原文題目(出處)：	Revascularization of an immature permanent tooth with periradicular abscess after luxation. Dent Traumatol 2011;27:55-8.
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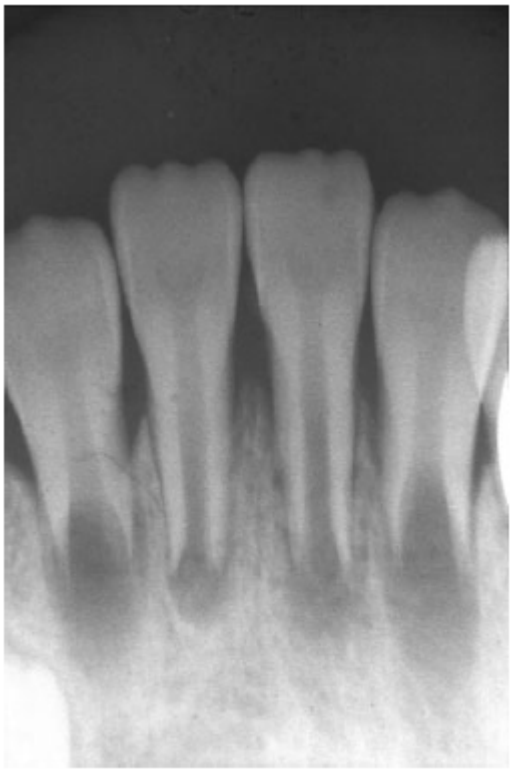
內文：

Abstract

1. An immature permanent mandibular central incisor with periapical involvement in a 7-year-old boy was treated to promote revascularization.
2. The tooth suffered from acute apical periodontitis after periodontal treatment by a general practitioner.
3. The root canal was not mechanically cleaned during the treatment period, but was irrigated with hydrogen peroxide and sodium hypochlorite.
4. At the fifth visit vital tissue appeared in the canal near the apical region, and calcium hydroxide compound was placed in contact with the soft tissue in the root canal.
5. Radiographic examination 30 months after the initial treatment confirmed closure of the apex and thickening of the root wall. The case was observed for up to 13 years and root development was confirmed.
6. Most of the reported cases have been mandibular premolar teeth, and the rest have been mainly maxillary incisors.

Case report

1. The patient was a 7-year-old boy. He received a scaling of lower incisors with a hand instrument by a general dentist in May of 1996. Soon after the treatment, he complained of pain and movement of both mandibular central incisors. He visited Tohoku Welfare Pension Hospital for special treatment in June of 1996.
2. The clinical findings of the patient were as follows;
    1) Gingival swelling around the mandibular anterior teeth with mobilities of these teeth for the right central incisor and lateral incisor and for the left central incisor.
    2) Radiographic examination revealed that both central and lateral incisors had incomplete root formation and a periodontal ligament space in the left central incisor was widened (Fig. 1).
    3) Positive response to thermal (Pulper Dental Coolant, GC, Tokyo, Japan) and electric (PulpTester; AT Analytic Technology, Redmond, WA, USA) sensitivity testing were confirmed from the right central and lateral incisors but not from the left central incisor.



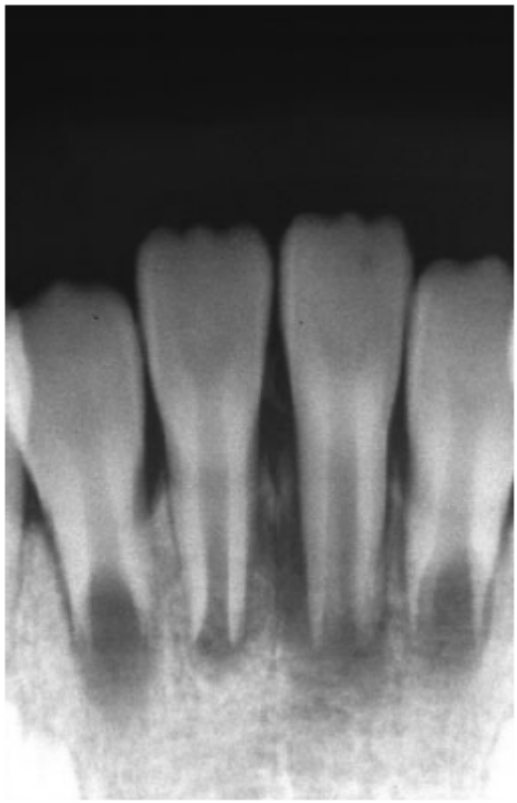
(Fig.1)

