

### Do lithium disilicate crowns have the same clinical longevity as metaloceramics? (Marcelo Giannini)

Lithium disilicate materials perform very well in clinical studies and today represent an equivalent alternative to metaloceramic restorations, provided that they are properly prepared and bonded. Similar to different types of zirconia, lithium disilicate performs differently compared to other types of lithium silicates.

### Do you recommend thin ceramics (less than 1 mm thick) on occlusal surfaces? (Marcelo Giannini)

From a scientific point of view, yes. From the clinical point of view, no. The materials are strong enough, but only when supported by proper adhesion, sufficient layer thickness and, most importantly, a defect-free surface. Intrabuccal occlusal adjustment, which is commonly performed to adjust occlusal contacts, dramatically reduces the resistance of glassy materials such as ceramics.

### Is the adhesion of resin cements to zirconia still a problem? (Marcelo Giannini)

Adherence to zirconia is no longer a critical issue as pretreatment procedures are well described and adhesive monomers such as MDP are available. However, if someone treated zirconia in the same way as a lithium silicate restoration, it might not work. A specific protocol must be followed. A problem really occurs when a zirconia restoration needs to be removed. In general, zirconia offers sufficient stability and can be easily cemented in conventional manner - without the need for adhesive cementation.

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## Rehabilitation of anterior teeth with direct composite resin restorations: 3-year follow-up

**ABSTRACT:** **Introduction:** Fractures in anterior teeth are frequently considered as emergencies in dental practice. Crown fractures not considered complicated involve enamel and dentin and may receive different levels of treatment, such as bonding the dental element or restoring it with composite materials. **Objective:** The goal of this study was to perform aesthetic and functional rehabilitation through the use of composite resins. Three cases of patients who suffered different degrees of uncomplicated crown fractures in upper central incisors were treated with direct composite resin restorations. **Results:** Treatment with resins composite restoration of aesthetics and function was adopted in all three cases. **Conclusion:** Three years of follow-up with clinical and radiographic exams revealed successful rehabilitation of fractured teeth. **KEYWORDS:** Dental restoration, permanent. Fractures. Case report.

## INTRODUCTION

The prevalence of dental trauma in anterior teeth has been widely studied in the world,<sup>1</sup> and this prevalence ranges between continents. In Asia and Africa, the prevalence of dental injuries in anterior teeth of adolescents ranges from 4% to 35% and from 15% to 21%, respectively. In America and Europe, the prevalence ranges from 15% to 23% and from 23% to 35%, respectively.<sup>1</sup>

Dental trauma mainly involves crown fractures of anterior teeth, being maxillary central incisors, the most affected teeth due to their position in the dental arch.<sup>2</sup> Moreover, falls and collisions are the main causes of dental trauma and the age group most affected is from 9 to 11 years.<sup>3</sup> The majority of patients is male and this dental injuries incidence occurs due their big participation in sports and dangerous activity.<sup>3</sup>

Additionally, dental trauma of anterior teeth can be rehabilitated with restorative resin composite,<sup>4</sup> ceramic laminates,<sup>5</sup> prosthetic crowns<sup>6</sup> or reattachment of fractured teeth fragments.<sup>7</sup> The treatment will depend on the degree of tooth destruction, the age as well as the socio-economic condition of the patient.<sup>8</sup>

When treating children or adolescent, a conservative and minimally invasive approach is

required. In dental trauma with partial crown destruction, resin composite restorations represent the fastest and most effective method of rehabilitating the teeth of a young patient, since there are not-or-minimal treatment because the enamel layer is not reduced.<sup>5</sup> Furthermore, direct anterior composite restorations are quickly and minimally invasive and have to be considered a good treatment option for rehabilitating children, because they are inexpensive and repairable over time.<sup>5</sup> Hence, the aim of this article is to report a brief therapeutic approach in three cases of patients who suffered varying degrees of uncomplicated crown fractures in permanent maxillary central incisors that were treated by adhesive dental restorations.

## CASE REPORT

### General procedures

Every patient was male, with age among 11 and 46 years old. Patients sought Dentistry School at our institution reporting dental fractures in anterior teeth. In all patients clinic and radiographic exams as well as intraoral photographs were performed. In addition, a molding of the upper and lower hemiarches to obtain a stone model. Through this model, it was made a waxing diagnosis and a silicone guide to assist the palatal restoration (Clonage, DFL, Rio de Janeiro, RJ, Brazil).

