Long-term treatment of root fractures

Jozef Mincík and Marián Tulenko discuss the long-term treatment of root fractures with Rebilda Post System

Root fractures must be regarded as a form of complex trauma because they affect both the dental hard tissue and the periodontal and pulpal tissue. They result from powerful forces with compression zones acting in the root region. The consequence of fractures is that the tooth is split into a coronal and an apical fragment.

As regards the level at which the fracture occurs, a distinction is made between fractures in the apical, middle and cervical third of the root. It is known that young patients, in whom root growth is not yet complete, have the best prospects of the fracture healing.

Other factors that are favourable to the healing process include a positive sensitivity test at the time of the accident, no dislocation and no pronounced mobility of the coronal fragment. In the absence of dislocation, there is a danger of the fracture not being detected, and therefore imaging at two levels is necessary for the purpose of diagnosis (Arx von, Chappuis, Hänni, 2007).

The recommendation that a root fracture should be treated with rigid splinting for several months has long since become obsolete. No positive effect on the healing pattern in the region of the fracture gap was demonstrated with splinting for longer than four weeks (Cvek, Andreasen, Borum, 2001).

The factors determining the choice of treatment are the location of the fracture, the nature and degree of dislocation of the coronal fragment, and the stage of root growth. In the case of root fractures located entirely in the intra-alveolar region, the outcome is often favourable. With a root fracture, only the coronal fragment is treated as a rule because the apical portion generally remains vital (Andreasen, Hjorting-Hansen, 1967).

The specific case

In 1999, an 11-year-old patient came to our practice after a cycling accident. During the intraoral examination, we found greatly increased mobility of the upper right lateral incisor (UR2) and less pronounced mobility of the maxillary central incisors (UR1, UR2) after trepanation and temporary restoration. The partially erupted upper right canine (UR3) was undamaged.

The radiograph shows the root fractures of the upper right lateral incisor (UR2) (root region), the maxillary central incisors (UR1, UR2) (apical region) and the upper right lateral incisor (UR2) after trepanation and temporary restoration. The partially erupted upper right canine (UR3) was undamaged.
At the patient’s regular visits to our practice, the clinical and radiographic check-ups revealed no pathological changes up to 2008. However, nine years after the accident, the pulp test on the upper left central incisor (UL1) was negative. The radiograph shows an external inflammatory root resorption of this tooth in the fracture line (Figure 3).

Following a temporary calcium hydroxide dressing, a permanent restoration was placed in the affected upper left central incisor (UL1). The restoration extended as far as the fracture line because the apical region displayed no changes, and therefore was most probably vital – as is typical with root fractures (Figure 4).

The next check-up was two years later. The patient complained of discomfort at the upper right central incisor (UR1). The radiograph showed considerable healing of the external resorption of the fracture gap on the upper left central incisor (UL1) however, on the other hand, we diagnosed external resorption on the upper right central incisor (UR1), similar to the upper left central incisor (UL1) (Figure 5).

The upper right central incisor (UR1) received endodontic treatment similar to the upper left central incisor (UL1). The root canal filling extended as far as the fracture gap (Figure 6).

This check-up revealed a periapical process on the upper right lateral incisor (UR2), which was not filled to the apex because of an obliteration. In our opinion, the infection extended to the periapex, and therefore to the fracture line via the gingival sulcus. Consequently, we decided to secure both fragments of the tooth with the aid of the glass fibre-reinforced composite post Rebilda Post (Voco) and to seal the gap with composite. In this way it was possible to save the tooth.

We use the fibre-reinforced composite (FRC) Rebilda Post because this system has proved very successful in our experience. One of the benefits of this post is that it has a modulus of elasticity similar to that of the tooth. In this particular case, securing the fragments assists the treatment of the root fracture, and the adhesive luting creates a barrier against ingress of bacteria into the periodontium (Figures 7a-c).

Subsequently, we treated the periapical process surgically by performing a resection and retrograde restoration. We restored the bone defect with bone substitute material (Figures 8a and 8b).

The latest check-up, in June 2011, 12 years after the accident, shows formation of new bone in both fracture lines following the endodontic treatment. Furthermore, the radiograph confirms that the periapical process of the upper right lateral incisor (UR2) has healed following the resection (Figure 9).

Thanks to this treatment, the teeth are fully functional in spite of root fractures. With the exception of the discoloration on the upper right lateral and upper left
central incisors (UR2, UL1), the patient has been free of all symptoms for 12 years after the accident (Figures 10 and 11).

Conclusion
Our experience confirms that the prognosis for root fractures is very good in most cases. This may be linked with the fact that, in comparison with apical interruption of the blood supply, the revascularisation area is large and the distances to be bridged are small.

As mentioned at the beginning, the treatment is determined by the location of the fracture, the nature and degree of dislocation of the coronal fragment, and the stage of root growth.

References