of the tooth from any inadvertent forces originating from masticatory apparatus. This type of prosthesis design is not routinely advised. However, it can serve the purpose of an interim functional prosthesis when a tooth involved has a questionable prognosis, thus balancing both clinicians’ enthusiasm to save the natural tooth and patient’s demands. One can plan for a two unit bridge taking support from the mandibular second molar after achieving desired results, without any mobility, swelling, peri-apical pathology and most importantly resistance to root fracture. However, these treatment procedures performed gave complete satisfaction and confidence to the patient.

After an observational period of over a year; finding favorable results, the final treatment option of fabrication and cementation of a two unit bridge was performed. The distal second molar was prepared to serve as an abutment. And a two unit bridge, involving the mesial half of the first molar and the distal second molar served the purpose of following, both biological and mechanical principles of a fixed prosthesis [Figure 3]. The patient readily agreed for a two unit bridge as he was convinced with the quality of treatment delivered. And the clinician’s enthusiasm and expertise helped in saving the natural tooth and avoided a more intrusive treatment option of an implant.

References


