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10-year Follow-up of Natural Crown Bonding After Tooth Fracture

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Clinical Relevance

Fracture of anterior teeth by trauma has become frequent in the permanent dentition, and bonding of the tooth fragment seems to be an excellent and reliable treatment. It is a quick and simple procedure that reduces concerns about tooth color and the longevity of composite restorations.

SUMMARY

The aim of this article is to discuss relevant considerations about crown bonding and describe a clinical case in which a tooth fragment and direct composite resin were used to successfully restore a fractured anterior tooth. Clinical examinations showed good esthetics and periodontal health after 10 years of follow-up.

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INTRODUCTION

The purpose of this case report is to demonstrate the bonding of a lower canine tooth that fractured obliquely and to assess its longevity.

DESCRIPTION OF THE TECHNIQUE

A 30-year-old male patient had an accident while surfing and fractured the crown of the lower right canine tooth (27) obliquely, involving enamel, dentin, and pulp (Figures 1 and 2). After the trauma, the patient kept the tooth fragment in his mouth and then stored it in real saline solution. Endodontic treatment was conducted because of the prolonged exposure of the pulp. During all phases of endodontic treatment the fragment was kept in the solution in a closed flask. The patient had undergone direct restorative esthetic treatment to close the diastema in teeth 6, 7, 8, 9, 10, and 11 with composite resin approximately 5 years earlier. This fracture revealed the strength of that composite buildup, which suffered no alterations in the accident. Because the patient was young and long-term follow-up was possible, bonding of the tooth fragment was proposed. The patient agreed, and treatment was conducted.

The attachment of the fragment was checked for fit, and then the tooth was isolated with a 212 clamp and rubber dam (Figure 3); 2 mm of root canal filling

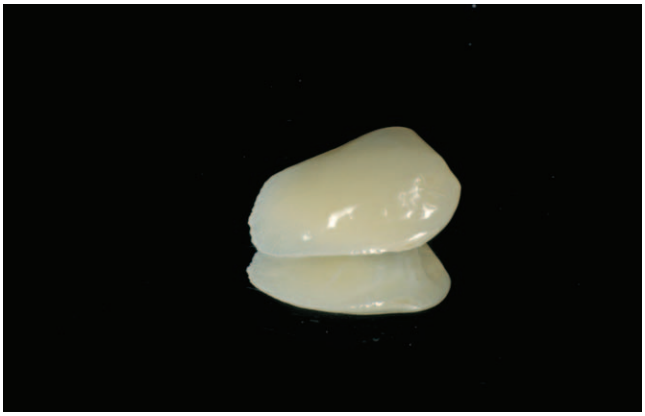

Figure 1. *Tooth fragment.*

was removed with a round number 4 carbide bur using a slow-speed handpiece. Phosphoric acid at 35% was applied for 15 seconds for etching on both the fragment and tooth and then removed by flushing with water for 30 seconds. Primer and adhesive were applied on the remaining tooth structure followed by application of a layer of Z100 composite resin. Subsequently, the fragment was placed and excess material removed (Figure 4).

The adhesive system and composite resin were cured at the same time so that the adhesive layer would not interfere with the fitting of the fragment. The composite resin Z100 was chosen because it had better flow than other resins available. The curing stage needed special attention to ensure that the light would reach the deeper portions of the tooth; thus, the light irradiation time (SDI, Victoria, Australia) was 60 seconds on each surface, the buccal and lingual. Excess material was removed using a number 12 scalpel blade. Finishing was done with diamond burs and abrasive discs in areas that allowed their use; occlusal adjustment was done with articulating paper (Figure 5).

Figure 2. *Oblique fracture.*

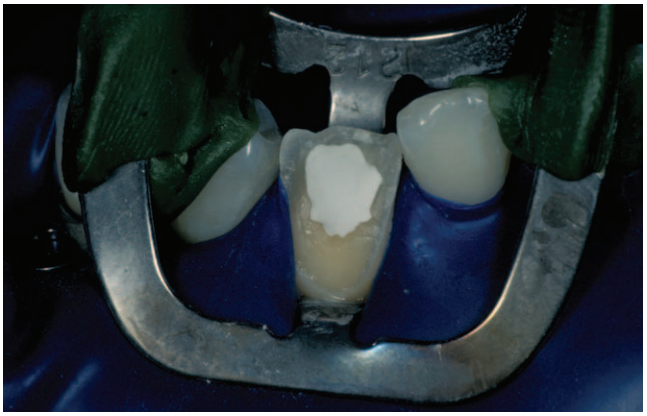

Figure 3. *Absolute isolation.*

Recall appointments were conducted annually for two years. At that point, the patient returned reporting the debonding of the fragment, which was then rebonded using dual-cure composite Biscore along with the adhesive system Scotchbond Multipurpose Plus with activator, in a self-cure chemical reaction. The patient remains scheduled for annual recall appointments (Figure 6).

