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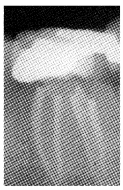

CASE REPORT

Long-term follow-up of a complicated crown fracture treated by partial pulpotomy

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Abstract

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Aim To present the 7-year follow-up of a permanent incisor with complicated crown fracture, treated by partial pulpotomy.

Summary A healthy permanent right central maxillary incisor with complicated crown fracture was treated by partial pulpotomy and reviewed clinically and radiographically for 7 years. At each recall, there was no spontaneous pain; the pulp showed signs of vitality and no periapical radiolucency developed.

Key learning points

• Partial pulpotomy may be a successful permanent treatment in cases of complicated crown fracture.

Keywords: complicated crown fracture, partial pulpotomy, permanent teeth.

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Introduction

A tooth fracture involving enamel and dentine that exposes the pulp is defined as complicated crown fracture. If there is a concomitant luxation injury, the pulp appears ischaemic but otherwise may appear healthy and bleeding (Andreasen *et al.* 1999).

Complicated crown fractures represent 18–20% of all traumatic injuries to permanent teeth (de Blanco 1996). Treatment options include direct pulp capping, pulpotomy (partial or cervical) or pulpectomy, depending on factors such as the interval between the accident and examination, the degree of root development and the size of the exposure. The key determinants of success are the extent of pulp damage and the length of time after exposure

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of the pulp to the oral environment (Heide & Mjör 1983). The objective of treatment in complicated crown fracture is to maintain the pulp vitality (McDonald 1974). Pulp capping was traditionally recommended for small exposures that occurred not more than a few hours previously. When the exposure site was large or the time elapsed between the accident and examination was long, because of the penetration of microorganisms into the tissue, vital pulpotomy was considered the treatment of choice (Cvek 1981).

Cvek (1978) demonstrated clinically high success rates (96%) for complicated crown fractures in permanent incisors treated by partial pulpotomy. Favourable outcomes were seen regardless of the size of the pulp exposure or the time passed between the accident and treatment. Although the success rates following partial pulpotomy are high, little information is available about the long-term effects of the treatment (Fuks & Chosack 1993, de Blanco 1996, Sarı 2002).

This case reports a 7-year follow-up of a permanent incisor with complicated crown fracture, treated by partial pulpotomy.

Case report

A 9-year-old boy was referred 2 days after falling at school. Clinical examination revealed a complicated crown fracture of tooth 11(FDI) (Fig. 1). The tooth was not mobile and gave a vital pulpal response on electronic pulp testing. Radiographic examination (Fig. 2) revealed that the root was incompletely formed with an open apex. There was no apparent periapical pathosis or alveolar bone fracture.

It was decided to treat the tooth by partial pulpotomy, using the technique recommended by Cvek (1978). Briefly, after local anaesthesia, the tooth was isolated with cotton rolls and saliva ejector. The exposed area was cleaned with sterile saline solution. The pulp was amputated to a depth of 2 mm using a diamond bur on a high-speed turbine with water-cooling. The wound surface was irrigated with a sterile saline solution and dried with cotton pellets to avoid clot formation. Calcium hydroxide powder mixed with distilled water was applied to the wound surface. The cavity was sealed with zinc-oxide eugenol cement and glass–ionomer cement before restoring with composite material (Fig. 3).

The tooth was examined clinically and radiographically at 3-month intervals during the first year. Healing was considered to have taken place when the following criteria were observed: (i) absence of clinical symptoms such as pain, tenderness to percussion, swelling etc; (ii) absence of any periapical pathology; (iii) continued root development and presence of dentine bridge; and (iv) positive response to electric pulp testing.

In the follow-up examinations the tooth met all the criteria mentioned above. After 7-years, the tooth was clinically symptomless, and displayed normal colour and mobility (Fig.4). Radiographically, the apex of the tooth was closed without any sign of pathology, and a dentine bridge was apparent at the pulpotomy site (Fig. 5).

Figure 1 Initial intraoral view of the patient.

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Figure 2 Initial periapical radiograph of the maxillary incisor.

Figure 3 Post-treatment radiograph of the case.

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Figure 4 Intra-oral view of the case after 7 years.

Figure 5 Periapical radiograph of the case after 7 years.

Discussion

The treatment of complicated crown fractures may involve pulp capping, partial pulpotomy or cervical pulpotomy. Direct pulp capping can be performed in small exposure cases when the time between the accident and treatment is short. When the time between the accident and treatment is long, the exposed pulp shows proliferative changes (Cvek 1978). This is because of the continuous salivary rinsing, which does not permit accumulation of debris and microorganisms, eventually leading to regressive changes (Fuks & Chosack 1993). Proliferative changes have been observed in a clinical

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study in humans (Cvek 1978) and in histological studies in monkey teeth (Cvek *et al.* 1982, Heide & Mjör 1983). Partial pulpotomy in contrast to cervical pulpotomy implies the amputation of only 1–2 mm of exposed pulp as that is the only part of the pulp tissue affected by inflammation (Cvek 1978). Partial pulpotomy procedure is quick and easy to perform. It allows the tooth to maintain its vitality and continue its root development. When considering the disadvantages of cervical pulpotomy, where the entire coronal pulp is removed, physiological apposition of dentine is prevented and risk of cervical fracture is increased. Thus, partial pulpotomy seems to be the treatment of choice in cases of complicated crown fractures with large exposure areas. Partial pulpotomy causes only limited injury to the pulp and limited loss of tooth substances, which is important for pulpal healing and facilitates subsequent restoration of a fractured crown (Cvek *et al.* 1982).

For many years, a conventional root filling has been recommended when root formation is completed, in teeth treated by pulpotomy (Hallett & Porteous 1963). Fuks *et al.* (1982) concluded that pulpotomy should not be considered an interim treatment that should be followed automatically by a complete root filling. They claimed that, regular periodic radiographic check-ups should be performed in order to disclose any pathosis that might eventually develop. Furthermore, clinical and histological findings confirm that partial pulpotomy is a permanent treatment both in immature and mature teeth (Cvek 1993, de Blanco 1996).

Conclusion

Long-term follow-up of this case report has shown that partial pulpotomy may be a successful permanent treatment in teeth with complicated crown fractures.

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