Eruption disturbances of mandibular permanent incisors

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In this study, we analyzed 7 eruption disturbance cases of mandibular permanent incisors (5 males and 2 females), aged 5y9m to 10y4m. The etiology was divided into 3 categories: traumatic injuries (3 cases), odontomas (2 cases), supernumerary teeth (2 cases). The procedures such as removal of cause (4 cases), surgical exposure (5 cases) and traction (1 case) were done.
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INTRODUCTION

There are few reports on eruption disturbances of mandibular permanent incisors. Such disturbances are very rare in comparison with the maxillary permanent incisors.[1-5] According to our study in 1996[6] among the outpatients of the Pedodontic Clinic in Niigata University Dental Hospital, the number of eruption disturbances in mandibular permanent incisors was only 7 (1.5%) from a total of 476 permanent teeth except for the third molars. One case was associated with cleidocranial dysostosis. In this paper, we analyzed 6 of the past 7 cases and one more case found in 1998, all of which were cased by local factors, and studied the etiology, treatments and prognoses of eruption disturbance in mandibular permanent incisors.

MATERIAL AND METHODS

This study consisted of 7 Japanese children (5 males and 2 females), aged 5y9m to 10y4m at the beginning of treatment for eruption disturbances of mandibular permanent incisors (Table 1). The observation periods ranged from 2 months to 15 years and 5 months.

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The etiology, types and periods of treatment and prognoses after treatment were obtained and estimated from the clinical records, radiographs and intra-oral photographs.

RESULTS

The causes of the present 7 cases were divided into 3 categories; traumatic injuries (3 cases), odontomas (2 cases) and supernumerary teeth (2 cases).

Eruption disturbances caused by traumatic injury

In 3 cases (Cases 1, 2 and 3), traumatic injury caused eruption disturbances of mandibular permanent incisors. In Cases 1 and 2 whose injuries of the primary teeth occurred at ages were 2y0m and 2y5m, disturbed eruption of the permanent teeth about 4 years later. The female in Case 1 avulsed and lost all four mandibular primary incisors. Although the mandibular left permanent central incisor was surgically exposed at the age of 5y9m because of non-eruption (Figure 1A), it was extracted 2 months later as there was no tendency for eruption and severe root dysplasia. The adjacent central and lateral incisors also showed slight dysplasia of the cervical region (Figure 1B).

The male in Case 2 suffered from tooth luxation of all four mandibular primary incisors and the right canine. At the age of 6y4m, the mandibular right permanent central incisor was noticed to have delayed root development compared to the left one (Figure 2) and was surgically exposed. The incisor began to erupt 3 months later with slight hypoplasia on labial surface. There were no anomalies of eruption or dysplasia in the other mandibular permanent incisors and canine.

At the age of 7y6m, the male of Case 3 fractured the crown of his mandibular left permanent central incisor and his right central incisor had not erupted yet. Although the right central incisor was under orthodontic traction since the age of 8y6m due to its non-erup-

Table 1. Treatment course and prognosis in each case

Case	Sex	Affected Tooth	Etiology	Treatment Start	Treatment
1	F	31	traumatic injury	5 y 9 m	surgical exposure
2	M	41	traumatic injury	6 y 4 m	surgical exposure
3	M	32	traumatic injury	8 y 6 m	surgical exposure
4	M	42	odontoma	7 y 10 m	surgical exposure
5	M	42,43	odontoma	10 y 4 m	surgical exposure
6	M	32,33	supernumerary tooth	9 y 6 m	surgical exposure
7	F	32,33	supernumerary tooth	8 y 2 m	surgical exposure

tion (Figure 3), it was extracted 4 months later because ankylosis of the tooth was surmised.

Eruption disturbances caused by odontomas and supernumerary teeth

Calcified obstacles interrupted eruption of mandibular permanent incisors in 4 cases (Cases 4 to 7). A small odontoma within the dental follicle in Case 4 delayed eruption of the mandibular right lateral incisor (Figure 4) and a large odontoma in Case 5 caused non-eruption of the mandibular lateral incisor and canine (Figure 5).

After surgical removal of the odontomas at the ages of 7y10m in Case 4 and 10y4m in Case 5, the obstructed permanent teeth progressed toward eruption within the alveolar bone. However, as the teeth did not erupt spontaneously, surgical exposure was required in both cases. The lateral incisor erupted soon in Case 4 and showed slight hypoplasia on the incisal edge of the crown. The lateral incisor in Case 5 was extracted due to space deficiency after surgical exposure by an orthodontist who aligned the canine in the dentition without traction.

Eruption disturbances were caused by supernumerary teeth in two cases (Cases 6 and 7). In both cases, the immature calcified germ of a supernumerary tooth disturbed eruption of the mandibular right lateral incisor and canine. Although the lateral incisors and canines moved toward eruption after removal of the cause, the canine in Case 6 needed surgical exposure about one year later. The other 3 affected teeth erupted spontaneously and were progressed toward alignment.

