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Case Report

Traumatic injury to permanent tooth resulting in complete root resorption: a case report

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Abstract: When a tooth is avulsed and replanted following traumatic dental injury, complications such as replacement and inflammatory resorption may occur. Ultimately, resorption may result in loss of the tooth. This case report describes a traumatic injury to a permanent tooth resulting in complete root resorption within a short period, which required surgery. In the present case, improper treatment measures such as dry condition of the avulsed tooth before replantation and extra-oral retrograde root canal filling may have led to rapid complete root resorption. Even if it is impossible to avoid resorption completely, the overall knowledge of both dentists and patients regarding traumatic dental injuries should be improved to delay the progress of resorption. (J. Oral Sci. 49, 341-344, 2007)

Keywords: dental trauma; resorption; avulsion; replantation.

Introduction

In clinical practice, traumatic injuries to the incisors are observed very frequently in pediatric cases, and the number of children who experience such trauma is increasing yearly (1). However, because the age at the time of injury and the condition of the teeth during the initial visit to the hospital vary, a wide range of treatment measures have been advocated for trauma to permanent teeth. The prognosis of patients with such trauma is often affected by the skill and experience of the dentist. Numerous studies have attempted to determine the most appropriate treatment of avulsed teeth (2-9).

Here, we report a case of traumatic injury to a permanent tooth that resulted in complete root resorption and required surgery.

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Case Report

A 9-year-old boy visited the Department of Pediatric Dentistry at Nihon University Dental Hospital with the chief complaint of loss of the left maxillary central incisor. The medical history and family history of the patient were unremarkable.

In August 2004 (approximately 5 months before his first visit to the department), during a visit to his parent's hometown, the patient collided with his younger brother in a swimming pool while the latter was coming down a water slide. He hit his left maxillary central incisor, resulting in its avulsion. He took the avulsed tooth wrapped in tissue paper to a dental clinic immediately and underwent tooth replantation approximately two hours after the injury. He said that the position and angle of the replanted tooth after the replantation differed from those before the injury, and that the replanted tooth was not splinted. There were no other serious postoperative problems. In January 2005, he crashed against the wall of his school's gymnasium and injured the same tooth again. Only the crown of the tooth fell out this time. He immediately visited a nearby dental clinic and was advised to undergo a detailed examination. Thus, he visited the department the day after the second injury.

Intra-oral findings

Dental age: IIIA, Overjet: 3.1 mm, Overbite: 0.0 mm

The left maxillary central incisor was missing and a laceration approximately 5 mm was observed on the

gingival margin. There was no bleeding or swelling (Fig. 1). However, the patient complained of severe gingival pain on palpation. He had brought the crown of the left maxillary central incisor in a Tupperware container to the department (Fig. 2).

Fig. 1 Initial photograph

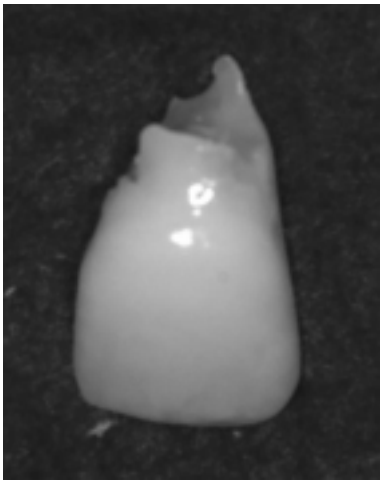

Fig. 2 The crown of the left maxillary incisor

Fig. 3 Initial radiograph

X-ray findings

The root of the left central incisor root was not visible. Radio-opacity was observed in the alveolar bone probably due to the retained gutta-percha point. The right central incisor root was incompletely formed with an open apex (Fig. 3).

Treatment

The foreign substance was surgically removed from the alveolar bone (Figs. 4, 5) and a partial denture was fabricated to replace the lost incisor.

Discussion

Trauma to the teeth frequently occurs in childhood immediately after the eruption of maxillary incisors in both the primary and permanent dentitions. In the classification by Ellis and Davey, class VII (avulsion) are most common

Fig. 4 Photograph of surgery

Fig. 5 Enucleated gutta-percha points and tissues

in the permanent incisors, with 6.4% of such cases involving complete avulsion (1).

Chappuis et al. (10) reported that the survival rate of a tooth that was completely avulsed and replanted was 95.6% one year after replantation. They suggested that the induction of replacement resorption after replantation was influenced by the time lag between avulsion and replantation during which the tooth is exposed to dry conditions. Donaldson et al. (11) reported that the time limit for successful replantation was 15 minutes, while Mclntyre et al. (2) reported a time limit of 20 minutes if the tooth had been exposed to dry conditions. In the present case, complete root resorption had occurred within a very short period of 5 months after the replantation. This could be explained by the poor condition of the periodontal ligament, probably due to the exposure of the avulsed tooth to dry conditions for two hours.

Since no cavity preparation was observed in the crown, it was assumed that retrograde root canal filling by gutta-percha points had been performed outside the oral cavity. Inflammatory resorption of the root is triggered by small disturbances in the periodontal ligament or cementum due to trauma, and occurs frequently in teeth with an immature root because the dentinal tubule is wide and the cementum coating the root surface is thin in such teeth (11). Moreover, root canal filling using calcium hydroxide is generally recommended to avoid the inflammatory resorption consequent to trauma (12). In this case, retrograde root canal filling by gutta-percha points outside the oral cavity, not only prolonged the extra-oral time, but also resulted in unnecessary damage to the tissue at the apical area of an immature root. These treatment flaws are assumed to be the cause of the rapid root resorption.

The rapid external inflammatory resorption and replacement resorption might have also been due to improper techniques such as the avulsed tooth not being returned to its appropriate position in the alveolar socket and the tooth not being splinted.

From this case, we consider it necessary to adequately educate school and pool facility personnel regarding the immediate management of traumatic injuries, to stock preservative solution for avulsed teeth at places where trauma to teeth often occur, to establish a tie-up between such places and specialized dental clinics, and to improve the knowledge of both dentists and patients regarding management of traumatic injuries (13). Also, because surgical invasion was required in this case, it is essential to provide parents with sufficient information on the prognosis of teeth that experience trauma and importance of follow-up after replantation.

In conclusion, the following points need to be considered in the clinical management of avulsed permanent incisors with open apex:

1. Extraoral time; 20 minutes or less is ideal, and the tooth should be soaked in preservative solution or cold milk.
2. A tooth with open apex may revascularize, therefore, whether it needs root canal treatment or not should be decided after follow-up.
3. Replanted teeth should be splinted for a minimum of 7-10 days.

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