3. Diagnosis:

1) Subluxation was made for the right mandibular central incisors and lateral incisors
2) Lateral luxation and suspected apical periodontitis was made for the left central incisor

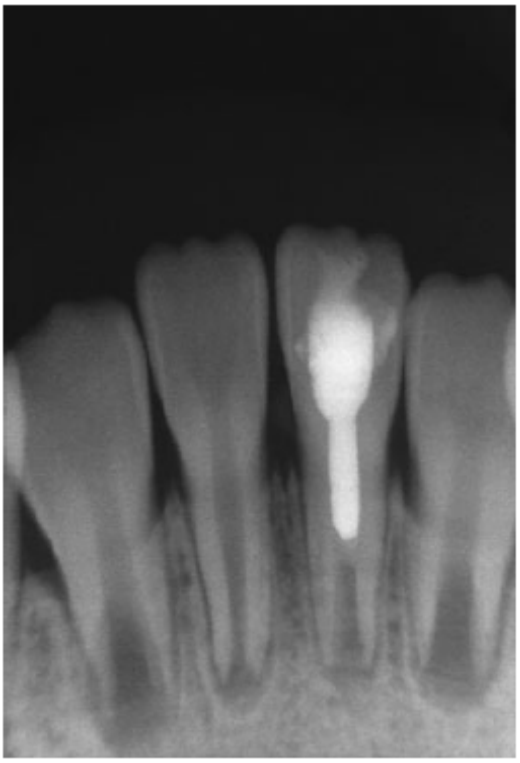
4. Based on the diagnosis, the anterior mandibular teeth were stabilized using adhesive resin, and antibiotics (Amoxicillin 600 mg per day for 3 days) were prescribed for the patient. 19 days after the initial visit, gingival swelling and abscess formation occurred on the left
central incisor (Figs 2 and 3).

(Fig.2)



(Fig.3)

5. Therefore, the diagnosis of the left central incisor was changed to acute apical periodontitis, and root canal treatment was initiated.
The fixation was prolonged for 2 weeks for a total of 4 weeks.
6. When the access cavity was prepared on tooth 31, bloody and purulent exudate discharged from the pulp chamber.
7. The patient had no pain sensation when the access cavity was prepared and also when a smooth broach was inserted into the canal. The tooth was left open until the next visit to achieve drainage through the canal.
8. The patient visited the hospital weekly and the discharge of exudates stopped by the second visit. Until the fifth visit the access cavity was opened to the canal orifice and the upper part of the root canal was irrigated using 5% sodium hypochlorite and 3% hydrogen peroxide. Calcium hydroxide compound (Calcipex, Nippon Shika Yakuhin, Shimonoseki, Japan: Calcium hydroxide 24%, Barium sulphate 24%, distilled water and others 52%) was placed in the upper part of the root canal. The root canal was not mechanically cleaned during the treatment period.
9. At the fifth visit, existence of vital tissue approximately 10 mm from the orifice was confirmed by visual inspection. Insertion of a smooth broach into the canal elicited a painful response. At the sixth visit, calcium hydroxide compound (Vitapex, Neo Dental Chemical Products, Tokyo, Japan: Calcium hydroxide 30%, Iodoform 40.4%, Silicone Oil 22.4%, Inert 6.9%) was placed in contact with the soft tissue in the root canal, and the access cavity was sealed with glass–ionomer cement followed by adhesive composite resin.
10. A radiograph taken 3 months after application of Vitapex revealed the first signs of apical closure and dentin bridge formation (Fig. 4).


