Journal of Nepal Dental Association (2010), Vol. 11, No. 1, Jan.-Jun., 49-55

Case Note

Conservative management of complicated tooth fracture

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Abstract

Complicated crown fracture of maxillary incisor ranges from 2%-13%.Trauma cases are always challenging as these situation demands prompt clinical action and proper management of the case in hand. Fractured segment reattachment has been practiced since long and has shown considerable amount of success and is till date the most conservative treatment modality.Clinician should be updated with the current method and technique for management of complicated tooth fracture.

Key words: Complicated crown fracture, Fracture segment reattachment, Dental trauma, Treatment options

Introduction

The incidence of complicated crown fractures ranges from 2% to 13% of all dental injuries and the most commonly involved tooth is the maxillary central incisor[1]. Dental injuries do cause certain amount of disfigurement in the appearance of an individual. There are always two components in any traumatic injury namely; physical and psychological; both will hamper individual's daily activities. So these scenarios require quick decision and prompt clinical action to get the individual back to their daily activities.

Although composite resin restoration is indicated in the management of fractured anterior teeth, reattachment is an excellent option when the fragment is available[2-7]. Clinical reports have indicated the application of additional preparations, on both the fractured tooth and the fragment, before and after bonding, with the aim of improving bond strength. Researchers have pointed out that when reattaching without making any extra preparation for the broken incisal part and for the remaining tooth in the mouth, lower values than an intact tooth fracture strength were obtained[8,9]. Such preparation methods include internal enamel groove, internal dentinal groove, over contour technique and external enamel groove in the shape of a V on the tooth when reattaching the broken incisal part.

Apart from above mentioned procedure in cases of extensive complicated crown fracture intracanal anchorage has been used prior to reattachment[10,11]. Although long term study in this type of procedure is lacking and predictability is still to be determined. This alternative mode of treatment will provide economic option of retaining patients own tooth.

The case reports presented here deals with management of complicated crown fracture by reattachment of the fractured segments. First one by simple preparation on fractured segment and the remaining tooth structure and the other by intracanal anchorage. In these cases, the patients were emotionally distressed and positive emotional effects resulted from fragment reattachment and increased the patient's self-esteem to face the world once again.

Case report I

Twenty three years old female patient was referred to Kantipur Dental College Teaching Hospital and Research Centre with broken maxillary right central incisor(11) due to trauma 10 hours back (Fig 1). She had no soft tissue injury. On examination it was found that there was complicated crown fracture or Ellis class III in relation to 11. She had been prescribed analgesics by a general dental practitioner for pain control. The patient had brought the fractured portion of the tooth (Fig 2) wrapped in her handkerchief. She was very worried about the appearance and wanted some immediate improvement of her appearance.

Since the fractured portion had proper adaptation to the remaining fractured tooth part, decision was made to

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carry out single visit root canal treatment followed by crown reattachment.

