ISSN: 2977-6139

Case Report

Open Access Journal of Pediatrics Research

Pediatric Composite Crowns : A Case Report

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Received: June 20, 2025; **Accepted:** June 26, 2025; **Published:** July 02, 2025

ABSTRACT
Pediatric dentists have long struggled with the cosmetic repair of badly damaged anterior teeth. This is partially because there aren't many materials and methods accessible, and partially because the children who need these restorations are young and usually less cooperative.

Keywords: Crowns, Impressions, Composite Shell, Pediatric

Introduction

The aesthetic restoration of severely decayed anterior teeth has long been a challenge for pediatric dentists. This is partly due to the lack of available materials and techniques, and partly due to the young age of the children requiring such restorations, who are typically less cooperative. Furthermore, these teeth have short and narrow crowns, limiting the surface area available for bonding. The pulp chamber is relatively wide, and the aprismatic surface enamel is difficult to etch. Depending on the gradient, the dentist has a choice between different materials: amalgam, composite, traditional glass ionomer cement (GIC), high-viscosity GIC (hVIC), MARGC (GIC modified by the addition of resin), compomer, or metal preformed pediatric crown (PPC).

The objective of this article is to illustrate, through a clinical case, the contribution and benefits of using composite crowns in the pediatric restoration of fractured teeth

Case Report

A.L., a 14-year-old child, presented to the Casablanca Dental Consultation and Treatment Center (CDCT) following a road traffic accident that resulted in an enamel-dentin fracture of his maxillary central incisors with pulp exposure. Once the root canal treatment and endodontic filling were complete, he was transferred to the removable prosthesis department for prosthetic rehabilitation. The extraoral examination revealed a flat profile, maintained harmony of the facial proportions and normal mandibular kinematics without deviation. Examination of the masticatory muscles and temporomandibular joints revealed no pain or condylar clicking (Figure 1).

Figure 1: Extraoral Examination

Intraoral examination shows that both maxillary central incisors are fractured with a glass ionomer filling, the rest of the teeth are healthy (Figure2).

The occlusal examination shows correct Spee curves with normal amplitude, the anterior frontal curve is disturbed following the fracture of the two maxillary central incisors thus complicating

Citation: Nidal Elmoutawakkil, El Gasmi Fatima-Zahra, Hafssa Oumaima Wahid. Pediatric Composite Crowns : A Case Report. Open Access J Ped Res. 2025. 2(2): 1-4. DOI: doi.org/10.61440/OAJPR.2025.v2.09

the occlusion plane and the anterior guidance ; The occlusion is class I Angle (canine and molar) right and left, the overlap is 2mm while the overjet is 3mm (Figure 3).

Figure 2: Intraoral Examination

Figure 3: Occlusal Examination

Aesthetic analysis shows a respected collar alignment, a non-coincidence of the median lines and discoloration of the two central incisors; the smile is dental (figure 4).

Figure 4: Aesthetic Analysis

Radiological examination in fact shows the complicated enamel-dentin fracture of the two central incisors (figure 5).

Figure 5: Radiological Examination

Analysis of the casts after wax-ups of the fractured teeth showed sufficient prosthetic space in all 3 directions (Figure 6). It was therefore decided to perform a corono-radicular construction using glass fiber posts followed by composite shell crowns.

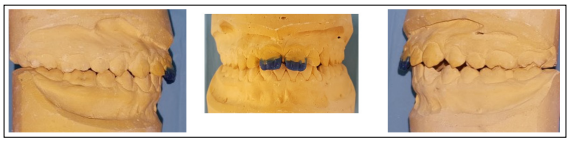

Figure 6: Plaster Cast's Analysis

The fibered root post housing was prepared by partial canal unobturation (figure 7). Next, we shaped the canal, etched the post and the canal, conditioned the canal with an adhesive after washing and drying, injected the dual composite, and then placed the post. Finally, we reconstituted the core using the same composite resin after photopolymerization was complete (figure 8).

