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Case Report

Alternative replantation for an iatrogenic perforation repair with an undesirable root fracture: A case report

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ABSTRACT

Intentional replantation is done in cases of endodontic failures where conventional forms of treatment options either fail or become impossible. It involves the removal of the offended tooth, execution of extra oral apicoectomy followed by its reinsertion into the socket. The present case report discussed in this paper presentation demonstrates a scenario where a right maxillary second molar had an iatrogenic perforation in the middle third of distal root. The decision of intentional replantation was made for its repair but unfortunately, the tooth underwent fracture in the course of extraction. The procedure was still performed with a reduced distal root length. Fortunately, a favourable outcome was observed after 1 year of follow up. However, for recording the long term survival, the patient is kept on follow-up.

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1. Introduction

Grossman defined, Intentional replantation as the "removal of a tooth and its almost immediate replacement, with the object of obturating the canals apically while the tooth is out of the socket."¹ It is considered a procedure of last resort by many dental practitioners. Intentional Replantation is indicated in the following conditions; when surgical endodontic treatment is impossible because of the thickness of buccal or lingual plate as in mandibular molars and the palatal root of maxillary molars.²⁻⁶ Routine RCT is not possible in some patients due to limited mouth opening.⁷ Previous nonsurgical endodontic therapy has failed. An unfavorable apicoectomy procedure reasoned anatomic factors. (e.g. Thickness of buccal plate, close to the mandibular nerve or inaccessible operating field like the lingual surface of mandibular molars) or financial conditions of the patient where conventional implant placement is impossible.^{8,9} When the canal is obstructed

due to broken files or calcification.¹⁰⁻¹² Contraindications of Intentional replantation are as follows: When an implant placement or conventional apical surgery can be successfully executed and have a good prognosis, active periodontal disease, grossly decayed tooth, extraction requiring hemisection or osseous recontouring. A tooth acts as an abutment for multiple tooth prostheses, or a tooth with divergent roots.^{3,5} Advantages of intentional replantation embraces: Cost-effective and less time-consuming than other treatment options. Disadvantages are the risk of root fracture during extraction, root resorption, and ankylosis. A great discrepancy has been reported in the success rate of this technique. A success rate of 81% has been reported by Bender and Rossman of 31 teeth followed for up to 22 yr.³ Kingsbury and Weisenbaugh reported a success rate of 95% for 151 teeth followed for 3yr.^{2,3,13} Lu et al reported a case of intentional replantation that was endodontically mistreated and had tooth mobility as a result of severe bone loss caused by periodontal disease. The replanted tooth was finally extracted due to prosthodontic reasons but has survived for an unexpectedly long duration of time i.e.,

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32 months before extraction. There has not been any case reported in which intentional replantation was performed on a maxillary second molar in which iatrogenic perforation of the middle third of distal root had been repaired with an undesirable root fracture. Perforation of the furcation caused by a pathologic or iatrogenic process often constitutes a very complicating and frustrating problem in endodontic therapy. It is well established that perforation in the cervical third of the root or the floor of the pulp chamber has a questionable prognosis. In some cases, extraction may be the only alternative.² This case report dispenses with a rare case in which intentional replantation was performed for a right maxillary second molar with an iatrogenic perforation repair with an undesirable root fracture. Conventional surgical endodontic treatment was not possible in this case because of an inaccessible location of the defect to be corrected.

2. Case Report

A 20-year old male patient came to the Postgraduate clinic of the Department of Conservative Dentistry and Endodontics at Mithila Minority Dental College and Hospital, complaining of severe pain in the right upper back tooth region. The medical history was non-contributory. A detailed dental history revealed that the patient had undergone endodontic therapy one day prior with respect to #17. On clinical examination, the patient was experiencing severe tenderness on percussion. On radiographic examination, no periapical pathology can be appreciated and canals were not completely obturated.