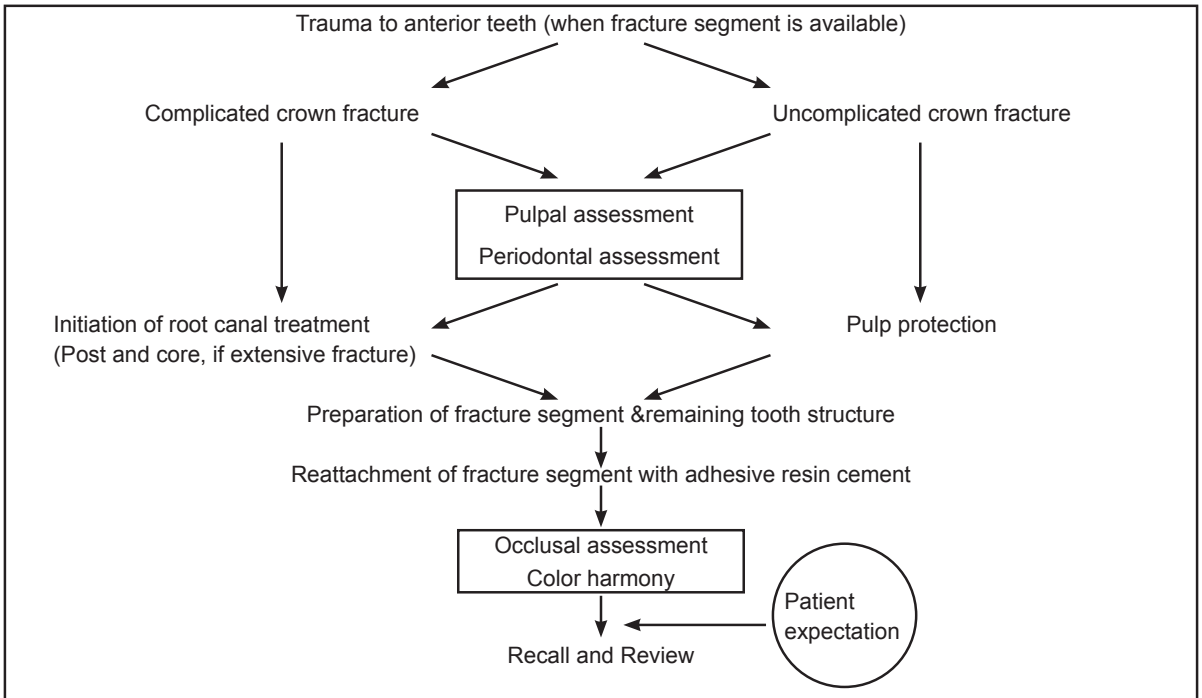
Local anaesthesia was administered and access was gained through the fractured area. Single visit root canal treatment was done with the use of engine driven ProTaper files with copious irrigation of sodium hypochlorite and normal saline. Obturation was done by lateral condensation technique with Gutta percha and AH plus sealer.

Grooves were made on the fractured segment and on the remaining tooth structure (Fig 3 & 4). Both were acid etched and after proper isolation, bonding agent (Prime and bond, Dentsply, USA) was applied, cured and segments were reattached with dual cure resin cement (Smartcem II, Dentsply, USA). All margins were light cured for 40 seconds and finishing and polishing was done with composite finishing kit (Shofu Co.,Kyoto, Japan) (Fig 5 &6). Follow up visit after 12 months showed that the crown was intact and patient was satisfied with the esthetics (Fig 7).

Case report II

Seventeen years old male patient attended the Endodontics Department of Kantipur Dental College, Teaching Hospital and Research Centre. History revealed that the patient had a fall one week back. Cervical crown fracture was observed on maxillary right central incisor(Fig 8). Clinically, the fracture line extended palatally and it was a complete fracture and the fractured portion was held by gingiva. Periapical radiograph showed intact periodontal ligament space,complete root formation and intact root segment. The patient was worried about his appearance and wanted immediate management of the existing condition. After clinical and radiological examination treatment plan was made; to perform a single visit root canal treatment followed by reattachment of the fractured portion with intracanal anchorage using prefabricated fiber post. Patient was explained regarding the details of the procedure and a written consent was obtained.

Local anaesthesia was administered and the fractured portion was removed (Fig 9 &10). Single visit root canal treatment was performed and obturated. Post space was prepared and 0.8 mm fiber post (Easy Post,Dentsply Maillefer, France) was luted in the root canal leaving 2mm of its coronal portion outside the chamber (Fig 11). The fractured portion was cleaned to remove the pulpal remnants. Box shaped preparation was done on the fragment to receive the post head (Fig 12) and fractured segment was adapted prior to bonding to see the proper fit (Fig 13). The remaining tooth structure, the fiber post and fractured portion were etched (Fig 14) and two coats of bonding agent (Prime and bond, Dentsply, USA) were applied. The portion was reattached with dual cure composite resin cement (Smartcem II, Dentsply, USA). All margins were light cured for 40 seconds and finishing and polishing was done with composite polishing kit (Shofu Co., Kyoto, Japan) (Fig 15). At 12 months follow-up, the tooth was symptom-free and there was no discoloration of fractured tooth portion and the patient was content with the esthetic outcome (Fig 16).



Overview: Management of the complicated tooth fracture.

