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Repair of untreated horizontal root fractures: two case reports

CASE REPORT

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Abstract – To present two cases of root fractures which have healed spontaneously without any treatment? This article describes two untreated horizontal root fracture of the maxillary incisors. The fractured teeth were without any sign or symptom, and tested as vital to thermal and electric pulp test. These fractures were discovered during a routine full-mouth radiographic examination.

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Key learning points

- Root fracture may heal spontaneously without any treatment.
- Healing of the tooth is likely to be related to the absence of additional occlusal trauma.

Root fractures are generally defined as those that involve the dentin, cementum, pulp and periodontal ligament. The majority of teeth damaged in this way retain a vital pulp. Healing is observed in 74% of cases (1).

The prognosis for healing of a horizontal or transverse root fracture appears to depend on the same factors that help determine the prognosis for the vitality of the pulp after tooth luxations (2).

Treatment is usually directed at repositioning and stabilizing the coronal fragment in its correct position and monitoring the tooth for an extended period for pulp vitality (1). This following cases report the spontaneously reparative potential in the area of the root fracture.

Case 1

A 17-year-old male was referred to the department of endodontics and restorative dentistry with the complaint of carious lesions of the maxillary and mandible first molars. Routine examination of full mouth radiographs revealed horizontal root fracture in the middle third of the maxillary left incisor and a double lined of root fracture in the cervical and middle third of the maxillary right incisor (Figs 1–3). The history revealed a trauma to the premaxilla following a fall which has occurred 2 years before without any treatment. Clinical examination reveals no subjective symptoms. No discoloration of the coronal segment of the fractured tooth, mobility and tenderness to percussion were observed. The teeth tested appeared vital to thermal and electrical stimulation.



Fig. 1. Radiographic examination of the tooth 21 displays healing of middle third root fracture with bone surrounded by connective tissue (and can be seen) between the two segments. Note the absence of peri-apical or peri-radicular pathology.

Case 2

A 42-year-old female was referred to the department of endodontics end restorative dentistry for oral



Fig. 2. Radiographic examination of the tooth 11 displays healing of a cervical and middle third root fracture 2 years in stand of 6 months after the accident.

rehabilitation. The clinical examination revealed the presence of a discoloration at the level of the tooth 21 (Fig. 4). The patient reported an antecedent of traumatism dating > 10 years. No subjective symptoms, mobility and tenderness to percussion were observed. The thermal and electrical pulp sensitivity was not conclusive. The radiographic examination revealed horizontal root fracture in the middle third of the maxillary left central incisor. The pulp canal space was obliterated. The fragments were separated by bone with normal trabecular pattern (Fig. 5).

Discussion

Root fractures in permanent teeth are less frequent injuries comprising 0.5-7% of all trauma cases. Horizontal fractures occur most commonly in the middle-third of the root and rarely in the apical-third (3).

The horizontal root fractures cases exhibited a higher number of cases of pulp-vitality preservation than other luxation injuries without root fracture. Many studies have shown that most teeth with root fractures maintain pulpal vitality (1, 3). Successful union of root fragments is aided by vital pulp tissue and a healthy periodontium. Preservation of pulpal vitality improves the prognosis for healing. The prognosis of root fractures depends on the pulp tissue situation, dislocation of fragments (4). Andreasen et al. 2004 (5) reported the following factors to influence healing of root-fractured teeth:



Fig. 3. Periapical radiograph of the same teeth taken 6 months later.



Fig. 4. Buccal view of the case 2 showing the discrepancy in arch position secondary to the displacement of the coronal fragment because of the fracture.

- General and injury factors such as age, stage of root formation, level of fracture, degree of dislocation of coronal fragment, mobility of coronal fragment, diastasis of fragments.
- Treatment factors such as repositioning, type of splint. Welbury et al. 2002 (6) reported odds ratios > 2.0 for the following parameters to negatively influence pulpal vitality in root-fractured teeth:



Fig. 5. Periapical radiograph of the maxillary left central incisor displays healing of the horizontal root fracture. Note the pulp canal calcification seen in the coronal fragment, and also in both adjacent teeth.

- extrusive and/or horizontal displacement of coronal fragment
- concomitant coronal fracture
- cervical location of root fracture

Healing is initiated at both the pulpal and periodontal ligament sites, healing may therefore be competitive. In the absence of infection, the pulpal response can take two avenues depending on the integrity of pulpal tissue. If pulpal tissue remains intact, the response is essentially similar to a coronal pulp exposure and forms a hard tissue barrier uniting the two fragments. If the pulp is torn, pulpal healing is by a revascularization process and results in calcification of the coronal pulp space. During revascularization, periodontal cells may form a union of connective tissue between the segments. If the segments are separated or mobility is present, the formation of calculus is impeded, and the fibrous connective tissue similar to a periodontal ligament is formed between the segments. With wider separation, there may be bony growth between the segments. The fractured segments are lined with cementum with periodontal ligament between the tooth and the new bone (2, 3, 7).

Root canal therapy is not instituted until conclusive evidence of pulpal necrosis exists (4, 8). Actual treatment options with root fractures typically include reduction of the fracture and stabilization by semi-rigid fixation for about 3-4 weeks are actually recommended as initial treatment (9–11).

In the two cases presented here, clinical and radiographic observations showed functional fractured roots and no adverse effects were found such as pulpal necrosis, and/or periradicular infection. In the first case, we observed connective tissue around the border line of the fracture in the tooth 11 and bone surrounded by connective tissue in the tooth 21. In the second case, bone surrounded by connective tissue was formed. The observed repair pattern seems to occur only in the presence of vital pulp tissue.

Long-term follow-up of patients with injuries is important as pathological changes can occur several years following injury. However, healing of root fractures without treatment is also presented in many reports (12, 13). As illustrated in our cases, pulp can remain vital without any pathological changes after several years of trauma. An interesting finding is that no adverse effects were found even if the fracture is located in the cervical third in the case 1 and displacement of the coronal fragment in the case 2.

Conclusion

The fractured roots can spontaneously heal provided that the vitality of the pulp is preserved.

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