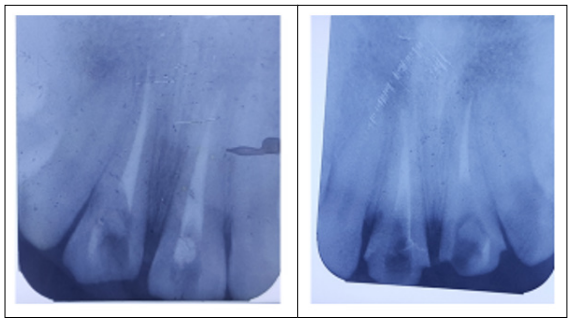

Figure 7: Unobturation and Root Shaping

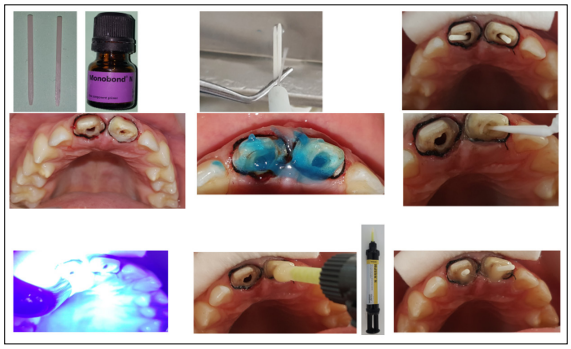

Figure 8: Corono-Radicular Construction Using Glass Fiber Posts

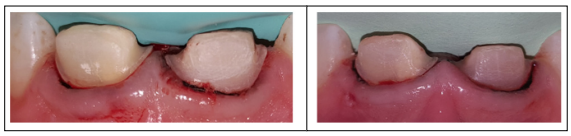

Figure 9: Final Core Build-Up

Once the cores were prepared, we proceeded to an impression according to the Wash technique using silicone by addition, access to the cervical limits was obtained using two cords; the provisionals by veneer technique were temporarily sealed (figure 10). Their removal after one week reveals a healthy periodontal tissus without inflammation or bleeding.

Figure 10: Wash-technique impressions and provisional crowns sealed

Composite crowns were created in the lab. Following functional and aesthetic fitting by assessing both static and dynamic occlusion, we used temporary sealing cement to seal the crowns (figure 11). The front and profile photos demonstrate the improved appearance following sealing (figure 12). A number of control appointments were made, and there will be four years of follow-up.

Figure 11: Composite Shell Crowns

Figure 12: Before and After Composite Crowns

Discussion

Since it's an indirect method, a lot of work is done on the plaster model, which cuts down on chairside time [1]. In order to correct the occlusion, maxillary and mandibular impressions are taken following the removal of carious tissue with an excavator and, if required, pulp therapy. To provide room for the resin cement, a second layer of insulation is put to the maxillary plaster models. After that, the composite is placed on the teeth that need to be fixed while maintaining the opposing teeth's occlusion. The crowns are polished after completion. To guarantee that the crowns are properly repositioned in the mouth, a silicone positioning key can be created before removing them from the plaster model.

The teeth are etched for fifteen seconds with 37% orthophosphoric acid, rinsed with water, and dried lightly. A fourth-generation adhesive is placed, dried, and light-cured for ten seconds. The crowns are filled with composite flow (or temporary luting cement), and excess material is removed using an applicator tip coated with adhesive. Light-curing is then performed palatal. Since the crowns were finished and polished in the laboratory, there is little chairside adjustment required [2].

According to a clinical case series, there was no difference in retention of composite crowns between multiple sessions versus one session (85% vs. 89%). Therefore, the authors encouraged clinicians to restore all anterior teeth in a single session for better immediate clinical results.

The high percentage of vital pulps (97%) in the Ram and Fuks study was higher than that described by Kupietzky et al. (91%) ; both concluded that composite crowns could be aesthetic and durable restorations for damaged primary incisors because they did not result in loss of pulp vitality [3].

Apart from "shell composite" crowns, the reconstruction of decayed anterior teeth (particularly primary teeth) can use celluloid molds in which the composite is loaded to reproduce a satisfactory anatomy (strip crown/matrix crown form).

The introduction of preformed zirconia crowns for pediatric (PPC) use in 2008 is a direct result of technological advances in the field of ceramics and the democratization of manufacturing processes. Zirconia PPCs are manufactured either by molding (injection) or by machining (CAD/CAM). Subsequently, the finishing process includes a sintering, characterization, and glazing process. Shade characterization helps give crowns a more natural appearance. However, the shade selection is very limited, but some manufacturers have begun offering two shade options. In 2008, California-based Ez-Pedo Inc. was the first to patent zirconia PPCs.

NuSmile® ZR is the only manufacturer to offer zirconia crowns for lower anterior teeth. They are also available in four sizes and two shades : extra light (XL) and light (L). For each tooth type, the manufacturer offers three types of kits : professional (84 crowns), starter (40 crowns), and evaluation (16 crowns).

Although their mechanical properties far exceed those of composite crowns, their overall cost remains higher, and their opacity, in some cases, reduces the translucency and therefore the overall aesthetics of anterior restorations.

Conclusion

The restoration of decayed teeth in children plays a very important role both in social and academic integration as well as in improving aesthetics and reducing psychological frustrations and fears arising from dental deterioration. The clinical case we present demonstrates a simple, easy and low-cost clinical protocol while maintaining its efficiency. Follow-up is the only guarantee of success for this type of treatment until adulthood.

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