Moreover, patients received a prophylaxis in all teeth with prophylactic paste (Odahcam, Dentsply Sirona, USA) and later the resin colors were selected. 37% phosphoric acid (UltraEtch, Ultradent Products, South Jordan, UT, USA), adhesive system (Ivoclar Vivadent AG, Schaan, Liechtenstein) was used in all restorative procedures. After that, it was performed the photopolymerization of composite resins for 40 seconds in the buccal and 40 seconds on the palatal surface using polymerizing halogen light with an intensity of 1400 mW/cm<sup>2</sup> (Radii LED Curing Light, SDI, Australia) and Amelogen composite resin (Amelogen Plus, Ultradent Products, South Jordan, UT, USA).

Esthetic improvement of the restorations involved correcting tooth shape and proportion, characterization of surface texture, and final polishing of restorations. Occlusion was always verified and adjusted by observing the points of contact in lateral movements and protrusion, and removing the premature contact points. The patients were instructed to avoid excessive masticatory load of these teeth, and guided to follow procedures related to oral hygiene care and routine visits for follow-up and maintenance treatment.

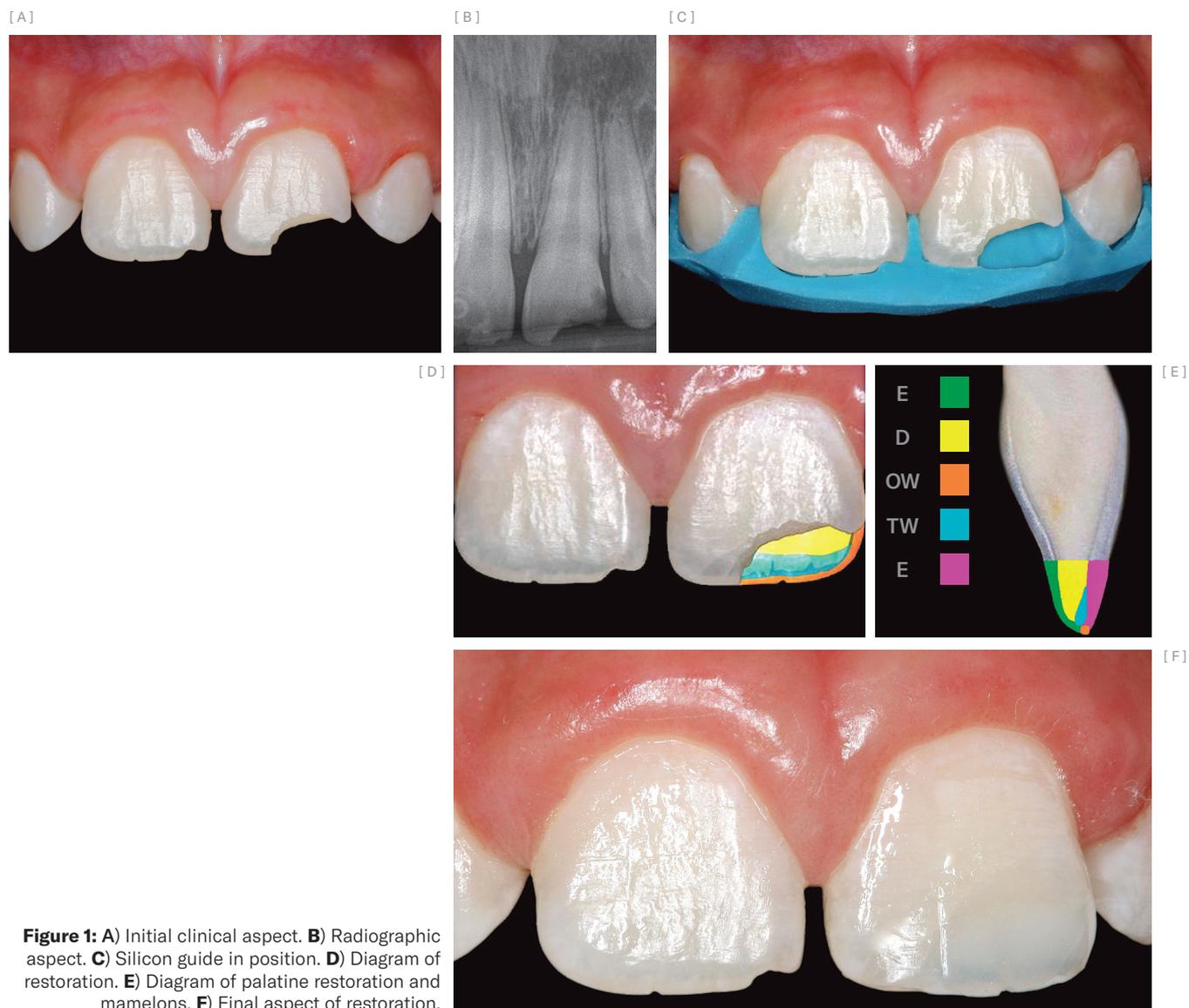
### Case Report 1

A 11-year-old male patient was presented in emergency sector at the School of Dentistry of the Federal University of Pelotas with fracture of his maxillary central incisor (teeth 21). During the anamnesis, the patient reported experiencing dental trauma at school but he did not remember the details of the accident. Clinically there was no mobility and lesions in soft tissues. The clinical and radiographic examinations also revealed a fracture confined to enamel and dentin with loss of tooth structure, but not involving the pulp (Fig 1A). The radiographic exam also showed no radiographically visible periodontal lesions or presence of alveolar bone fracture (Fig 1B).

As a conservative alternative to rehabilitation, the protocol proposed was the restoration of the anterior teeth with direct composite resin. The first step was to restore the tooth 21 using a translucent white composite resin (TW Amelogen Plus, Ultradent Products, South Jordan, UT, USA) under relative isolation by the technique of natural stratification of colors, and was done freehand (without the aid of a silicone barrier) on palatine. After that, enamel white composite

resin was used in dentin and enamel (EW Amelogen Plus, Ultradent Products, South Jordan, UT, USA) and an opaque white composite resin

