



Research Article

IMMEDIATE ESTHETIC REHABILITATION OF FRACTURED MAXILLARY LATERAL INCISOR: A CASE REPORT

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ABSTRACT

Coronal fractures of permanent dentition are the common cause of dental injury that mostly affect maxillary anterior teeth. The immediate reattachment of original fractured tooth fragment is a good alternative option in the view of emergency treatment for maintaining esthetics and functions if the original tooth fragment is retained following fracture. With the advances in adhesive system as well as prefabricated esthetic post, the option for choosing reattachment leads to more predictable outcome for immediate esthetic rehabilitation of the patient. This paper presents a case report wherein reattachment was considered as treatment plan for fractured maxillary right lateral incisor. The six months follow up revealed good function and esthetics as well as no changes in radiographic features.

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INTRODUCTION

Crown fractures are the most common consequences of traumatic injuries that mainly occur in the anterior teeth, predominantly involving maxillary incisors followed by mandibular central incisors which are comparatively less frequently involved.^[1]

The anterior positioning and protrusion caused by the eruptive pattern makes the maxillary incisors more prone to trauma which accounts for about 37% of all traumatic injuries.^[2]

In young people aged 6–13 years traumatic injuries to teeth and their supporting tissues usually occurs. The damage may vary from enamel fracture to avulsion, with or without pulpal involvement or even bone fracture.^[3] Fracture line usually seen in 80% of traumatised incisors proceeds in an oblique direction from labial to lingual aspect.^[2] A wide range of treatment modalities are reported in literature. Some of them includes resin composite restorations, placement of definitive crown after orthodontic extrusion, pins or posts,

osteotomy or osteoplasty, fixed partial dentures, extraction of the residual root followed by immediate or delayed implant placement and reattachment of the fractured tooth fragment.^[4]

Reattachment of the dental fragment is one of the options for managing coronal tooth fractures when the tooth fragment is available, with no or minimal violation of the biological width.^[1]

Reattachment of fractured tooth fragment provides good and long lasting aesthetics because the tooth's original anatomic color, form, and surface texture are maintained. It is relatively a simple procedure which restores function, as well as renders a positive psychological response. Understanding the limitations of the treatment is of utmost importance for good prognosis as well as addressing the patients needs.^[1]

The purpose of this case report is to discuss various possible advantages of attaching the natural tooth in order to maintain esthetic integrity of the dentition and to describe a case that was successfully treated using reattachment as a treatment modality.

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Case report

A 23 year old male patient reported to the Department of Conservative Dentistry and Endodontics, after sustaining a complicated crown fracture to his maxillary right central and lateral incisor due to accidental fall on the ground. On recording the chief complaint, the patient revealed history of trauma being 12 days old. The patient's medical history was unremarkable. No mobility of the injured tooth was observed except for fractured coronal part of maxillary right lateral incisor. There was no apparent trauma to the soft tissues visualised in the extraoral and intraoral examination.

Intra oral examination revealed Ellis Class III fracture of maxillary right central (11) and lateral incisor (12). The lateral incisor exhibited extensive coronal fracture extending from supragingival margin on the labial side and slightly submarginal on the palatal side. The fractured fragment was incompletely separated and apparently mobile [Figure 1a and b]. Tooth 11 revealed coronal loss of tooth structure exhibiting frank exposure of pulp. Electric pulp testing was done with tooth 11 to evaluate the status of pulp, which exhibited delayed response.

A periapical radiograph revealed that the root formation was complete, with no significant extrusion [Figure 1c]. The patient expressed the desire to maintain the tooth and restore it. A detailed explanation about the treatment plan was given to the patient, which included root canal treatment and placement of intracanal fibre post, followed by reattachment of tooth 12 as well as root canal treatment followed by final restoration with composite resin with respect to tooth 11. He agreed for the same and written consent was obtained.

Local anesthesia (2% lignocaine with 1: 80,000 adrenaline) was administered and the segment was removed with minimal force and recovered and stored in normal saline to prevent discoloration and dehydration [Figure 2a-c]. Following a detailed examination, the adaptation of the fragment was checked.

Single visit endodontic therapy was performed for the fractured lateral incisor. An access cavity was prepared, working length determined with an electronic apex locator (J Morita Root ZX Mini) and confirmed with radiography. Biomechanical preparation was carried out with the help of ProTaper rotary file till F3 (DensplyMallifer Switzerland).