(Fig.4)

11. Thirteen months after the application of Vitapex, the canal was opened, and using an explorer the formation of a dentinal bridge was found subjacent to the filling material. There was a positive response to electric pulp testing on the surface of the newly-formed dentinal bridge.

12. The upper part of the root canal was filled with warm gutta-percha system followed by adhesive composite resin. Radiographic examination 30 months after the initial treatment confirmed closure of the apex and thickening of the root wall (Fig. 5).


(Fig.5)

13. Postoperative radiograph after 11 years showed distinct lamina dura (Fig. 6). 13 years after the first visit, the tooth was in good condition without root fracture, obvious discoloration or other problems.

(Fig.6)

Discussion

1. In this case report, the mandibular central incisor received an excessively forceful scaling resulting in luxation.
2. We speculate that the infection of the root canal was caused either by direct invasion of bacteria through the periodontal pocket or by bacteremia caused by the injury of the periodontal pocket by the scaler. As far as we can find, revascularization of such a traumatized immature mandibular incisor tooth without any pulp exposure has not been reported. In addition, the patient was, as far as we can find, the second youngest among the existing reports on pulp revascularization.
3. Banchs and Trope speculated that calcium hydroxide would cause necrosis of tissues with the potential to differentiate into new pulp. Andreasen et al. reported that long term calcium hydroxide as a root canal dressing might increase the risk of root fracture.
4. In the present case report, we considered that the cytotoxic effect of calcium hydroxide was negligible as it was placed only in the coronal part of the canal. However, the application of calcium hydroxide compound for the purpose of revascularization should be carefully evaluated.
5. The bactericidal efficacy of a mixture of ciprofloxacin, metronidazole and minocycline in the infected root canals has been confirmed in in vitro studies by Hoshino et al. and Windley et al. However, side effects of dressing with a mixture of antibiotics has been also reported. Crown discoloration, development of resistant bacterial strains and allergic reaction to the intracanal medication have been reported. Considering this, we did not use a mixture of antibiotics in the present case.
6. Intentional formation of a blood clot by irritating apical tissue using an explorer and other instruments have been advocated. In such treatment protocols, mineral trioxide aggregate was placed over the blood clot.
7. Similar to the previous case report, we waited for the growth of vital tissue from the apical area without intentional manipulation. It is uncertain whether intentional

manipulation would be effective in cases where growth of vital tissue is unlikely.
8. It has been reported that teeth with an apical foramen larger than 1.1 mm have the potential for revascularization after replantation. The larger the diameter of the apical foramen, the more blood supply into the root canal would be anticipated. In the present case, the diameter was more than 1.1 mm as measured on the radiograph taken at the initial visit. This factor may have contributed to the achievement of revascularization.

題號	題目
1	How many diameter that teeth with an apical foramen larger than have the potential for revascularization after replantation? (A) 0.9mm (B) 1.1mm (C) 1.3mm (D) 1.5mm
答案(B)	出處：Kling M, Cvek M, Meja` re I. Rate and predictability of pulp revascularization in therapeutically reimplanted permanent incisors. Endod Dent Traumatol 1986;2:83–9.
題號	題目
2	Which one is not one of the side effects of dressing with a mixture of antibiotics have been reported? (A) Crown discoloration (B) Development of resistant bacterial strains (C) Allergic reaction to the intracanal medication (D) Root fracture
答案(D)	出處：Reynolds K, Johnson JD, Cohenca N. Pulp revascularization of necrotic bilateral bicuspids using a modified novel technique to eliminate potential coronal discolouration: a case report. Int Endod J 2009;42:84–92.