

# Esthetic Smile Rehabilitation through Autogenous Bonding of Dental Fragment: A Case Report

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*Autogenous tooth fragment bonding offers advantages over restorations with composite resins and porcelain, including better esthetics, greater durability, reestablishment of the natural function of the dental element and short execution time. A case is presented of a 14-year-old male patient who suffered an oblique crown fracture of the permanent right maxillary central incisor (I1) due to a traumatic fall. The clinical examination revealed pulp exposure with no invasion of the biological space. Due to the extension of the fracture, endodontic treatment and the placement of an intra-root esthetic pin was needed. The tooth was restored using the autogenous fragment bonding method. Excellent esthetic and functional results were observed after two years of follow up.*

**Keywords:** tooth fracture, esthetics, permanent dentition

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## INTRODUCTION

Fracture of enamel or enamel and dentin is one of the most common types of dental trauma and mainly affects the maxillary incisors.<sup>1-4</sup> The etiology is associated with gender, overjet, lip coverage, age, falls, collisions and violence<sup>4,8</sup> causing physical and psychological discomfort, which can affect the patient's quality of life.<sup>9-12</sup>

Esthetic and functional problems can be minimized by restoring the fractured tooth. Several authors have suggested the use of autogenous tooth fragment bonding as a method for restoring fracture anterior.<sup>13-15</sup> Autogenous tooth fragment bonding offers advantages over restorations with composite resins and porcelain, including superior esthetics, greater durability, reestablishment of the natural function and short

execution time.<sup>15-17</sup> Furthermore, this method achieves positive social and emotional responses for the patient due to the preservation of his/her natural dental structure.<sup>15,17</sup>

The purpose of the present article is to describe a case of crown fracture of a permanent maxillary central incisor and esthetic and functional results two years of follow-up.

## Case report

A 13-year-old boy was referred to the Dentistry Clinic at Federal University of Vales do Jequitinhonha e Mucuri reporting a fracture of the permanent right maxillary central incisor. The patient brought in the fragment, which had remained dehydrated for the last 6 hours.

After a clinical and radiographic exam, an oblique crown fracture was observed, involving the enamel and dentin, with pulp exposure and with no invasion of the biological space (Figure 1-A, B and C). The proposed treatment plan included fragment reattachment associated with intraradicular reinforcement.

During the emergency treatment, and after local infiltrative anesthesia the tooth structure and fragment were cleaned with a calcium hydroxide solution. The contaminated pulp was removed and the tooth was restored temporarily with a glass ionomer restoration (Vidrion R, SSWhite, Juiz de Fora, MG, Brazil). A splint was fashioned with a temporary restoration using denture tooth and autopolymerizable acrylic resin (Duralay, Dental MFG, IL, USA). Tooth was anchored to it as a temporary restoration (Figure 1 - D). The fragment was stored in physiological solution, where it was kept for 14 days until use.

Due to the extensive fracture and contamination of the coronal pulp, endodontic treatment was necessary (Figure 2 - A). In order to enhance the retention of the fragment, a