After the removal of temporary restorative material, blood was oozing out from the pulp chamber. The access opening was modified. While the estimation of working length an iatrogenic perforation was appreciated in the middle one-third of distal root with respect to #17 (Figure 1). The patient was well informed about the poor prognosis of the involved tooth, but he refused to go extraction of the tooth. The patient was proposed for Surgical intervention by using intentional replantation as the only treatment option left to save this tooth. The procedure for the intentional replantation was explained to the patient and the patient was motivated to proceed with this treatment option.

Before the surgical procedure, the tooth was ground out of occlusion. Local anesthesia was administered with 2% lignocaine hydrochloride in 1:80,000 adrenaline. After achieving the complete anesthesia of the operating field, extraction of the tooth was attempted using an elevator and maxillary molar forceps. However, despite the careful implementation of the procedure, the apical one-third of the distal root got fractured. The fractured fragment was retrieved with the help of 40 H-file without any damage to the extraction socket (Figure 2). Extracted teeth, as well as the extraction socket, were carefully examined for any remaining fractured fragment in the socket or any crack and abnormality on the intact root surface. Although the distal

root was fractured in the apical one-third, we are still left with half of the root intact which offered the chance to attempt intentional replantation.



Fig. 1:



Fig. 2:



Fig. 3:

Extraoral apicectomy was done in the distal root and the apical area was prepared with an ultrasonic tip. All three canals were irrigated with 5.25% sodium hypochlorite and



Fig. 4:



Fig. 5:



Fig. 6:

EDTA following final irrigation with saline. Canals were obturated using pro taper gutta-percha points and AH plus sealer. MTA was the material of choice for retrograde filling of resected root apex (Figure 3). The occlusal surface of the tooth was filled with Glass ionomer cement after completion of endodontic therapy. During the replantation procedure, normal saline was used to keep the extracted tooth hydrated, wrapped up in a wet gauze piece. Care was taken not to violate the viable periodontal membrane. Apicoectomy and retrograde MTA filling were done to achieve the hermetic sealing of the root apex. The blood clot was removed from the socket by irrigating the socket with normal saline afterward tooth was placed back in to socket (Figure 4). Calculated extra-oral time for the entire procedure was approx. 17 minutes. The postoperative radiograph was taken to appraise the position of the replanted tooth and it was resting in the desired position (Figure 6). Postoperatively, the patient was instructed to maintain oral hygiene. The patient was prescribed 0.12% of CHX solution twice daily, Amoxicillin 500 mg (TID), and Aceclofenac, Paracetamol, and Serratiopeptidase (BID) for 7 days and was advised to have a soft diet. The patient was recalled 2 weeks later for removal of a non-rigid splint. The tooth was stable in the socket without any clinical sign of inflammation or pathologic mobility. An implanted tooth was assessed after 6 months and 12 months (Figure 6) Followed by the placement of prosthesis with 1 month follow up.

3. Discussion

In daily practice, we frequently come across cases where intentional replantation is indicated but it always opts as a treatment option of last resort. Despite several contraindications and disadvantages, the success rate for its procedure depends upon the following factors-extraction conditions, extraoral time, handling, periodontal ligament condition, and patient's general health.¹⁴

According to Alhadainy, if an iatrogenic perforation is left untreated, it results in chronic inflammation of the gingiva, tenderness on percussion, and exudate formation. An iatrogenic perforation causes severe destruction of periodontium leading to chronic periodontal lesion due to its communication with the oral environment.^{15,16} Relationship between the pulp and periodontal disease has been confirmed by many authors. It has been reported that the location of an iatrogenic perforation in association with the gingival sulcus has great relevance. A tooth with perforation in the coronal third also involving the furcation area is having a doubtful prognosis because of its closeness to the gingival sulcus. According to other authors, the prognosis of the root perforation depends upon the size and location of the perforation, the period to which the defect is exposed to contaminants, materials used for repair, ease, and accessibility to repair the defect.² Intentional replantation was appraised for this case because the location of the defect

was inaccessible to repair, where tunneling procedure was not possible.² According to Cohen and Burns, nonsurgical repair of perforation of the coronal third of the root or the floor of the pulp chamber is possible if good accessibility is obtained from the pulp chamber but we cannot go for non-surgical repair when the defect is acting as a bottomless pit because the repair material will purge into the periodontal space.¹⁷