Copious irrigation of the root canal was intermittently done during instrumentation with 3% sodium hypochlorite (Prime Dent, India) and normal saline. The canal was dried with absorbent points (Dia Dent, Europe), and obturation (Dia Dent, Europe) was done by sectional method maintaining 5mm apical seal. After preparing the post space with Peeso Reamer upto size 2 (Densply Mallifer, Switzerland) conditioning of root canal space (Liquid of Type II GIC, GC corporation, Tokyo, Japan) was done and later a prefabricated glass fiber post (Meticept Dental, UK) was luted in the canal with bonding agent (3M ESPE) application and dual cure resin cement (Multi Link Ivoclar Vivadent). The tooth fragment was disinfected with 3% sodium hypochlorite solution (Prime Dent, India) and then rinsed properly with water. Then, the pulp chamber part of coronal fragment was throughly cleaned.

An enamel bevel was prepared around the remaining tooth structure as well as fractured margins of tooth fragment. An additional internal dentinal groove was also prepared within the dentine of the fractured fragment part and approximated with the coronal aspect of the post before proceeding to the final step of reattaching the coronal tooth fragment.

Acid etching of coronal as well as fractured tooth fragment was done with 37% phosphoric acid (3M ESPE Scotchbond Universal Etchant). Bonding agent (3M ESPE Scotchbond Universal Adhesive) was subsequently applied to the coronal and fractured tooth fragment followed by light cure for 20 s. Dual cure composite (Multilink Ivoclar Vivadent) was applied over the fiber post and around the tooth surface. The fragment was carefully seated on the remaining tooth and light cured [Figure 3a and b].

Root canal treatment was performed for tooth 11 followed by placement of composite (3M ESPE, Filtek Z350 XT) [Figure 3c]. High points were checked as well as occlusion. Postoperative instructions were given to the patient to avoid loading of anterior teeth. The patient was recalled for follow-up after 1 week. During 1 week follow-up the tooth 11 and 12 were in normal function and esthetics. So, composite buildup (3M ESPE Filtek Z350 XT) was carried out with 11. The patient was recalled for follow-up after 3 months and 6 months of treatment, both the tooth were normal in function, esthetics as well as no changes in radiographic features observed [Figure 4a and b].

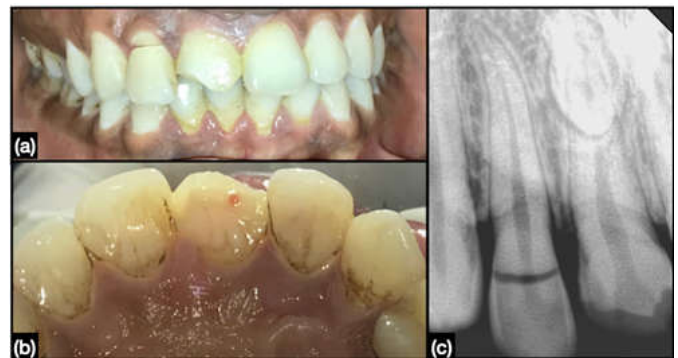


Figure 1 (a,b) Pre-operative photograph buccal and palatal view. (c) Pre-operative radiograph.

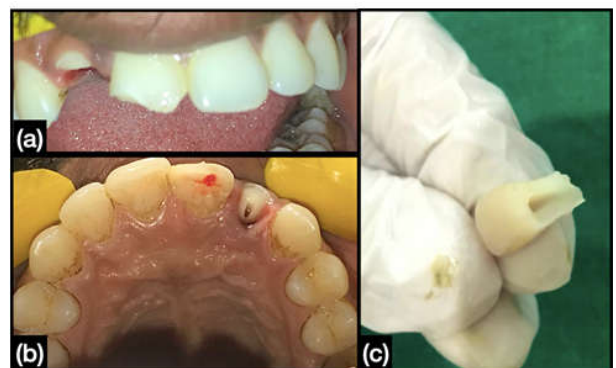


Figure 2 (a,b) Buccal and palatal view after removal of fragment. (c) Coronal fragment.

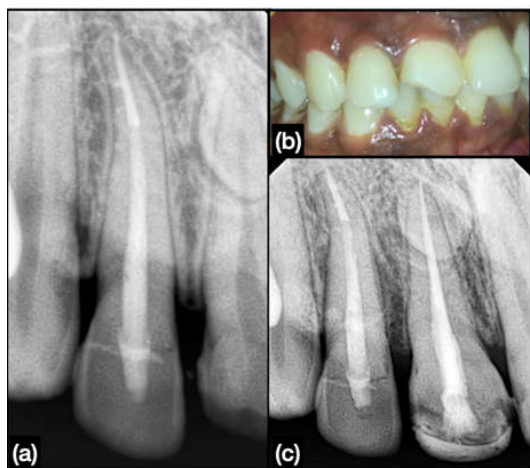


Figure 3 (a) Post operative radiograph of tooth 12 after complete root canal treatment followed by fibre post and reattachment procedure. (b) Post operative photograph after reattachment. (c) Post operative radiograph after complete root canal treatment with tooth 11.



