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# Homogenous bonding – case report and 18-year follow up

CASE REPORT

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<sup>1</sup>Department of Pathology and Dental Clinic, Universidade Federal do Piauí; <sup>2</sup>Department of Dentistry, Faculdade Integral Diferencial (FACID), Teresina, PI, Brazil **Abstract** – Fracture of the anterior teeth by trauma is the most frequent type of injury affecting the permanent dentition, especially the maxillary central incisors. When the fragment is not available or its use is not recommended, donated extracted teeth (homogenous bonding) can be used. The aim of this paper is to report the successful 18-year follow up of a maxillary central incisor fracture in which homogenous bonding was performed.

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Fracture of the anterior teeth by trauma is the most frequent type of injury affecting the permanent dentition, especially in children between 9 and 11 years old. The teeth most frequently affected are the maxillary central incisors owing to their anterior position and protrusion caused by the eruptive process (1, 2).

There are many treatment modalities to restore the function and esthetics of anterior fractured crown. The most frequently used are resin crowns, pin-retained resin, porcelain jacket crowns, porcelain bonded crowns, resin composite restorations, and biological restorations (1, 3). When the fracture carries minimal or no violation of the biological width and when the fragment is available, reattachment of the dental fragment is one option for restoring the tooth (4).

Fragment reattachment provides excellent results regarding surface smoothness, esthetics, and the maintenance of the incisal guide in dental structures that cause physiological wear (5, 6). When the patient does not present the fragment or its use is not recommended, donated extracted teeth (homogenous bonding) can be used (3).

Banks of human teeth are non-profit institutions generally integrated into teaching or research institutions. After the teeth are donated, they are sorted and stored in distilled water under refrigeration (7). Before use in homogenous reattachment, the teeth must be sterilized in humid heat (120°C for 15 min) (3).

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The aim of this paper is to report a case and the 18year follow up of a maxillary central incisor fracture in which homogenous bonding was performed.

# Case report

A 9-year-old boy was referred to a pediatric dentistry office after a trauma affecting the orofacial region. On clinical examination, an oblique coronary fracture affecting the disto-incisal angle of the left central incisor was observed (Fig. 1a). No significant hard or soft tissue other than tooth fracture was observed. On the radiological examination, the tooth had incomplete root formation (Fig. 2a). Two options were discussed with the patient: composite resin restoration and reattachment of a tooth fragment. As the fractured fragment was missing, an alternative option was the reattachment of a dental fragment obtained from a donated tooth (homogenous bonding). The patient was informed about the options and chose homogenous bonding.

The extracted tooth was obtained via a public dental service through which patients donate their extracted teeth. A tooth whose color and shape were compatible with the fractured tooth was selected from the tooth storage. The selected tooth had been stored in water for approximately 18 months. Then, it had been sterilized by autoclaving in accordance with biosecurity standards (3).



*Fig. 1.* (a) An intraoral photograph at the initial visit. Note the fracture in the left maxillary incisor involving enamel and dentin. (b) Preparation of the fragment in the laboratory using liquid-carbon. (c). A piece of gutta-percha stick on the incisal edge of the tooth fragment to facilitate its manipulation during the bonding procedure. (d) Final aspect after the homogenous bonding procedure. (e) Final aspect after the polishing procedures. (f) Clinical aspect 18 years after the procedure was performed.

Impressions of the upper and lower arches were taken to obtain a replica of the clinical situation (Fig. 1b), and liquid-carbon (Lac'Star, Fortaleza, CE, Brazil) was used to identify the small areas that needed to be weaned out. Diamond drills were used to remove the interference areas and to make an internal dentine groove to improve the mechanical retention and adaptation of the fragment. A piece of gutta-percha stick (Odakan, Petrópolis, RJ, Brazil) was used on the incisal edge of the tooth fragment to facilitate its manipulation during the procedures (Fig. 1c).

The fragment was bonded using self-curing resin (Adaptic; Johnson & Johnson, New Brunswick, NJ, USA). Acid etching of the fragment and the cavity was carried out for 40 s using 37% phosphoric acid (Adaptic; Johnson & Johnson), the bonding union (Adaptic; Johnson & Johnson) agent was subsequently applied, and a thin layer of resin was applied on the fractured margin of the fragment and on the tooth. The fragment was approximated to the tooth using finger pressure and checking its correct position. Excess composite extruding from the junction was removed using a probe before the composite polymerized. Finger pressure was used until the composite was cured. The restoration was completed using self-polymerizing resin (Fig. 1d). The finishing and polishing were



Fig. 2. Periapical radiographs taken at the initial visit (a), after the homogenous bonding (b) and at the 18-year follow up (c).

performed with diamond burs and sandpaper disks of different granulations. The final result is shown in Figs 1e and 2b.

Periodic appointments were scheduled to monitor the physiologic process of the root apex. Seventeen months after the procedure was performed, the patient returned because the fragment was dislocated after a second trauma. All of the operatory procedures previously described were performed, and as the patient presented protrusion of the upper incisors, he was more predisposed to traumatism; thus, a 0.6-mm stainless-steel wire (Morelli, São Paulo, SP, Brazil) was bonded onto the palatal surface to improve the retention. The patient was referred for orthodontic treatment.

The patient returned for clinical and radiological evaluations annually. Eighteen years after the trauma, the affected tooth was in esthetically and functionally good condition, suggesting that the technique was clinically successful (Figs 1f and 2c).