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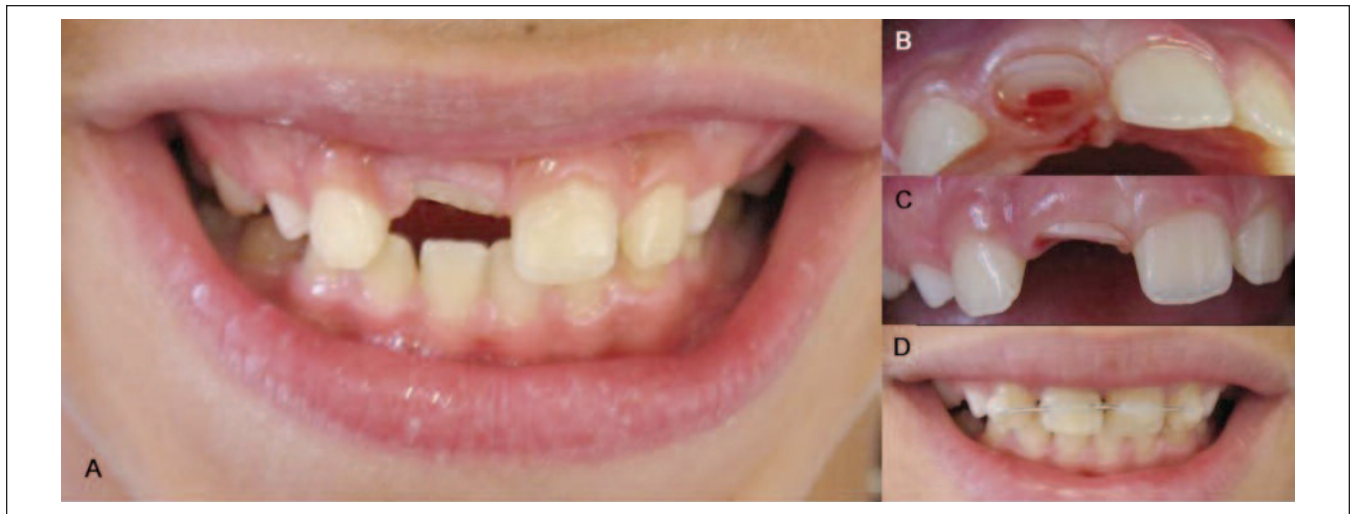
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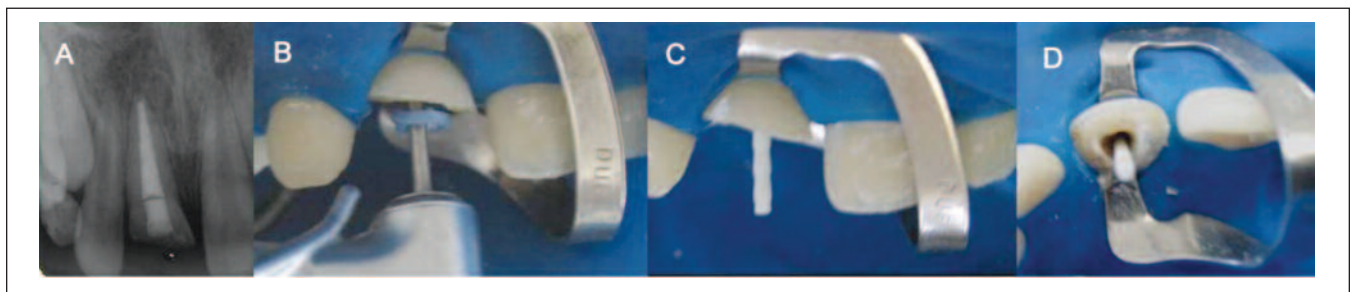
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**Figure 1.** A – Initial smile: crown fracture of right upper central incisor; B – Incisal aspect of fracture with pulp exposure; C – Vestibular aspect; D – Temporary restoration anchored by a splint.

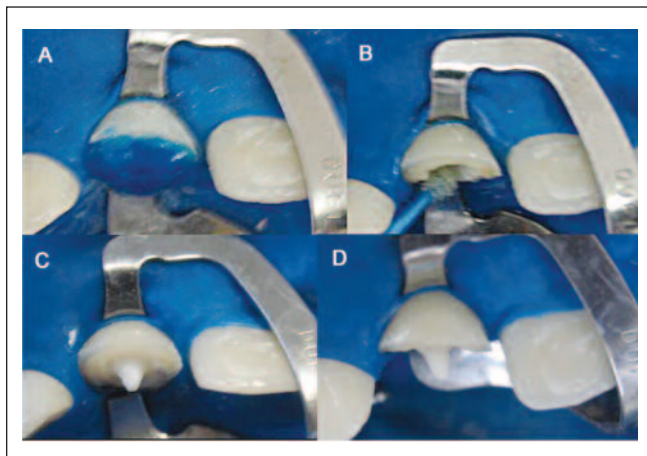


**Figure 2.** A – radiograph after endodontic treatment; B – clearance of root canal; C – test of fiberglass pin – vestibular view; D – Test of fiberglass pin – incisal view.

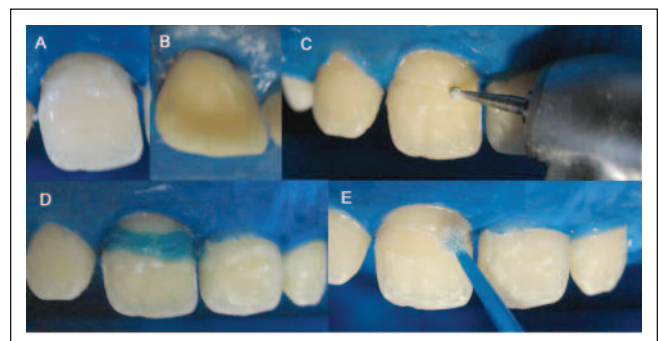
fiberglass intra-root pin (Post System-Pentron) was prepared to be cemented to the root canal after clearance of 2/3 of the obstructing material using a drill bit with dimensions compatible to the diameter of the canal and pin used (Figure 2 - A and B). The pin was adjusted to the root canal (Figure 2 - C and D). The exposed crown portion of the pin and inner surface of the fragment were scored (Figure 3 - C and D) for the adaptation of the tooth fragment. The fragment was analyzed, tested to check for proper positioning and fit with

the fractured crown structure and a positioning stent was fabricated using a high-fusion compound.

