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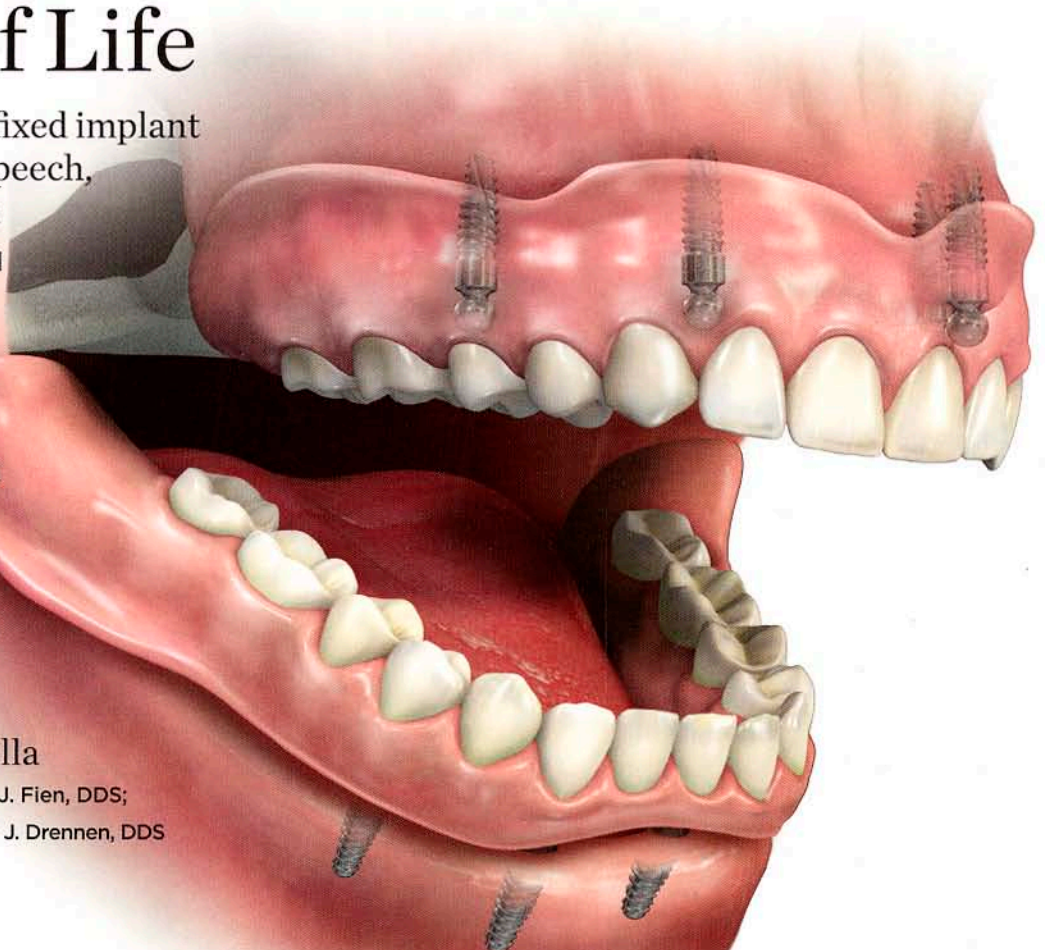
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# Case Report 1

## Conservative Restoration of a Traumatically Involved Central Incisor

Joyce Bassett, DDS

### ABSTRACT

The use of a direct composite material known for excellent polishability, polish retention, and wear resistance is described in this case of a fractured central incisor restoration. The method used enabled the clinician to conserve tooth structure and maintain full control of the outcome while creating an esthetically imperceptible, reliable, and durable restoration for a young male patient. Emphasized in this case are the techniques of layering, contouring, and polishing of a nanocomposite used to maximize esthetics and meet patient expectations. To further ensure imperceptibility, the author recommends first facilitating color shade selection for both body and dentin—especially in two-shade or multiple-shade restorations—by placing the composite in its planned area of the restoration and curing it in its proper thickness to allow a preview and recipe map.

Composite restorations provide a number of advantages when selected as the material to restore a dentition. Direct composite treatments are more conservative than full-coverage crowns or facial veneers and can be performed without having to wait for a ceramist to fabricate a porcelain restoration. For dentists, skilled use of composite can help deliver an outstanding level of esthetics. Composite treatments also can aid the clinician in maintaining control over the esthetics, which is paramount in the anterior region. This case demonstrates the use of composite to create an esthetically imperceptible restoration for a fractured central incisor.

