

# Clinical Showcase

*Clinical Showcase is a series of pictorial essays that focus on the technical art of clinical dentistry. The section features step-by-step case demonstrations of clinical problems encountered in dental practice. This month's article is by Drs. Edward J. Barrett and David J. Kenny, speakers at the International Society for Dentistry, Sport and Trauma (ISDST) Fourth World Symposium on Sport Dentistry and Dental Trauma, which will be held August 26 and 27 in Montreal, in conjunction with the FDI World Dental Congress.*



## Emergency Vital Pulpotomy and Restoration

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Pulp exposure following a crown fracture is among the most common dental injuries. If the dental pulp has been exposed for less than 3 days, vital pulpotomy is the treatment of choice to facilitate recovery of the pulp. When successful, this procedure produces a tooth with normal root length and an apex sufficiently constricted to allow conventional endodontic treatment should the pulp eventually become necrotic.

A typical case illustrates the principles of vital pulpotomy. A 12-year-old girl was hit in the mouth with the butt end of a stick while playing street hockey with friends. She presented 6 hours after the injury with pulp exposure of approximately 3 mm × 2 mm (Figs. 1 and 2); she brought with her the fractured crown segment (Fig. 3). Radiography revealed that the root, while close to complete, still had an immature apex. There were no medical contraindications to treatment, and the child was prepared to cooperate.

In this case vital pulpotomy was chosen over direct pulp capping to ensure that the interface between the calcium hydroxide and pulp tissue was free of blood clot and excessive bacteria. Pulpotomy allows better pulp visualization, removal of blood clot and debris, and reduction of bacteria than direct pulp capping.

### Procedure

Once local anesthesia has been achieved, the dentist begins the procedure by opening the pulp chamber with a new fissure or diamond bur in a high-speed handpiece with irrigation (Fig. 4). The coronal pulp is removed to a depth of 3–4 mm with a round or football-shaped diamond bur in a high-speed handpiece with water irrigation. Other implements are not suitable for this procedure: a slow-speed round bur might become entangled in the pulp chamber tissue and the canal pulp may be torn free by the bur or stretched by a spoon excavator, especially if the tool is not brand new and sharp. High-speed diamond burs produce the desired debridement without damaging adjacent chamber or canal pulp.

The next phase is the most sensitive to technique and is critical for a successful outcome. In the vital pulpotomy technique described by Cvek,<sup>1</sup> the freshly bleeding pulp stump(s) must be compressed with a moistened pledget of cotton for 5 minutes to achieve hemostasis (Fig. 5). The damp cotton will not adhere to the pulp tissue and, unlike a dry cotton compress, will not stimulate bleeding when it is removed. The cessation of bleeding after a 5-minute application of pressure is an important diagnostic clue. Failure to arrest bleeding by the application of direct pressure indicates that the clinician should remove additional pulp tissue, possibly all of the coronal pulp if necessary to arrest bleeding after 5-minute compression cycles. If hemostasis cannot be attained with coronal pulpotomy, the clinician should proceed to pulpectomy and conventional endodontic treatment.

After the bleeding has been arrested, a dressing of nonsetting calcium hydroxide (e.g., Pulpdent, Pulpdent Corp., Watertown, Mass., or Calasept, Nordiska Dental, Angelholm, Sweden) is applied to the amputated pulp by means of a blunt cannula (Fig. 6) and is condensed with a moistened cotton pledget to ensure contact (Fig. 7). Before the restoration is initiated, a layer of glass ionomer lining (e.g., Vitrabond, 3M ESPE, St. Paul, Minn.) is placed over the exposed tissue to “protect” the calcium hydroxide paste (Fig. 8).

A glass ionomer seal should be used only as temporary protection for a few days before the tooth is restored with composite resin. In this case the fragment was to be reattached, so the glass ionomer, dentin and enamel surfaces were acid etched and bonded (Fig. 9). In addition, the fragment was hollowed out slightly (Fig. 10), and the trial fit demonstrated room for a composite resin interface. The resin was applied (Fig. 11), the 2 segments were approximated, and the composite resin interface was polymerized. When, as in this case, the tooth fragment is available, it can be used to effect a quick and esthetic restoration (Fig. 12) after pulp therapy.

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**Figure 1:** Lingual view of complicated crown fracture (i.e., with pulp exposed).



**Figure 2:** Incisal view of complicated crown fracture.



**Figure 3:** Fractured crown segment.



**Figure 4:** The pulp chamber is opened with a #56 flat fissure bur.



**Figure 5:** Hemorrhage is controlled after removal of 3–4 mm of chamber pulp.



**Figure 6:** Calcium hydroxide is extruded from the cannula onto the remaining chamber pulp.



**Figure 7:** Calcium hydroxide is compressed against the chamber pulp with cotton pledget.



**Figure 8:** Light-cured glass ionomer lining is packed against the calcium hydroxide.



**Figure 9:** Bond is applied over the glass ionomer seal.



**Figure 10:** Hollowed crown segment is acid etched and bonded.



**Figure 11:** Crown segment is reinforced with composite resin.



**Figure 12:** Labial view after vital pulpotomy and reattachment of the fractured crown segment.

### Summary Points

- Traumatically exposed pulp has very good regenerative capacity and prognosis.
- Vital pulpotomy has several advantages over direct pulp capping: visibility, ease of debridement and compression, and reduction of bacterial populations.
- Early pulpotomy improves prognosis and necessitates less removal of pulp tissue.
- There must be no blood clot between the remaining pulp and the calcium hydroxide.
- The calcium hydroxide interface must be protected by glass ionomer and composite resin restoration or the reattached fragment.
- Radiographic follow-up at 6 months is required. ➤

### Reference

1. Cvek M. A clinical report on partial pulpotomy and capping with calcium hydroxide in permanent incisors with complicated fracture. *J Endod* 1978; 4(8):232–7.



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*At the ISDST symposium, Dr. Barrett will be speaking on “The Emdogain case series: lessons from cell biology that affect replantation.” Dr. Kenny’s topic will be “Finite element modelling of blunt trauma to the maxilla.”*

*For more information on the ISDST symposium, visit [www.sportsdentistry.org](http://www.sportsdentistry.org) or e-mail [ISDSMontreal2005@aol.com](mailto:ISDSMontreal2005@aol.com).*