was used for the creation of the incisal halo (OW Amelogen Plus, Ultradent Products, South Jordan, UT, USA) (Figs. 1C-F).



**Figure 1:** A) Initial clinical aspect. B) Radiographic aspect. C) Silicon guide in position. D) Diagram of restoration. E) Diagram of palatine restoration and mamelons. F) Final aspect of restoration.

### Case Report 2

A 18-year-old male visited the dental clinic at our dentistry school institution for evaluation of the right maxillary central incisor (teeth 11). During the anamnesis, the patient reported having suffered a bicycle accident that caused an enamel and dentin oblique fracture in the middle and incisal third of the 11 without involving pulp exposition (Fig 2A). The vitality of the pulp was not compromised, and there was no impaired mobility or lesions in soft tissues. Radiographic observation revealed normal conditions of periodontium and bone structures (Fig 2B). In addition, there was no bevel in the remaining tooth structure.

The resin composite used were palatine enamel shade B1 and dentin shade A1 (Amelogen Plus, Ultradent Products, South Jordan, UT, USA). Blue and gray tints (Tetric Color, Ivoclar Vivadent, Schaan, Liechtenstein) were used to modify the incisal resin, improving the aspect of the incisal third of the tooth, and buccal surface was restored with enamel shade B1 (Amelogen Plus, Ultradent Products, South Jordan, UT, USA) (Figs. 2C-E). The patient returned for follow-up visits after 36 months post-treatment (Figs 2F-G).

[A]



[B]





**Figure 2:** A) Initial aspect of the fracture. B) Radiographic aspect. C, D) Final aspect of the restoration. E) Final aspect of the restoration after 3 years. F) Radiographic aspect after 3 years. G) Radiographic aspect of the restoration after 3 years.

### Case Report 3

A 46-year-old male patient sought the Dentistry school reporting a fracture in maxillary central incisor (teeth 11). The patient reported that the trauma had occurred approximately 2 days ago and had been caused by a falling during a sport activity (Figs. 3A-B). The tooth had an uncomplicated crown fracture involving enamel and dentin in the mesio-distal direction.

Clinically the teeth revealed no mobility or lesions in soft tissues. Radiographic examination showed no periodontal lesions or bone fractures. For restoration procedures, the selected color of the com-

posite resin used was A2 Enamel and C2 Dentin (Amelogen Plus, Ultradent Products, South Jordan, UT, USA) (Figs. 3C-E).