### CASE REPORT

The patient, a 25-year-old man, presented to the office after fracturing his maxillary right central incisor while intoxicated. The patient, who expressed feeling humiliated by his condition, also had abrasions to his lips, and reported diffuse, intense pain in the area (Figure 1).

An assessment of the damage beyond the tooth structure was conducted. Zygoma and root fracture were ruled out, and the pulpal status was evaluated. Microfractures in adjacent teeth were noted, and an assessment for cracked-tooth syndrome on the remaining dentition, which still had intact enamel, was performed.

Radiographs were taken, and clinical testing revealed a fracture-free root and zygoma. An endodontic assessment was performed, and a diagnosis of reversible pulpitis was determined. The patient was informed that testing of the pulpal status should be repeated 2 weeks after the site had healed from the trauma.

### TREATMENT PLAN AND PHASES

The patient was informed of his restorative options, which included a full-coverage crown, ceramic veneer, or composite bonding. In order to conserve tooth structure and for the clinician to maintain full control of the outcome of the rehabilitation, a

direct composite restoration was chosen as the restorative solution.

Local anesthesia was administered, and the extrinsic stain was removed from the surface of the fractured and adjacent teeth by using pumice on a soft prophyl cup.

Shade selection and a mock-up were performed immediately. (Note: If the clinician waits to choose the shade after the bonding protocol, there is a risk that the tooth will desiccate and become lighter, resulting in an incorrect match.) The body shade of restorative composite (Filtek™ Supreme Ultra Universal Restorative, 3M ESPE, www.3MESPE.com) was selected by using the Vitapan® tooth shade guide (Vident, www.vident.com) and choosing a color that matched the center portion of the tooth (Figure 2).

In cases such as this, it is important to discuss the patient's expectations for the level of esthetics in the final restoration. If the patient has low expectations and a monochromatic tooth, the case can be completed using one body shade. However, in this case, the depth of color, vitality, and translucency needed to mimic the adjacent tooth were complex and required a multiple-shade mock-up.

The dentin composite shade was also selected by using the Vitapan tooth shade guide and matching the visually exposed dentin of the fractured tooth. This layer provides opacity and color intensity. The enamel shade was selected by using the Vitapan tooth shade guide to match the proximal and/or incisal area of the adjacent nonrestored tooth. During this step, the 3M ESPE Shade Selection Wheel was used to assist by providing recommended shade recipes for multi-shade restorations. A dentin color was chosen that was one chroma higher than the final desired shade. The dentin color can be modulated by placing enamels and translucent composite shades over the dentin composite. This spatial perception allows the depth of color to come from within the restoration.

A translucent shade was also selected for internal use in order to create translucency on the incisal third. The translucent shade can also be used as the final facial layer over the top of the restoration to create depth while decreasing value to the restoration. Experimenting with these colors by placing the composite in its planned area of the restoration and curing it in its proper thickness allows a preview and a recipe map. This step is paramount to creating an imperceptible restoration. A putty lingual and incisal matrix of the mock-up was fabricated.

## PREPARATION

In order to produce a seamless, undetectable transition from tooth to restoration, a bevel was prepared on the facial aspect with a fine, tapered diamond bur. An infinity bevel, as described by Fahl, was prepared beginning 0.5 mm into the dentin and carried 2 mm to 2.5 mm past the fracture line, rounding the finish line (Figure 3).<sup>12</sup> A starburst bevel can also be used on the facial in cases like this<sup>3</sup>; the bevel varies in length, depth, and volume, mimicking a starburst pattern. In this case, the lingual prepara-

tion required a chamfer preparation of 0.8 mm to 1 mm.<sup>3</sup> This bulk of composite will sustain tooth flexure (Figure 4).

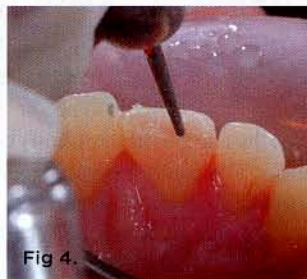
The tooth was microetched and rinsed, and a 37% phosphoric etch was applied for 15 seconds and agitated with a microbrush past the margins of the infinity bevel onto unprepared tooth structures. The tooth was rinsed for 5 seconds and lightly air-dried, leaving a moist dentin surface.

Adhesive (Scotchbond™ Universal Adhesive, 3M ESPE) was applied and agitated for 20 seconds and air-dried for 5 seconds in order to remove the ethanol water solvent. The area was then light-cured for 10 seconds.