Case I photos

Fig 1: Preoperative view

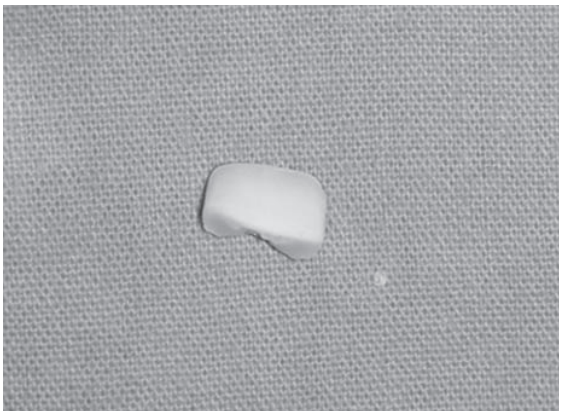


Fig 2: Fractured tooth segment

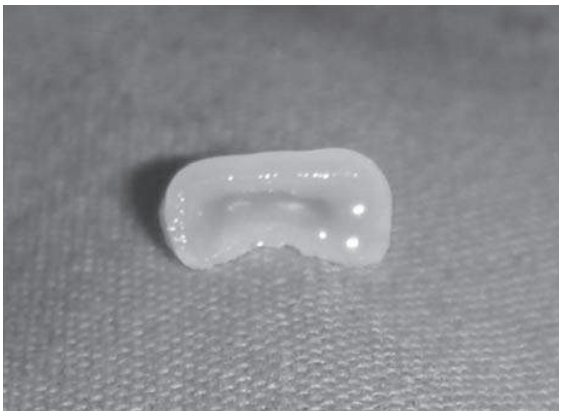


Fig 3: Prepared fractured segment

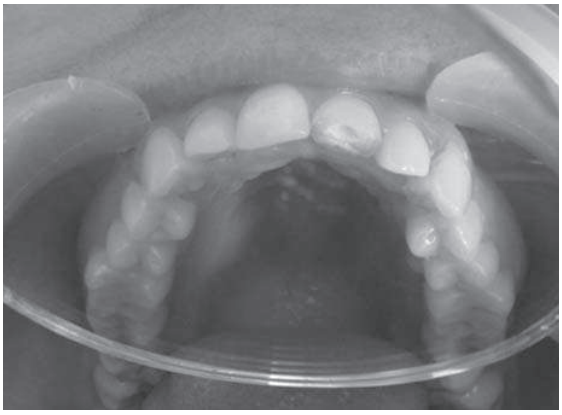


Fig 4: Prepared remaining tooth structure

Fig 5: Fractured segment reattached

Fig 6: Palatal view showing proper adaptation

Fig 7: 12 months follow up

Case II photos

Fig 8: Preoperative view

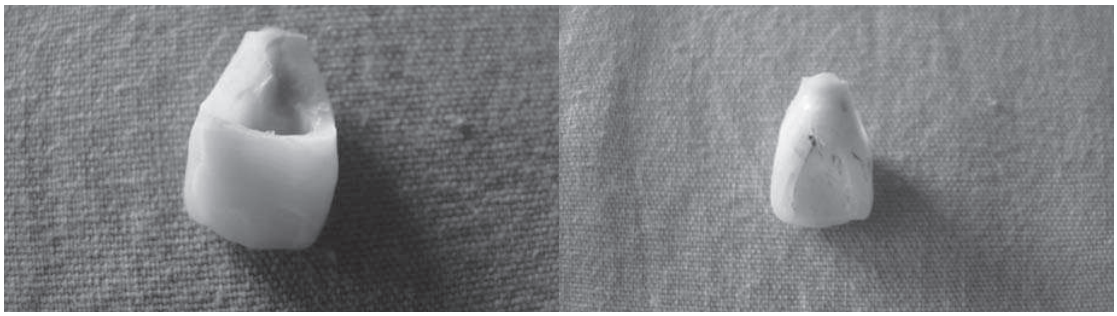


Fig 9: Facial and palatal view of fractured segment

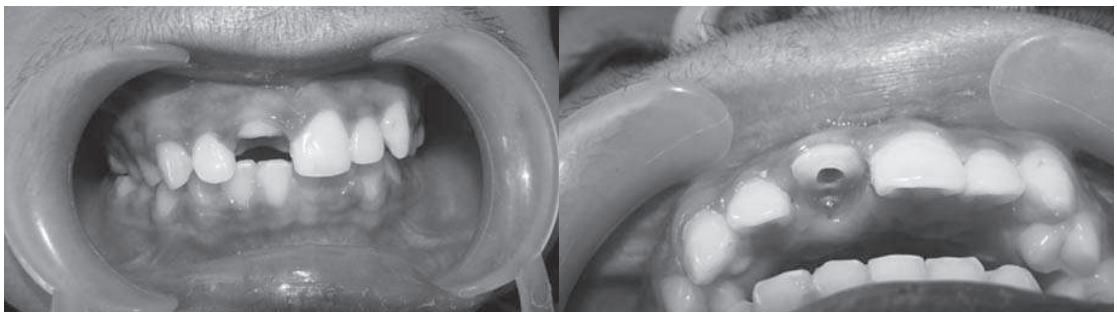


Fig 10: Facial and palatal view after fractured segment removal

Fig 11: Fiber post placement

Fig 12: Fractured portion preparation

Fig 13: Fractured portion try in

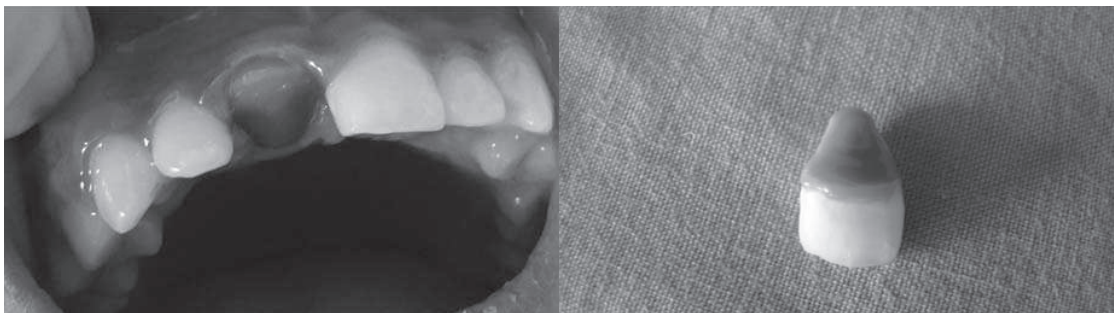


Fig 14: Etching procedure

Fig 15: Fractured portion reattached

Fig 16: Twelve months recall

Discussion

Trauma to maxillary anterior teeth is of most common occurrence[1]. Various treatment modalities have been described for the management of the fractured teeth[10,12,13]. They include: Fragment removal followed by restoration, fragment reattachment, orthodontic extrusion with/ without gingivoplasty, forced surgical extrusion, vital root submergence and extraction followed by implants.

Both the cases presented in this article were managed by simple reattachment procedure but one required intracanal anchorage. There were no concomitant alveolar bone injury and most importantly the fractured portion were retrieved intact in both the cases. So whenever there is availability of the fractured incisal segment reattachment is the most conservative treatment of choice. There are various advantages described by various authors for reattachment procedures:

- Most rapid and conservative management
- Color match to the remaining tooth structure
- Wears off in similar proportion to adjacent/opposed teeth without trauma
