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Conservative treatment for root fracture located very close to gingiva

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Abstract – When a root fracture is located very close to the gingiva, the chance of healing with calcified tissue is poorest. Therefore, a preferable treatment is usually thought to be the removal of the coronal fragment and subsequent orthodontic or surgical extrusion of remaining apical fragment. This case report describes conservative treatment for root fracture located very close to the gingiva. The treatment of root fracture was by repositioning and fixation. A 7-years follow-up showed healing with calcified tissue and pulp canal obliteration.

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Key words: conservative treatment; fixation; reposition; root fracture

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Root fractures are relatively uncommon dental traumas, comprising 7% of the injuries affecting the permanent teeth (1). The principles of treating root fractures of permanent teeth are reduction of the displaced coronal fragment and firm immobilization. Root fractures at the cervical margin have been considered to have a very poor prognosis and extraction of the coronal fragment has been proposed before the orthodontic or the surgical extrusion of the apical fragment (2).

The purpose of this report was to describe a conservative approach comprising permanent proximal fixation of a root fracture located very close to the gingival with good healing at the 7 years follow-up examination.

Case report

An 8-year-old boy was referred to our clinic 1 day after falling from a horizontal bur. The right mandibular central incisor appeared luxated. The extra-oral examination revealed the swelling of the lower lip. The intra-oral examination revealed that there were neither lacerations nor evidence of alveolar bone fracture. The right mandibular central incisor was luxated with minor mobility and slightly sensitive to cold. The coronal fragment of tooth was displaced in a labial direction (Fig. 1). The luxated tooth responded to the electric pulp tester and had a high metallic sound to percussion test. The radiograph showed the right mandibular central incisor had not completed root development and had a root fracture located very close to the gingiva (Fig. 2).

Prior to repositioning of the luxated tooth, local anesthesia was administered. The coronal fragment was carefully repositioned into its original position. Superbond C & B (Sun Medical, Kyoto, Japan) with strengthener wire (Dentsply-Sankin, Tokyo, Japan) was used for fixation. The materials placed on both lingual side of the traumatized right central incisor and adjacent non-injured left central incisor. After acid-etching technique, super bond C & B was applied to the etched surfaces and a strengthener wire was buried into the super bond (Fig. 3). The patient was then seen every month for 4 months.

During the fixation period, the patient was asymptomatic. After 2 months, the fixation was removed, because the radiograph showed the state of healing of the fractured fragment. The radiograph indicated that the fractured tooth had not yet completed root development (Fig. 4). The luxated tooth responded to the electric pulp tester and had a high metallic sound to the percussion test. Tooth was still mobile to labial and lingual direction. After 10 months, the radiograph showed partial pulp canal obliteration. The radiopacity of the fracture line was increased. The formation of apex indicated completion of root development (Fig. 5). The high

Fig. 1. Frontal view of laterally luxated root fracture at the initial visit (1 day after the injury).

Fig. 2. The right mandibular central incisor was fractured horizontally in the gingival third of the root.

metallic sound to percussion test had decreased and the tooth showed normal mobility. After 7 years, the radiograph showed pulp canal obliteration along the entire pulp cavity. In coronal fragment, the pulp chamber could not be visualized because of marked pulp canal obliteration (Fig. 6). The high metallic sound to percussion test was further decreased. The tooth now had normal

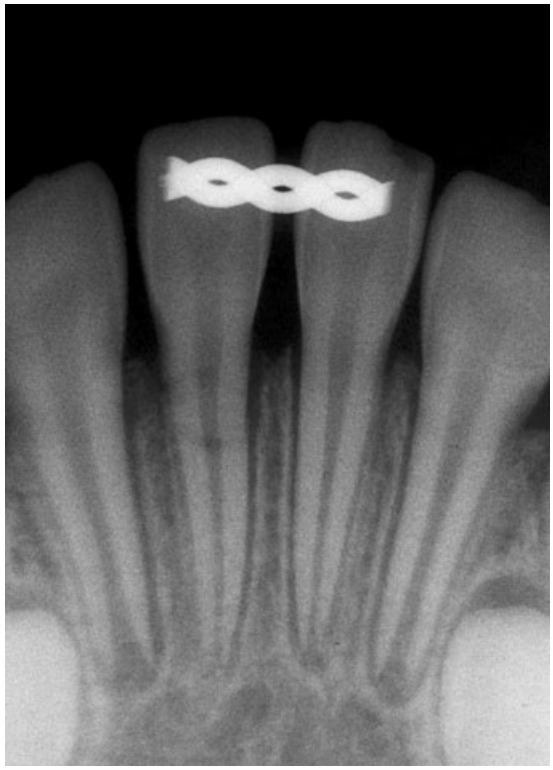

Fig. 3. Superbond C & B with a strengthener wire was applied to the etched enamel surface for fixation.