The lingual increment of the composite—including the incisal facial line angles and the proximal contacts—was created by placing the white enamel (WE) composite inside the putty matrix, seating the matrix against the tooth, and light-curing for 20 seconds. The lingual matrix was removed, and while comparing it to the adjacent tooth, it was decided that some additional opacity was needed. Therefore, an additional thin layer of WE was placed on the incisal edge and cured (Figure 5).



Fig 1. Patient presented with a fractured right central incisor. Fig 2. The body shade of composite was selected by using the Vitapan tooth shade guide and selecting a color that matched the center portion of the tooth. The dentin shade of composite was selected by matching the fractured exposed dentin.



**Fig 3.** The infinity bevel preparation began 0.5 mm into the dentin and was carried 2 mm to 2.5 mm past the fracture line. **Fig 4.** The lingual chamfer preparation of 0.8 mm to 1 mm. **Fig 5.** The lingual shelf was created and an additional 1-mm rope of WE was placed on the incisal edge. **Fig 6.** The dentin shade was used to conceal the fracture line and to form the lobes. **Fig 7.** The primary anatomy required that the line angles of the central incisor converge 10 mm to 12 mm from the CEJ. **Fig 8.** Perikymata were created by using a coarse diamond bur with a low rpm and dragging it over the facial surface in a pendulum-like motion. **Fig 9.** Final polish using Sof-Lex finishing discs.



The dentin shade A2D was applied in two separate increments. A small amount was rolled into a ball and smoothed and feathered over the bevel. The second increment was used to form the lobes. Note that it is important to view the tooth from an incisal, occlusal view and not to build this layer too thick. This will allow for space for the final facial layer of enamel (Figure 6).

A combination of blue and clear translucent shades was then applied in between the lobes to provide internal characterization and an internal diffusion of light. When creating this layer, the contralateral central incisor was examined and the effects were mimicked.<sup>4</sup>

To create the translucency of the enamel, BIE composite was placed as a final facial layer and light-cured for 20 seconds. This final layer created an illusion of depth.

### FINISHING AND CONTOURING

Finishing and contouring were performed to ensure proper anatomical contour and imperceptibility between the composite and fractured tooth segment and the contralateral central incisor. Primary anatomy, which consists of the facial profile, outline form, and incisal embrasures, was refined by using a large, coarse finishing and polishing disc (Sof-Lex™, 3M ESPE). A central incisor exhibits three planes when viewed from a profile; the middle plane is flat and the incisal plane tips back towards the lingual. When viewed from the incisal, the facial incisal line angle must remain as close as possible to a 90-degree angle and not be rounded. When performing these adjustments, it is important to evaluate and mimic the contralateral tooth in all views.

Secondary anatomy, which consists of line angles and reflective surfaces, was contoured by using fine diamond burs. Line angles of a central incisor typically converge 10 mm to 12 mm from the cemento-enamel junction (Figure 7). Tertiary anatomy consists of major facial grooves, and in this case perikymata, which are lines on the enamel surface related to striae of Retzius. These were created by using a coarse diamond bur, turning down the revolutions per minute (rpm) on the electric handpiece and dragging it over the facial surface in a pendulum-like motion (Figure 8). Finishing discs (Sof-Lex™) were used as a final polish over the facial surface (Figure 9).

The contrast between the preoperative condition and the final restoration is depicted in Figure 10 and Figure 11.

### CONCLUSION

A myriad of options are available for restoring a fractured anterior tooth. The restorative used in this case is a nanocomposite material that is known for excellent polishability, polish retention, and wear resistance; therefore, it can be expected to serve well for years.

The conservative nature of the technique used allows the dentist to re-establish exceptional esthetics to the fractured tooth

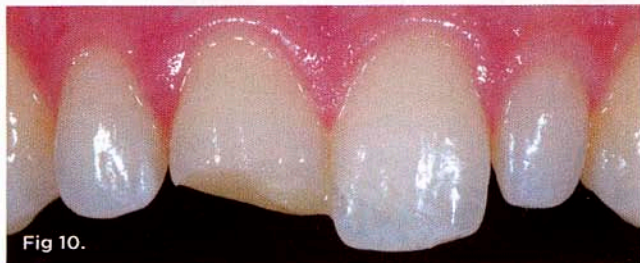


Fig 10.



Fig 11.

Fig 10. Preoperative photograph showing the fractured central incisor.  
Fig 11. The final conservative, esthetic, imperceptible restoration.

while having complete control over the procedure. Mastering the techniques of layering, contouring, and polishing of composite is paramount to the imperceptibility of the restoration.

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