POTENTIAL PROBLEMS

Dental trauma is quite frequent and is considered a public health problem.[1] It may cause esthetic, physical, and psychological problems.[2] The therapeutic challenge in cases of dental trauma is assessing the extent of the damage and any other implications that will define the treatment needed. Type and extent of the fracture, presence or absence of pulp exposure, root involvement, and condition of the dental fragment must be taken into account when determining the restorative treatment.[3]

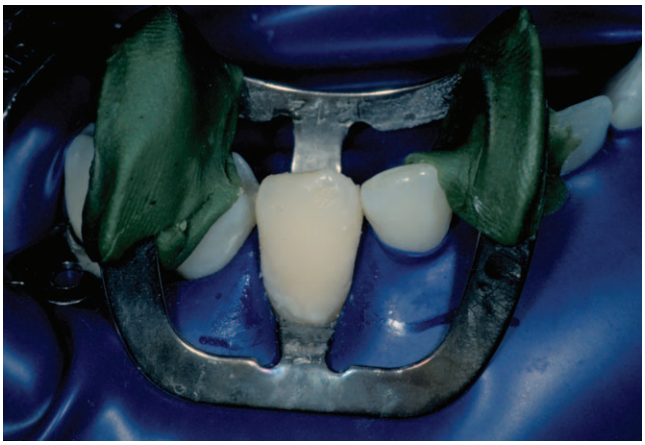

Figure 4. *Fragment reattached.*

Figure 5. *Complete dental bonding.*

Figure 6. *Restoration at the 10-year follow-up*.

Several authors have reported that morphologic buildup of traumatized teeth can be done with direct restorations of composite resin, ceramic crowns, or even tooth replacement in case of irreversible loss.[4–7] Bonding the fragment is the most conservative approach. By using the fragment, however, it is possible to restore function, tooth contour, surface texture, and a color compatible to the natural tooth.

The bonding option is possible because of adhesive dentistry resources and thus became the first choice of treatment for dental fractures.[8–11] In those cases where the fragment does not present a good fit, it is necessary to use adhesive restorative techniques to fill the gap.[12, 13] This clinical procedure is conservative, has a low cost, demands less clinical time, and is more convenient for the patient.

Although dental bonding has its advantages, there are some limitations that should be considered when choosing this procedure. The longevity of this technique is not predictable and the patient must be aware of its limitations. If the fragment is not kept in a moist environment, color change may occur compromising the esthetics and resulting in a visible line of fracture.[3, 14] Advantages and limitations of the procedure to be performed should be discussed with the patient when deciding which treatment will be carried out.

ADVANTAGES AND DISADVANTAGES

Bonding a tooth fragment is an excellent treatment option for treating traumatic injuries of the anterior teeth. It is a quick and simple procedure that eliminates concerns about tooth color and temporary restorations. The fragment maintains the color, translucency, shine, texture, and shape of the original tooth.[15, 16] Furthermore, the original fragment is more resistant to stains and abrasion than resin restorations and causes fewer periodontal problems.[16] The procedure has a lower cost compared with a ceramic crown. Because the technique is simple, the fracture is easily solved, keeping the patient's well-being in mind.

The main disadvantage of dental bonding seems to be that the longevity of this procedure is not predictable, and in time, debonding of the fragment may occur. To increase the durability of the restoration, rehydration of the fragment has been proven to work. It is considered a key step in the treatment of fractured teeth and should be routinely conducted to avoid any flaws in the restoration of teeth that could compromise the bonding and esthetics; the fragment cannot regain its original color when it is dehydrated.[17] The limitations can be controlled by strictly following the adhesive protocol in order to ensure good fracture resistance and to maintain a satisfactory esthetic appearance without compromising the remaining dental tissue.[15]

Conflict of Interest

The authors of this manuscript certify that they have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

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