The fiberglass pin was cemented with chemically activated resinous cement (C&B-Bisco) after application of the bonding system on the tooth remnant and pre-fabricated pin (Figure 3). The fragment was then prepared for fixation through conditioning with a 37% phosphoric acid gel for 30 seconds on the enamel and 15 seconds on the dentin (Figure 5 - B and C). Rinsing, drying and application of the bonding system (ALL-BOND 2<sup>®</sup> Bisco Inc., Schaumburg, IL, USA) were then performed. The bonding of the tooth fragment was performed with the same material used in the cementation of the intra-root pin.



**Figure 3.** A – Acid conditioning of tooth remnant; B – Application bonding system on tooth remnant; C – Cementing of pin – incisal view; D – Cementing of pin – vestibular view.



**Figure 4.** A –Vestibular view after bonding; B –Palatine view after bonding; C – Confection of vestibular channel; D – Acid conditioning; E – Application bonding system.



**Figure 5.** Final clinical and radiographic aspect; A – approximate aspect in occlusion; B – and C – in laterality; D – final smile; E – final radiographic aspect.



**Figure 6.** Control after 24 months; clinical and radiographic aspect.

Following the cement polymerization, a juncture line was observed at the fracture site on the vestibular face. The decision was made to confect a beveled channel and insert a microhybrid composite resin (Z-100-3M-ESPE) in order to eliminate this esthetic defect (Figure 4). The occlusal adjustment was then made, eliminating anterior contact in occlusion and protrusion so that, with the mouth open, lateral movements had only a canine guide, thereby avoiding contact with the bonded fragment (Figure 5 A, B and C).

After seven days, finishing and polishing of the tooth surface was performed, using multi-laminated tips, sanding discs, rubber cups and paste for the polishing of the restoration. The patient was instructed to avoid harmful habits (chewing on objects, nail biting, etc.) and to be careful when eating in order to avoid fatigue of the restoration material (Figure 5 D and E). After two years, clinical and radiographic assessments revealed the good state of the restoration (Figure 6).

## DISCUSSION

This report presents the restoration of tooth 11 using fiberglass pin and own fragment. Excellent esthetic results were obtained after one year of follow up, with the preservation of the color, size, shape and surface texture of the original tooth. Immediate function of the dental element

was reestablished, maintaining the previous guide and causing physiological incisor wear in the antagonist tooth. The treatment was fast, conservative and obtained positive emotional and social responses for the patient due to the preservation of his natural dental structure.<sup>15,16,18</sup> It is suggested that the bonding associated with the fragment is performed enamel beveling, external chamfer or internal grooves to improve the fracture strength of the reattachment, as simple reattachment without additional preparation may not restore even half of the fracture strength of intact teeth.<sup>15,19</sup> These advantages often make autogenous fragment bonding preferable to restorations with composite resin or porcelain.<sup>17,19</sup>

Clinically, traumatized teeth need immediate attention. If there is pulp exposure, the degree of exposure should be assessed and the correct initiatives must be taken (pulp capping and pulpotomy (traumatized immature teeth) or pulpectomy).<sup>20,21</sup> In the present study, the decision was made to perform pulpectomy due to the extensive exposure and contamination of the pulp by soil and to enable the placement of an intra-root pin to assist in the retention of the fragment.

Greatly compromise the dental structure extended to the cervical third, intrarradicular reinforcement was deemed necessary to provide retention and stability to the dental fragment, which is commonly achieved by the use of screw-posts, cast-posts or dentin post.<sup>15,16,22</sup> The fiberglass pin was used on the child due to its extremely satisfying esthetic aspects and light transmission as well as its physical and mechanical characteristics, which are closer to natural teeth when compared to metal pins. The pin chosen was attached to the dental structure through adhesive cementation, which reinforces the tooth remnant, thereby assisting in the capacity to endure masticatory forces, as such forces are distributed throughout the root, impeding displacement and possible tooth fracture.<sup>23,24</sup> It also allows be adjusted to the size and shape of the root conduit.<sup>23</sup> Another option would have been the confection of a biological pin due to the ample size of the pulp chamber as well as advantages such as allowing a juxtaposed adaptation to the root canals. Biological pins also do not generate stress on the dentin, as they exhibit the same biomechanical behavior as the restored elements.<sup>15,22</sup>

During the procedures that preceded the bonding (endodontic treatment, healing and periodontium recovery), the fragment was kept in physiological solution. Adequate hydration is an important factor for maintaining the properties of the dental fragment, as dehydration results in a change in color and can alter bio-structural characteristics.<sup>17</sup> Dehydration of a tooth fragment for more than an hour results in a significant reduction in its adhesive durability.<sup>15</sup>

The patient is currently in follow up. The clinical and radiographic results at the two-years follow-up evaluation were favorable, revealing the adequate adaptation of the fragment and effective seal of the restoration material. The natural biocompatibility of the tooth surface has provided satisfactory esthetics, function, sharp and gingival health.

## CONCLUSION

The use of autogenous tooth fragment bonding offers excellent esthetic, functional, and psychosocial results, which justifies the use of this technique to achieve the morphofunctional recovery of fractured teeth.

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