#### Discussion

In recent decades, dentistry has achieved great scientific and technological advances regarding restorative and adhesive materials. Nevertheless, to date, no restorative material has been more effective than the properties of the natural dental structures themselves (3, 5).

Reattachment of a fractured tooth segment is one of the best techniques to restore a fractured anterior tooth (8). The technique offers the following advantages: (1) it results in better esthetics because shade match and translucency will be perfect; (2) the incisal edge will wear at a rate similar to that of the adjacent teeth; (3) replacement of the fractured portion may be less timeconsuming than needed for the completion of a provisional restoration; and (4) patients have a positive emotional and social response owing to preservation of the natural tooth structure (9). Moreover, this option is less time-consuming compared with other direct and indirect restorations (8).

An alternative option for cases in which the fragment is not found is reattachment of a dental fragment obtained from an extracted tooth (homogenous bonding) (3). However, this technique presents limitations, such as the difficulty of finding teeth with a similar color and shape as that of the affected element and the possibility that the patient may refuse to accept a tooth fragment obtained from another patient (3, 5). We believe that another factor that should be considered in cases of homogenous bonding is the long time that is required for the laboratory preparation of the dental fragment obtained from the extracted tooth.

When this case was performed 18 years ago, there were no registered tooth banks; the teeth were obtained through donations, especially from public services. Currently, teeth should be obtained by means of tooth banks, non-profit institutions that store and provide teeth for didactic, clinical, and scientific use. In Brazilian dental schools, banks of teeth are formed following guidelines laid down by ethics committees, and the donors must provide written consent (6).

A major advantage of the bonding fragment technique is the small line of resin composite exposed to the oral environment. Additionally, the fracture line may become visible over time owing to discoloration of the adhesive and composite used for the reattachment (10). When the resin exposed to the oral environment was discolored, polishing was performed using diamond burs and sanding disks of different granulations; when discolorations were larger, part of the resin was replaced by conventional adhesive procedures.

A fact to be considered is the need to educate the population about the importance of finding and obtaining fractured dental fragments and storing them in moisture to prevent drying, which can cause irreversible discolorations. Moreover, it is important that victims of dental trauma seek professional care as soon as possible to obtain more satisfactory restorations, from esthetic, biological, and functional points of view.

Although a bonded fragment promotes excellent cosmetic and functional results, it is necessary that the patient pay special attention to hygiene and dental care to avoid excessive pressure on the teeth, which could cause fractures. The healthy tooth that originally fractured in the trauma now has a fracture line more susceptible to fracture. In this patient, re-fracturing occurred 17 months after the first bonding. The patient was advised again to prevent further trauma in the region, and steel wire was used for reinforcement.

Appointments for preventive maintenance with clinical and radiographic evaluation should be conducted annually. In the case presented herein, 18 years after the trauma, the affected tooth was in esthetically and functionally good condition, suggesting the clinical success of the technique. One important fact to be emphasized is the satisfaction of the patient with regard to the adopted restorative technique.

Despite the difficulty of the technique, homogenous bonding is a viable alternative for restorative treatment of fractured anterior teeth. Effective control by clinical and radiographic evaluations and taking special care to avoid excessive pressure on the teeth are essentials for maintaining tooth restoration.

### References

- Bruschi-Alonso RC, Bruschi-Alonso RC, Correr GM, Alves MC, Lewgoy HR, Sinhoretti AC et al. Reattachment of anterior fractured teeth: effect of materials and techniques on impact strength. Dental Traumatol 2010;26:315–22.
- Zuhal K, Semra OE, Huseyin K. Traumatic injuries of the permanent incisors in children in southern Turkey: a retrospective study. Dent Traumatol 2005;21:20–5.
- Busato AL, Loguercio AD, Barbosa AN, Sanseverino Mdo C, Macedo RP, Baldissera RA. Biological restorations using tooth fragments. Am J Dent 1998;11:46–9.
- Macedo GV, Ritter AV. Essentials of rebonding tooth fragments for the best functional and esthetic outcomes. Pediatr Dent 2009;3:110–6.
- Corrêa-Faria P, Alcântara CEP, Caldas-Diniz MV, Botelho AM, Tavano KTA. Biological restoration": root canal and coronal reconstruction. J Esthet Restor Dent 2010;22:168–78.
- 6. Demarco FF, Moura FRR, Tarquinio SBC, Lima FG. Reattachment using a fragment from an extracted tooth to treat

complicated coronal fracture – case report. Dent Traumatol  $2008;\!24\!\!:\!\!257\!-\!\!61.$ 

- Nassif ACS, Tieri F, Ana PA, Botta SB, Imparato JCP. Structuralization of a human teeth bank. Pesqui Odontol Bras 2003;17:70–4.
- Goenka P, Marwah N, Dutta S. Biological approach for management of anterior tooth trauma: triple case report. J Indian Soc Pedod Prev Dent 2010;3:223–9.
- Patni P, Jain D, Goel G. A holistic approach to management of fractured teeth fragments: a case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;109:e70–4.
- Stellini E, Stomaci D, Stomaci M, Pétrone N, Favero L. Fracture strength of tooth fragment reattachments with postpone bevel and overcontour reconstruction. Dent Traumatol 2008;24:283–8.

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