

FIBER POST USED FOR REATTACHMENT OF FRACTURED TOOTH FRAGMENT: A CASE REPORT

ABSTRACT

Reattachment of the fractured anterior tooth is a highly conservative and aesthetic treatment that has gained popularity in the recent past. Presented here is one such case in which a combination of external enamel bevel and internal dentinal groove has been used to enhance the bonding between the fractured fragment and the remaining tooth. The treatment was found to be successful both functionally and aesthetically at the 12-month follow-up.

KEYWORDS: Anterior tooth trauma, bonding, reattachment, fiber post.

INTRODUCTION

Coronal fractures of the anterior teeth are a common form of dental trauma that mainly affects children and adolescents^{1, 2}. Complicated crown fractures involving the enamel, dentin, and pulp constitute a major share of all dental injuries and are most common in maxillary central incisors^{3, 4}. A fractured anterior tooth requires immediate clinical attention and, if untreated, can cause damage to dentition and even have a psychological impact on the patient³. Complicated crown fracture management is a multifactorial process influenced by the extent and pattern of fracture (biological width violation, endodontic involvement, alveolar bone fracture), restorability of fractured tooth (associated root fracture), secondary injuries (soft tissue status), presence/absence of fractured tooth fragment and its condition for use (fit between fragment and the remaining tooth structure), occlusion, esthetics, finances, and prognosis⁵.

Coronal fractures must be approached in a systematic way to achieve a successful restoration. One of the options for managing coronal tooth fractures, especially

when there is no or minimal violation of the biological width, is the reattachment of the dental fragment when it is available⁶.

CASE REPORT

A 27-year-old male injured in a road traffic accident (RTA) was referred to the Department of Conservative Dentistry and Endodontics. Clinical and radiographic examination revealed a complicated crown fracture on 11. The fractured segment. Ellis class II fracture of 21 was also noted but the fractured segment was missing (Figure1(a)). Periapical radiographs revealed an intact periodontal ligament space, complete root formation, and no root fracture in relation to both teeth. Medical history was noncontributory. It was planned to perform single visit root canal treatment (RCT) on 11 followed by reattachment with fiber post reinforcement. 21 was also planned for composite restoration.

Fig 1(a-g): Figures showing the fracture and different stages of treatment



Figure1(a)



Figure1(b)



Figure1(c)

Figure1(d)

Figure1(e)

Figure1(f)

Figure1(g)

Local anesthesia was administered (1.0 cc of lidocaine 2% with 1: 80,000 epinephrine) and the fractured segment in relation to 11 was atraumatically removed. It was then cleaned with 2% chlorhexidine solution and stored in isotonic saline solution. pulp extirpation was done. the entrance of the root canal was sealed with a caviti G plug. The pulp chamber, dentin and enamel were etched with a 37% phosphoric acid gel, rinsed, and coated with an ethanol-based adhesive system (Adper Single Bond Plus, 3M ESPE) and the adhesive was not light cured at this point.

The coronal tooth fragment was secured by a “pick-and-stick” device in order to facilitate handling and the fractured surface of the fragment was treated with 37% phosphoric acid gel for 30 seconds followed by delicate rinsing. The adhesive system was then applied to the etched surface. Composite resin (Venus, Heraeus Kulzer, Dormagen, Germany) was applied to both fragment and tooth surfaces. The fractured segment was then accurately placed on the tooth, paying special attention to the fit between the segments. When the original position had been re-established, excess resin was removed and the area was light-cured for 40 seconds on each surface, making sure that no displacement of the fragment occurred before adhesive/resin polymerization was complete. The margins were properly finished with diamond burs and polished with a series of Sof-Lex disks (3M ESPE) and diamond polishing paste.

RCT was performed on 11(Figure 1(d)) shows the selection of master cone and RCT was completed post space was prepared using GG drills and Peeso reamers (Figure(e)). Esthetic post was selected (Figure(f)). The prepared post space was etched for 15 seconds using 37% phosphoric acid. It was then rinsed thoroughly with water and excess water was removed with a cotton pellet. Next the adhesive (Prime & Bond NT, Nanotechnology Dental adhesive, Dentsply, St. Paul, MN, USA) was applied on the etched surface as well as the post. The adhesive was air thinned and light-cured for 10 seconds. The post was then luted with resin cement (Multilink, Ivoclar, Vivadent) with 2mm of its coronal portion extending into the chamber. The composite restoration for 21 was performed. The patient was kept on

periodic review and it was observed that both endodontic and restorative treatments remained clinically acceptable through each visit. The clinical and radiographic pictures after 1 year revealed favorable healing (Figures 1(g) and 1(b)).

DISCUSSION

The treatment performed and presented in this clinical case report is one of the many possible options that could have been used to rehabilitate this patient. The other treatment options may have included the endodontic therapy followed by restoration of the tooth with composite resin or with a full coverage crown. Selection of the treatment plan should be made considering the advantages and disadvantages of each technique available and should be in conjunction with the desires and limitations of the patient⁷.

Restoration with composite resin with the help of the acid etch technique is considered to be a highly aesthetic treatment for restoring fractured anterior teeth. Although composite resins do not have hydroxyapatite crystals, dentin tubules or enamel rods, these newer formulations possess secondary optical properties such as translucency, opacity, opalescence, iridescence, fluorescence and surface gloss. There is, however, no synthetic restorative material that can replicate the aesthetic characterization or color stability of the natural tooth structure⁸.

Moreover, composite resin will be abraded more quickly than enamel by the opposing dentition⁹. In contrast to this, when the fractured tooth fragment is reattached, the rate of wear and abrasiveness is the same as that for the intact tooth. In addition, the treatment procedure is less time-consuming; thus, cutting the cost of the treatment¹⁰.

Reattachment of the original tooth fragment also gives an emotionally and socially positive response due to the protection of the natural tooth structure. The patient and parents are at least satisfied of the original fragment being used in the restoration of their fractured tooth¹¹.

Various authors have recommended extra preparation of the fractured fragment and the remaining tooth structure to enhance the bonding of the fractured fragment to the remaining tooth^{12, 10, 13}. They 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 intact tooth fracture strength were obtained. Therefore, they stated the necessity of the application of an extra preparation on the tooth when reattaching the broken incisal part. In the case presented here, a combination of external enamel groove (bevel) in the shape of a V at the fracture interface and an internal dentinal groove has been used to enhance the bonding of the fragment with the remaining tooth. The patient was followed-up for 18 months and the results were found to be satisfactory, both aesthetically and functionally. In a similar manner, Bruke¹⁴ had used a combination of an internal dentin groove and the circumferential beveling of enamel margins and found the result to be successful. Other additional preparations that have been used by different clinicians to improve adhesion between the fractured and the remaining segment include placing a chamfer at the fracture line after bonding^{11, 15}, using a V-shaped enamel notch¹⁶ and placing an internal groove^{9, 17} or a superficial over contour over the fracture line¹⁸.

Andreasen et al. suggested fabrication of a mouth guard and patient education about the precautions and treatment limitations of this procedure. In young patients and adolescents, where a prosthetic rehabilitation or an implant is indicated but is limited by their age, reattachment may be carried out as a provisional restoration or treatment. In those cases, if the patient could benefit from the restoration for some years before receiving a more complex — and expensive — prosthetic solution, our objective will have been achieved⁷.

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