- Economical, requires single visit
- Maintenance of original tooth contours and preservation of incisal translucency
- Positive emotional and social response from the patient

There are also perceived disadvantages:

- Color changes of the bonded fragment
- Less esthetic result if the tooth fragment is dehydrated
- Unknown longevity
- Need of continuous monitoring

After the treatment, periodontal tissues were evaluated radiographically with regard to pathologic resorption but in both cases it was absent when followed up for a period of one year. The fragment was rehydrated placing in distilled water so that colour discrepancy between the dehydrated factured portion and the remaining tooth structure could be minimised and there was no change in color of the fragment when observed on recall visits. Several case reports show that even subgingival tooth fractures can be restored successfully[14-17]. Use of a fibre post luted with resin cements increases the retention of the segment and provides a monoblock effect[18]. Fractured portions were reattached with a dual cure resin cement, Smartcem II, which has been used widely as a luting agent. Fragment detachment and change of colour was not seen in both the cases till the follow up period of one year and both the patients were satisfied with the esthetic outcome of the treatment.

Conclusion

Immediate esthetic management of traumatic injury demands proper and quick planning which should be based on sound knowledge of the techniques available, their indications and along with risk benefit ratio patients expectation should also be kept in mind during the treatment planning. Whenever fracture segment is available the most conservative treatment is the fracture reattachment procedure which provides quick esthetic rehabilitation to the patient.

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