

Aesthetic Correction of an Old Incisal Fracture with Mild Vestibulomesial Rotation and Mild Fluorosis Using a Ceramic Chip: A Conservative Restorative Approach in a Teenager

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Abstract

Case Report

Fractures of the mesio-incisal angle of maxillary central incisors are frequent among adolescents, often managed initially with direct composite resins. However, these direct restorations can have limited longevity when faced with compromised enamel support, parafunctional habits, or misaligned tooth positioning. This case report presents the conservative management of an old incisal fracture on a right maxillary central incisor with mild vestibuloversion, mesial rotation, and mild fluorosis in a 17-year-old female patient, following multiple failures of direct composite restorations. After minimal preparation, a digital impression was captured using an intraoral scanner, and a lithium disilicate partial ceramic veneer—commonly known as a "ceramic chip"—was fabricated. The intaglio surface of the lithium disilicate restoration was etched with hydrofluoric acid and treated with a silane coupling agent, while the tooth structure was conditioned with phosphoric acid and an adhesive system. The ceramic chip was luted using a dual-cure resin cement under rubber dam isolation. The restorative approach successfully restored both esthetics and function, perfectly mimicking the natural tooth contours and mild fluorosis striations while providing a biomimetic, conservative solution that ensured high patient satisfaction.

Keywords: Incisal Fracture, Dental Fluorosis, Ceramic Chips, Restorative Approach.

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INTRODUCTION

Fractures of the mesio-incisal angle of maxillary central incisors are common in the adolescent population. Although trauma is frequently attributed to falls or sports injuries, playful aggression between siblings is another significant, yet less documented, cause.

Direct composite resin is often the first line of treatment due to its conservative nature and ease of application. However, its longevity may be limited in cases with compromised enamel support, parafunctional habits, or misaligned tooth positioning.

In contrast, partial ceramic restorations — commonly referred to as “ceramic chips” — offer

excellent esthetics, longevity, and precision fit, especially when combined with digital planning and adhesive bonding techniques.

This case presents the conservative management of a fractured right maxillary central incisor 11 with mild vestibular proclination and mesial rotation using a ceramic chip after multiple failed direct composite restorations.

CASE REPORT

A 17-year-old female patient presented with an aesthetic complaint related to tooth 11. The fracture occurred more than 7 years ago following a trauma. Since then, she had undergone several composite resin restorations, each failing within 6 months. In certain

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periods, she remained without any restoration, leading to visible aesthetic discomfort.

Clinical Examination



Figure 1: vestibular view (initial state)



Figure 2: occlusal view



Figure 3



Figure 4: vestibular view of the remaining structure



Figure 5: proximal view

The clinical examination (figure 1, figure 2 figure 3) revealed a fracture of the mesio-incisal angle of

tooth 11, associated with mild vestibuloversion and mesial rotation. The fracture line extended from the

incisal edge toward the buccal surface, reaching the cervical third of the crown, consistent with an enamel-dentin fracture. The remaining structure exhibited exposed enamel and dentin margins (figure 4 and figure 5), along with remnants of previous composite restorations.

Pulp vitality testing was performed using ethyl chloride, normal positive response, indicative of a vital pulp. During provisional removal, the tooth showed mild sensitivity to air-blast, which was considered within normal physiological limits and did not contraindicate adhesive bonding procedures.

Procedural Steps

Following the removal of the failing composite restoration, the enamel margins were gently finished using a fine-grit diamond bur to ensure smooth transitions and prevent crack propagation. The buccal enamel was selectively reduced in the incisal third to a depth of approximately 0.5 mm to correct the mesial rotation and mild vestibuloversion of tooth 11. A small

chamfer margin was created using a fine-grit diamond bur under constant water irrigation in the enamel to improve the marginal adaptation of the future partial veneer. The fracture line extended along the mesial incisal angle, partially involving the palatal surface, which was gently blended without excessive reduction to preserve enamel.

A digital impression was taken using an intra-oral scanner Medit i600.

A provisional restoration was fabricated intraorally using a silicone index derived from the wax-up and a self-curing bis-acryl resin (figure 6 and figure 7). Thanks to polymerization shrinkage, the provisional remained stable without the need for adhesive luting—a well-recognized method for minimal-prep veneers [4]. This provisional allowed the patient to assess and approve the esthetic parameters (shape, contour, visibility at rest and smile) before definitive treatment.



Figure 6: provisional restoration (self-curing bis-acryl resin)



Figure 7: At the final appointment, the ceramic restoration was tried in (figure 8). The shade match and marginal adaptation were validated clinically and visually



Figure 8: try in of the prosthetic piece

To facilitate controlled surface treatment and ensure the integrity of the restoration, a repositioning key was fabricated using a high viscosity silicone key (figure 9).



Figure 9: treatment of the ceramic surface

During surface preparation, the key was used to protect the external surface of the ceramic fragment, exposing only the internal surface to hydrofluoric acid etching. This controlled exposure minimizes the risk of damaging or contaminating the visible surface and ensures optimal bonding strength.

