FRACTURE REATTACHMENT: FUNCTIONAL AND AESTHETIC ALTERNATIVE: CASE REPORT

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Fracture of anterior teeth is relatively common. This article presents a case report of a 29 year old female with fractured maxillary central and lateral incisor. The fracture involved 2/3rd of the crown, compromising pulp and extended subgingivally on the palatal aspect, invading the biologic width. The procedure used was reattachment of the fractured fragment with bonding system and composite resin. Reattachment of the fractured fragment provides long lasting esthetic, improved function, positive psychological response and faster and less complicated procedure.

Key Words: Traumatic injury, fragment reattachment, biologic width, aesthetic, endodontic treatment, fiber post, dual Cure composite resin.

INTRODUCTION

A trauma with accompanying fracture of anterior teeth is a tragic experience for the patient who requires immediate attention, not only because of damage to the dentition but also because of psychological effect of the trauma. A number of techniques have been developed to restore the fractured crown. Early techniques include stainless steel crowns, basket crowns, orthodontic bands, pin retained resin (Tulunoglu et al 1997), porcelain bonded crown and composite resin with acid etch adhesive technique (Andreasan et al 1991) and jacket crown.[1] Tennery (1988) was the first to report the re-attachment of a fractured fragment using acid-etch technique.[2] Subsequently, Starkey (1979) and Simonsen (1982) have reported success with similar cases.[3,4] The introduction of composite in combination with the use of acid-etch technique to bond composite to enamel, made restoration possible for the fractured incisor, with minimal preparation.[5,6] However, composite resin has the disadvantage of poor abrasion resistance in comparison to enamel;[7] water absorption and staining of the composite.

Tooth fragment reattachment techniques can be applied, with good functional and esthetic results, to both relatively simple situations and more complex ones, in which pulp or the biologic width is involved.[8] This is true both for anterior and posterior tooth.

Technical, biological and esthetic problems results when the fracture extends subgingivally and impinges on the biologic width; access to the most cervical margin of the fracture and adequate isolation of the operating field are difficult to achieve.

New alternatives have appeared that allow for adequate union at critical enamel free cervical area. Marginal leakages and its possible consequences are thus minimized. In this sense, the possibility of acid etching the dentin, whether vital or non-vital, followed by application of an adhesive which contains a hydrophilic component, seemingly increases the chances of such cases.

The present article describes clinical case in which the fracture extends sub-gingivally. Fracture fragment reattachment, following restoration of the biologic width was performed.

CASE REPORT

The 29 year old female patient reported to the Department of Conservative Dentistry and Endodontics at Sharad Pawar Dental College and Hospital, Sawangi (Meghe), Wardha following trauma to maxillary left central and lateral incisor. A day before her visit she had fallen from scooter, resulting in fracture of maxillary left central and later incisors. The

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teeth fragments were mobile, but still in place. [Fig.1(A)]

Clinical examination revealed the presence horizontal fracture involving enamel, dentin and pulp (Ellis class III). The fracture was oblique extending from coronal aspect labially to palatal aspect subgingivally [Fig.1(B)]. Pulpal exposure as revealed by clinical and radiographic examination confirmed the necessity of endodontic treatment. [Fig.1(C)]

The absence of traumatic occlusion was confirmed. Root integrity and maturation status was assessed with pre-operative periapical radiographs. The treatment plan was decided to remove the fractured fragment, perform endodontic treatment, prepare post space and cementation of post followed by reattachment of fractured fragment.

The patient informed consent was taken; balancing the advantage against limitations and associated risk she agreed with the treatment to save the tooth by the fragment reattachment technique.

Under aseptic conditions following local anesthesia, the fracture fragments were removed [Fig.1(D)] and kept in 5% sodium hypochlorite for 1 minute to dissolve the remaining pulp tissue, which then were placed in normal saline during whole period prior to restoration.

The incisal fragment exhibited no caries, negligible loss of tooth structure, and adapted well to the remaining tooth structure when 'tried-in'.

The endodontic treatment was performed. Post space was prepared in both radicular portions of the tooth as well as in fractured fragments by pesso-reamer. The muco-periosteal flap was raised to expose the line of fracture. Bleeding was controlled [Fig.2(A)]. Appropriate size Fiber post (DT, fiber post) was cemented using dual cure composite resin cement. (Calibra, Dentsply, Mallifer) [Fig.2(B)]

The fractured fragment was etched with 37% phosphoric acid for 15 sec. and thoroughly rinsed with air-water spray. Excess water was removed with a brief jet of air, so that the surface was left visibly wet. A drop of primer A and Primer B of Calibra dual cure resin cement (Dentsply, Mallifer) were mixed together and applied to the wet dentin and enamel of the fragment. The fractured teeth were treated in similar fashion. The fragments were placed on the respective tooth and tightly apposed one at a time.

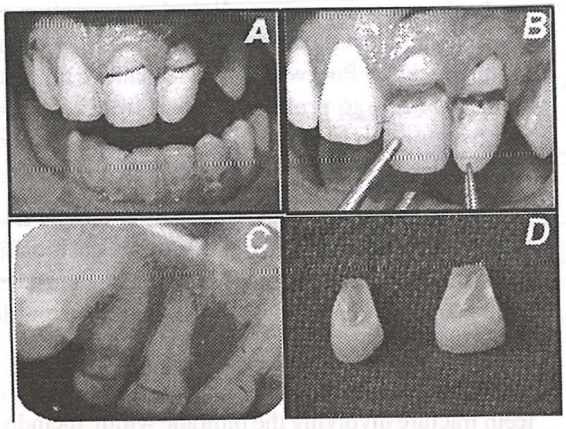


Fig. 1 Horizontal fracture of central and lateral incisor (A), oblique fracture extending from coronal aspect labially to palatal aspect subgingivally (B), radiographic picture showing horizontal fracture line passing through pulp chamber (C), fracture fragment after removal (D).