After that, the restorative procedure was evaluated for occlusal interferences and adjusted when necessary. The final polishing was performed using interface Sof-Lex disks (3M ESPE, St. Paul, MN, USA) and a high gloss polishing slurry (Opal L Renfert GmbH, Hilzingen, Germany). Clinical and radiographic examinations were performed for control during the follow-up visits at two and five months after the adhesive restorative procedure until the period of 36 months (Figs. 3F -G).

[A]



[B]





**Figure 3:** A, B) Initial aspect. C) Radiographic aspect. D) Silicon guide in position. E) Final aspect of restoration. f. Radiographic aspect after 3 years. G) Final aspect of the restoration after 3 years.

## DISCUSSION

The restoration of fractured teeth is important both aesthetically and functionally. The upper central incisors are the teeth most affected by crown fractures and have a strong impact on physical appearance.<sup>9</sup> Therefore, an immediate, conservative and aesthetic restoration is necessary. This is a great challenge for the dentistry; since it is necessary to reestablish the natural aesthetics of the traumatized tooth through shape, dimensions, color, opacity, translucency and, surface texture in relation to the adjacent teeth.<sup>4</sup>

Currently, there is a big variety of color and optical characteristics of the composite resin that help the dentist to reproduce and mimitize the restored element.<sup>9</sup> The resin composite used in this study shows a range of colors, such as translucent white, enamel white and opaque white, that aids to improve the quality of restorations and resembles the similar tooth.

Moreover, it is very important to make a good surface texture, and many finishing instruments must be used to afford similarity to natural enamel. The last step to obtain esthetics providing enamel shine is polishing.<sup>10</sup>

Furthermore, in all cases presented, it was used a silicon palatal guide to help the construction of the palatal enamel and to ensure the appropriate thickness of composite layers. Besides, the model used to make palatal guide helps the dentist in the three-dimensional perception of restoration.<sup>11</sup> This technique is very adopted by the clinicians; however, it requires some indispensable steps to prepare the mold. Firstly, the dentist perform the impression of the tooth in question, and after obtain the model and finally prepare his own wax either by himself or with the help of a technician.<sup>5</sup>

The restoration of a fractured tooth with an adhesive restoration is often one of the most conservative treatment options considered. Micromechanical enamel bonding and dentine bonding agents provide predictable adhesion to tooth structure, enabling the direct replacement of lost tooth structure with predictable aesthetic and functional outcomes. Depending on the extent of the loss of tooth structure and pulp insult, the restoration of the tooth with composite resin may be a temporary or permanent treatment.<sup>12</sup> In our report of three cases, the crown fractures of the traumatized teeth involved both the enamel and dentine without pulp exposure, and this condition is the most commonly observed fracture modality in the permanent dentition.<sup>13</sup> Moreover, as observed in our case series, the most frequently affected was the maxillary central incisor of the permanent dentition which corroborates with the literature.<sup>9,13,14</sup>

The number of patients with traumatized teeth assisted by the public dental health service provided in School of Dentistry at our institution because this is a reference in town for dental treatment emergency by the Brazilian unified health system. Thus, cases of dental trauma appear with some frequency and when the fracture caused little loss of tooth structure, teeth were treated with direct restorations.

The longevity of the restorations can be seen as an indicator for the quality of care delivered. Factors that have been identified as affecting the restoration performance are the filling material and their properties, as well as the dental remnant itself and the patient (e.g., socio-economic status caries risk) and dentist characteristics (experience).<sup>15</sup> In this report, the operator who performed all the cases was an undergraduate student supervised by a professor. According to our data obtained during the follow-up visits, the quality of restorations showed the success of the adhesive restorative procedure over three years. In addition, as previously described, the individual patient is a significant variable in determining the outcome of treatment provided. Whilst with some patient factors (e.g. smoking, parafunction and periodontal disease), the dentist may have some influence, many adverse considerations such as genetic predisposition and medical history are outside the dentist's direct control.<sup>12,15</sup>

Some recommendations for restorative techniques according to patient-related conditions may be made to support the clinical decision as “poor oral hygiene” or “patients with bruxism were excluded”. However, we did not do it. The investigation of factors related to patients is crucial to change their current status, increase the survival of restorative procedures, and cut costs.

## **CONCLUSION**

It was concluded that it was possible to restore the aesthetics and function of traumatized teeth of the three report case, through a minimally invasive treatment using composite resin restorations. After 3 years, the restorations were satisfactory.