Upon approval of the final lithium disilicate veneer, the intaglio surface was etched with 5% hydrofluoric acid (ceram etch 5%, Iena, France) for 20 seconds, rinsed, and dried (figure 10). A silane coupling agent (voclar Vivadent Monobond N Refill Universal Primer Ceramic Restoration 5g, Ivoclar Vivadent, Liechtenstein) was applied for 60 seconds (figure 11) to enhance micromechanical and chemical bonding [5].



Figure 10: 5% hydrofluoric acid



Figure 11: A silane coupling agent

The tooth surface was then treated with 37% phosphoric acid (Total Etch 37%, Ivoclar Vivadent, Liechtenstein) —30 seconds for enamel and 15 seconds for dentin—rinsed thoroughly and dried (avoiding over-desiccation) (figure 12, figure 13). A primer and

Heliobond adhesive (from Variolink II kit, Ivoclar Vivadent, Liechtenstein) were gently applied and left uncured to promote resin infiltration [2](figure 14, figure 15, figure 16).



Figure 12, Figure 13: 37% phosphoric acid—30 seconds for enamel and 15 seconds for dentin



Figure 14, Figure 15, Figure 16: Application of the primer and Heliobond adhesive (from Variolink II kit)

The dual-cure composite resin cement (Variolink II base and catalyst, Ivoclar Vivadent, Liechtenstein) was mixed and placed within the partial veneer (figure 17), which was seated under controlled pressure (figure 19, figure 20). A brief tack cure (5 seconds) (figure 21) facilitated removal of excess resin using a blade and floss (figure 22).

To prevent an oxygen-inhibited layer at the margins, glycerin gel was applied prior to final polymerization (40 seconds per surface) using a high-intensity LED light [6]. This sequence aligns precisely with Ivoclar's validated protocol for thin ceramic restorations [6].

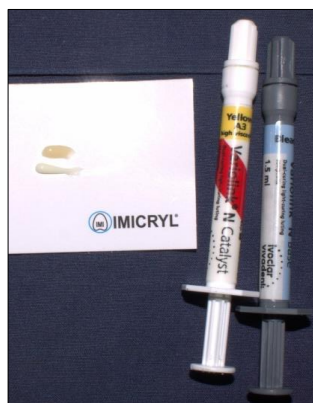


Figure 17: The dual-cure composite resin cement (Variolink II)



Figure 18: the prosthetic piece



Figure 20, Figure 19: partial veneer in place under controlled pressure



Figure 21: 5 seconds tack cure



Figure 22: excess removal using a blade

Surface smoothness and seamless transitions at the margins are critical for long-term esthetics and comfort; a final polishing session one-week post-bonding (figure 23, figure 24) notably enhances tissue

compatibility and tongue-friendliness, as supported in the literature [3]. Occlusion was carefully adjusted to avoid functional contact on the restoration, due to the ceramic's limited mechanical resilience.



Figure 23: final polishing



Figure 24: final polishing



Figure 25: final result



Figure 26: vestibular view of the final result



Figure 27: proximal view

Outcome and Follow-up

The patient was highly satisfied with the aesthetic outcome. The chip blended seamlessly with adjacent teeth in terms of shape, texture, and shade.

Functional evaluation showed stable occlusion, no interferences, and no symptoms.

At one-week review:

- Minor contact point refinement was performed.

- All surfaces were smoothed and polished to high gloss.
- The tooth responded normally to vitality tests, with no sensitivity reported.

DISCUSSION

The aesthetic and functional integration of a partial ceramic restoration is highly dependent on accurate treatment planning, initial analysis, and the final surface quality. In this clinical case, an initial study model analysis combined with a manual wax-up using blue diagnostic wax allowed precise visualization and planning of the final outcome, particularly concerning the correction of mesial rotation and vestibular displacement of tooth 11. While some studies advocate for digital aesthetic planning tools to enhance precision and reproducibility [4], the manual approach proved effective, especially in a young patient requiring careful and customized esthetic adjustments.

The polishing session performed one week after bonding significantly improved the surface quality of the restoration, leading to a smooth, tongue-friendly finish that contributed to the patient's comfort and oral integration. This outcome aligns with the findings of Lopes *et al.*, who emphasized that surface smoothness plays a crucial role in the patient's perception and the long-term success of ceramic restorations [3].

Furthermore, the invisible transition line between the restoration and the natural tooth was a key factor in the patient's satisfaction. The subtle white striations caused by mild fluorosis were carefully mimicked by the dental technician during multiple shade-matching and try-in sessions, leading to a highly biomimetic and natural-looking result. This highlights the importance of individualized esthetic integration and supports the principles of biomimetics, where restorative materials aim to replicate natural structures in form and function [1].

CONCLUSION

The clinical outcome of this work demonstrates that partial ceramic restorations ("ceramic chips") provide a highly effective, conservative, and biomimetic alternative to repeated direct composite placements for managing complex incisal fractures in young patients with mild misalignments and fluorosis. Important findings from this case highlight that combining digital

workflows, precise adhesive protocols, controlled surface conditioning, and meticulous post-bonding polishing results in seamless marginal adaptation, excellent tissue compatibility, and long-term aesthetic integration. In our view, paying close attention to individualized characterization—such as replicating natural white striations—and ensuring smooth, tongue-friendly surface finishes are critical factors that directly drive patient satisfaction and clinical success in modern aesthetic dentistry.

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