Super EBA, GIC, Composite, and MTA are used as the most common root-end filling materials. MTA has been used as root-end filling material in this case because of its good sealing ability and superior marginal adaptability as compared to other materials and also its physical and chemical properties are not altered by any contaminants. MTA promotes new cementum deposition and stimulates osteoblastic adherence to the retro-filled surface. When zinc oxide and eugenol are compared to super EBA and cavity as an apical sealer, super EBA and cavity showed a mild inflammatory response, reported by Pitt Ford in 1995. No significant difference was found between amalgam, composite, MTA, and super EBA as retrograde sealing materials, according to Adamo in 1999. Data that has been published following the procedure reported that MTA-Angelus shows better marginal adaptation than super EBA and vintremer.^{3,18}

Root resorption, ankylosis, and short-term retention are the most common cause of failure of the reimplanted tooth. Root resorption is related to the demise of the periodontal ligament and cementum. To reduce the demolition of the periodontal membrane during replantation, the tooth was wrapped in sterile wet gauze and only calculus, as well as the granulosomatous tissue on the root surface, were debrided. Grossman¹⁹ affirmed that the walls of the socket must not be curetted, because the healing and repair of the ligaments may be aided by the left out PDL attached to the socket wall. If all these working conditions are favorable, such as PDL has not been damaged during the time of extraction, minimal extra-oral time, and periodontal ligament have been kept hydrated, the prognosis of the tooth may be more expected.

The most important factor that should be scrutinized in the whole replantation procedure is the amount of extra-oral time after extraction.² Extraoral time can be decreased by performing a routine endodontic treatment before the tooth extraction, if possible. In this case, performing RCT before extraction was not possible due to engagement of the file into the perforation site during cleaning and shaping and it was not possible to bypass it too because of calcification in apical one-third. Kratchman reported that extraoral time should not exceed 10 minutes. According to Cho et al. chances of ankylosis increases up to 7-folds if extra-oral time is greater than 15 minutes, reducing the success rate of a replanted tooth.⁴ Extra oral time in the present case was less than 17 minutes.

Ankylosis of a replanted tooth may be associated with the vanishing of peri cementum, type of splint used for immobilization, and duration of splinting. The rigid splint was not required in this case, because adjacent teeth were present, and replanted tooth was firm in the socket, so the non-rigid splint opted in this case.^{2,19} As per a recent literature review splint type and duration of splinting were not so remarkable with healing outcomes.²⁰ Rigid splint should be given in case of short roots or lack of interseptal bone. Other studies have revealed that suture splint seems to be more beneficial than rigid splints. Suture splinting provides physiological loading on the replanted teeth, which might facilitate improved circulation and periodontal healing. The success rate ranges from 50 to 95%. The critical criteria for success include normal function, no mobility, healthy periodontium, and radiographically no periapical pathology should be present.⁴

4. Conclusion

Even though the success rate of intentional replantation is low as compared to routine endodontic therapy or apical surgery, careful case selection, and suitable training will lead to a high success rate in fewer expenses than any other treatment options available. Inflammatory resorption or replacement resorption and ankylosis are the most common cause for the failure of this procedure, still, it is considered as a treatment alternative when other options are not feasible. Intentional replantation may be considered as a last resort for preserving the tooth, where RCT or apical surgery is impossible, so all clinicians must should be aware of this approach of treatment, its indication/contraindication, surgical procedure, and complications followed by treatment done

5. Conflict of Interest

The authors declare no relevant conflicts of interest.

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None.

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