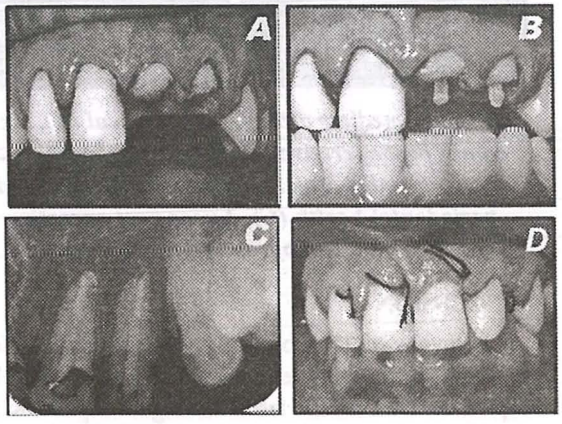


Fig. 2 Muco-periosteal flap raised (A), fiber post cemented (B), radiograph showing fiber post cemented with attachment of fracture fragment (C), muco-periosteal flap approximated and sutured (D).

The fragment site was light polymerized on the facial and palatal surface for 40 sec. each. The muco-periosteal flap was approximated and sutured. [Fig.2(D)]

During the post surgical phase, the patient was instructed to rinse with a 0.12% chlorhexidine gluconate solution, twice daily for 7 days. One week later suture were removed. [fig.3(A)] Finishing and polishing of the restoration were carried out and the occlusion was checked.

Clinical and radiographic examination after 3 months, 6 months and 1 year revealed a stable reattachment of the fragment, good esthetics and periodontal health.[fig. 3 (B,C,D)]

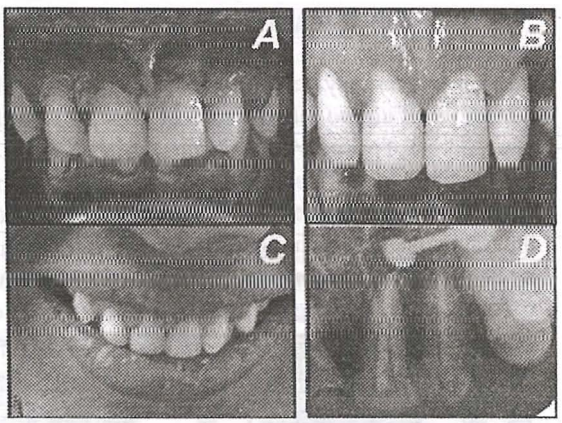


Fig. 3 immediate after suture removal (A), six month post operative (B), 1 year post operative showing stable attachment, good esthetics and periodontal health (C), 1 year post operative radiograph (D).

DISCUSSION

A review of 25 published case reports indicates that 85% of traumatized incisors fracture in an oblique fashion from the labial to lingual aspects with the fracture line proceeding in an apical direction. This tendency has been confirmed in an in vitro investigation by **Stokes.**[9] His study demonstrated that the presence of this unfavorable fracture pattern, once restored, exhibits a low resistance to labially applied forces which mimic trauma force vectors, but may exhibit higher resistance to horizontal traction forces which occur with incising or tearing food.

Functional, aesthetic, and biologic restoration of the fractured incisor often presents a daunting clinical challenge. Conventional composite resin restoration may result in less than ideal contours, color match, and incisal translucency. Prosthodontic restoration treatment outcome is one of uncertain longevity. When an intact fragment is available, fragment reattachment may offer a most functional and aesthetic treatment option.

Reattachment of fragment may offer following advantages:

1. Better aesthetics, as shade match and translucency will be perfect.
2. Incisal edge will wear at a rate similar to that of the adjacent teeth.
3. Replacement of fractured portion may be less time consuming than needed for completion of a provisional restoration.
4. A positive emotional and social response from the patient for preservation of natural tooth structure.

In the present case as clinical examination revealed pulpal involvement confirming endodontic treatment. Fiber Post was placed to achieve retention form and serve to protect the bond from rotational and twisting forces which may reduce the potential for success.

Reattachment of teeth fragments when the fracture extends subgingivally and invades the biological width requires creation of access to the most cervical margin of the fracture without esthetical mutilation of the patient.

There are several options for the treatment of teeth fracture involving the biologic width, including tooth extrusion, crown lengthening followed by fragment reattachment or reconstruction. Several conditions must be taken into consideration to determine the ideal option, such as location and extend of the fracture, the pulpal condition, the degree of tooth eruption and patients esthetic demand.

Tooth extrusion is an alternative for the treatment of sub-gingival fractures, although it can present some problems. First, it can impair good esthetic resolution because the cervical diameter of the extruded tooth is smaller then that of the adjacent tooth. Second the time required to achieve the final results is longer, considering the period for extrusion and stabilization. In the present case, as fractured teeth were central and lateral incisor which meant that the extrusion of this element would affect esthetics. Therefore, muco-periosteal flap was raised to expose the fracture line.

Van Dijiken[10] related that resin composite has favorable sub-gingival reaction. **Dragoo**[11] showed the formation of junctional epithelium and connective tissue adjacent to sub-gingival restorative materials.

In the present case, the favorable clinical outcome may have been a result of good adaptation of the fragment, associated with the sealing effect of the restorative material used and the proper fit and contour of the margin.

CONCLUSION

As with conventional restoration, fractured fragment reattachment success hinges on proper case selection and strict adherence to sound principles of periodontal - endodontic therapies, the techniques and materials for modern adhesive dentistry. Thus, incisal fragment reattachment procedure offers a conservative, cost-effective, and aesthetic restorative option when patients present with intact incisal edge segments.

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