Figure 4 (a,b) Follow up radiograph and photograph after 6 months.

DISCUSSION

For successful rehabilitation of complicated fractures of anterior teeth a comprehensive treatment plan is an essential prerequisite.^[4] Choosing the correct treatment depends on the age of patient.^[5]

Studies have shown that one out of every four person under the age of 18 will sustain a traumatic anterior crown fracture. Reattachment should be the first choice of treatment whenever the fracture fragment is available.^[2]

Now it is possible to achieve excellent results with reattachment of the fractured tooth fragments with advancement in dental bonding technology provided that the biologic factors, materials, and techniques are logically assessed and managed.^[1]

The use of natural tooth substance clearly eliminates the problems of differential wear of restorative material, unmatched shades, and difficulty of contour and texture reproduction associated with other techniques. Evaluation of the periodontal, endodontic, coronal and occlusal status after that treatment plan can be made.^[6]

Various factors such as time elapsed after trauma, fracture size, the location of the fractured part, the status of root formation, pulpal involvement, periodontal condition, invasion of biological width, type of post and the material used for reattachment depends on the success of reattachment.^[7] Dehydration of the fragment may result in decrease in the fracture strength of the tooth and change in dental color. Proper rehydration of the fragment has the capability of

restoring both color and strength.^[5] Here in this case report fractured tooth fragment was stored in normal saline until reattachment to prevent discoloration and dehydration.

Reattached teeth survival is the major concern in view of the success of the treatment. Reis et al. studied the effect of the reattachment technique on the fracture resistance. They found that simple reattachment without fragment preparation reestablished 37.1% of the intact tooth's fracture resistance, whereas buccal chamfer, internal groove and superficial over contouring placement restored 60.6%, 90.5% and 97.2% of fracture resistance respectively.^[8,9] Several studies have concluded that "over contour" and "internal dentinal groove" technique gives better results in comparison with other techniques.^[10]

In this case, to increase the fracture resistance of restored tooth, internal groove placement and circumferential beveling of enamel margins of the tooth as well as fragment was done. To improve retention, to distribute stress and to improve resistance to root fracture a post and core is needed. The post minimizes the stresses on the remaining tooth structure that is replaced and interlocks the two fragments.^[11]

Fiber-reinforced composite resin post have several advantages. They are more esthetic, exhibit monoblok effect, bonded to tooth structure and also modulus of elasticity similar to that of dentin.^[1] They have demonstrated negligible root fracture and require minimal preparation because it uses the surface irregularities and undercuts to increase the surface area for bonding. Thus, the possibility of tooth fracture is reduced.^[12] Monoblock effect was created with the use of a fibre post luted with resin cements which there by increases the retention of the segment.^[13]

The light cured luting resin cement in apical areas may result in incomplete polymerization. Hence, dual curing systems manifest to be the most advisable material as they would allow polymerization even in those areas which would otherwise have left uncured due to the failure of light to reach in deeper areas.^[14]

Debonding is the most common complication of post and core system. To achieve success in operative dentistry the clinician must consider that a clean and dry working field and proper use of bonding materials and bonding protocols are necessary. Trauma or parafunctional habits leads to reattachment failure, therefore patients education regarding treatment and fabrication of a mouth guard enhances clinical success.^[2]

Tooth 11 showed delayed response to electric pulp testing. This might be attributed to the greater amount impact injury, as well as the tooth being exposed to the oral environment for a period of 12 days which could have resulted in the ingress of bacteria and saliva. Hence, decision was taken to perform root canal treatment with tooth 11.

Follow-up is of critical importance with all traumatic injuries. Tooth mobility, esthetics and periodontal status should be confirmed both clinically and radio graphically with follow up visits.

CONCLUSION

A specialized interdisciplinary treatment is required for complex coronal fractures and it must be carefully assessed by the dental clinician to achieve the best possible outcome. The reattachment of fractured tooth fragment is one of the best treatment of choice because it is simple, fast, affordable, and esthetically predictable technique. It is possible only when the fragment is available and can be improved with different adhesive techniques and restorative materials. The main concern is to educate the population, to preserve the fractured fragment and achieve immediate dental care. To predict the durability of the tooth-adhesive-fragment complex, a long term follow up is necessary.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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