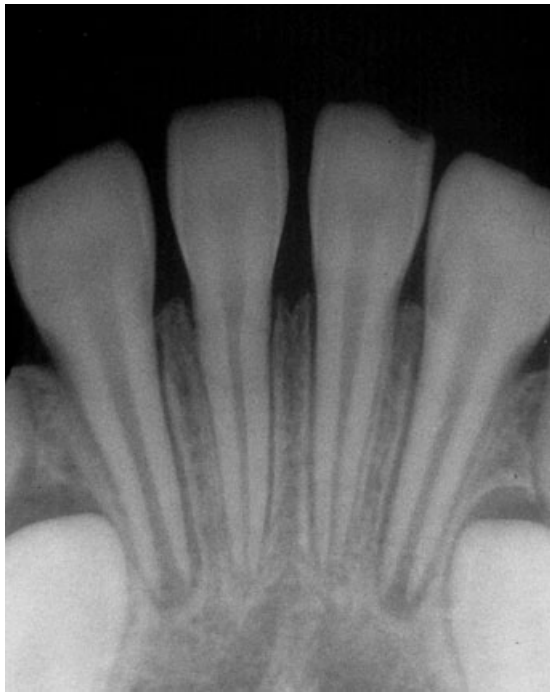

Fig. 4. After 2 months, fixation was removed, because the radiograph showed healing of the fractured fragment.

mobility similar to the left central incisor. The gross appearance of traumatized right central incisor was similar to the non-injured left central incisor (Fig. 7).

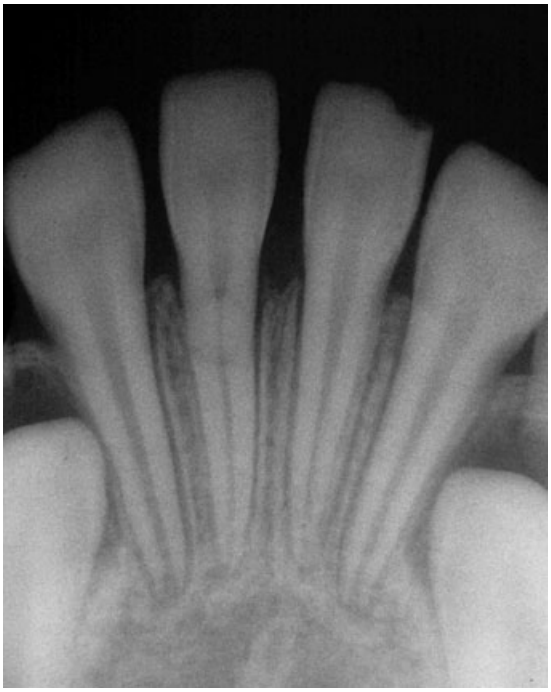

Fig. 5. After 10 months, the radiograph showed partial pulp canal obliteration.

Fig. 6. After 7 years, the radiograph showed pulp canal obliteration along the entire pulp cavity.

Discussion

Root fracture is usually because of a frontal impact that creates compression zones labially and lingually. The resulting shearing stress zone then dictates the plane of fracture. Fractures of the middle third of the root were reported to be the most frequent, while fractures of the apical and cervical thirds occurred with equal frequency (3, 4).

Fig. 7. Frontal view of laterally luxated root fracture after 7 years.

Root fracture healing was divided into four events by radiographic and histological observations (5): (i) healing with calcified tissue, (ii) interposition of connective tissue, (iii) interposition of bone and connective tissue, (iv) interposition of granulation tissue. The chance of healing with calcified tissue is poorest when cervical fracture line is very close to the gingiva. A preferable treatment has been thought to be the removal of the coronal fragment and subsequent orthodontic or surgical extrusion of remaining apical fragment (2). Recent studies (4, 6, 7) reported that no relationship could be demonstrated between the frequency of pulp necrosis and position of the fracture line, and therefore extraction of teeth has not been supported. In this case, conservative approach was attempted, because the fractured tooth had immature root formation. The result in this case was complete root formation and healing with calcified tissue. We have estimated three factors in this positive outcome: (i) absence of pulpal infection from ginigival sulcus because the patient practiced good oral hygiene, (ii) the pulp had a good blood circulation because the tooth was immature with an opened apex, (iii) the patient had good healing capability because he was young.

We feel that under condition described in this case that a conservative approach should be attempted before extraction or orthodontic extrusion.

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