DISCUSSION

Causes for eruption disturbances of mandibular permanent incisors

Many causes for eruption disturbances of the maxillary permanent incisors have been reported. They include severe dental caries with apical lesion,[7] odontoma,[7-11] supernumerary teeth,[7,8,12] trauma in the incisor region,[7,8] or immature lateral incisor.[13] However, there are few descriptions of disturbance of mandibular permanent incisors[1-5] and the anomaly, therefore, is considered to be less frequent. Our previous study,[6] on eruption disturbances of all permanent teeth except for the third molar in Japanese children also revealed that disturbance was most frequent in maxillary incisor region and its prevalence rate was 49.4%, in contrast to mandibular incisor region in which the disturbance was less frequent and its prevalence was only 1.5%.

The present study elucidated that the most frequent cause for eruption disturbances of mandibular permanent incisor is traumatic injury to the incisor region, followed by odontomas or supernumerary teeth, although only a total of seven cases were analyzed.

Eruption disturbances caused by traumatic injuries

Traumatic injury of a primary tooth causes many kinds of anomaly of the permanent successor; dysplasia of the crown and/or root, interruption of the root development, abnormal position or direction of eruption, and non-eruption or impaction.[14-16] It is also well known that anomalies are more likely to be transferred to the successor tooth when the injured the patient is young, and that the severity of the anomaly depends upon the type of injury and the strength of the hazardous external force.[17]

In Cases 1 and 2, the primary teeth of both patients were traumatized at a fairly young age. One of the three permanent successors in Case 1 was affected by severe dysplasia of the crown; no root developed, and the incisor had to be extracted. The severe dysplasia would be related to the young age of the patient at injury. Fortunately, the adjacent central and lateral incisors in Case 1 did not have to be extracted, but still suffered from moderate dysplasia in the cervical region. On the other hand, only one of 5 permanent successors in Case 2 was slightly damaged, and its root development was some-

Figure 1 Case 1. A radiograph showing severe root dysplasia of the left unerupted central incisor (A, arrow), which was surgically exposed at the age of 5y9m and extracted 2 month later. The adjacent central and lateral incisors after eruption, showing slight dysplasia of the cervical region (B).

Figure 2 Case 2. Radiograph showed delayed root development of right central incisor (arrow), which was surgically exposed and began to erupt 3 months later.

Figure 3 Case 3. The left lateral incisor (arrow) did not respond to the orthodontic traction due to ankylosis and was extracted four months later.

what delayed. The difference in severity between Cases 1 and 2 might be related to the modality of the hazardous external force and the type of injury.

In Case 3, ankylosis of unerupted permanent lateral incisors was recognized one year after injury. Yachida[16] reported that the root of a permanent incisor ceased to develop after exposure to an accidental hazardous force, even if the tooth did not fully erupt and the root was incompletely developed. Although there are many studies concerned with ankylosis after tooth luxation and replantation,[18-20] unerupted teeth such as the incisor in Case 3 have not been reported to become ankylosis after trauma. It was supposed, that the external force evoked by injury would be conducted even indirectly to the unerupted tooth germ via the alveolar bone, and that the root development was damaged and replacement resorption occurred as a result of repair of the periodontium.

Eruption disturbances caused by odontomas or supernumerary teeth

A small immature odontoma in Case 4 disturbed the eruption of a single tooth and relatively large odontoma in Case 5 disturbed the eruption of two teeth. It has been reported that even immature odontomas in the early stage of development as well as those already highly

Figure 4 Case 4. A radiograph shows a slight enlargement of the dental follicle of an unerupted tooth at the age of 6y10m (A). One year later, a new radiograph reveals an odontoma within the dental follicle. The odontoma was removed. As the disturbed incisor did not erupt after one year, it was surgically exposed (B). Four months after surgery, the incisor is fully erupted but an area of slight hypoplasia was detected on the incisal edge of the crown (C, arrow).

developed, can disturb the eruption of the incisors, even if they are very small and show little radio-opacity because of the low degree of calcification.[11,21,22]

It has been also demonstrated that affected teeth move toward eruption within the alveolar bone after removal of odontomas.[11] After removing of odontomas, the lateral incisors in Cases 4 and 5 also had their position improved spontaneously toward eruption within the bone, during 1-year and 1-year-7-months respectively. In Cases 6 and 7, in which eruption disturbances were caused by supernumerary teeth, the correction would occur in the same way.

In Cases 4 and 6, however, surgical exposure of the tooth was needed just before eruption. Recent pathological findings have suggested that the oral mucous membrane overlying an impacted and/or unerupted tooth can change from a normal to a pathogenic lesion, called myxofibrous hyperplasia, and might secondarily disturb the eruption.[23] This may be the reason why surgical exposure was required just before eruption and the unerupted incisors started to erupt soon after extirpation of the oral mucous membrane.

In Case 5, although a similar pathogenic change might have occurred in the mucous membrane, the space deficiency for eruption would be the primary reason for oral non-emergence of the lateral incisor during the 1 year and 7 months after removal of the odontoma. Extraction of the lateral incisor easily led the adjacent canine to align within the dentition.

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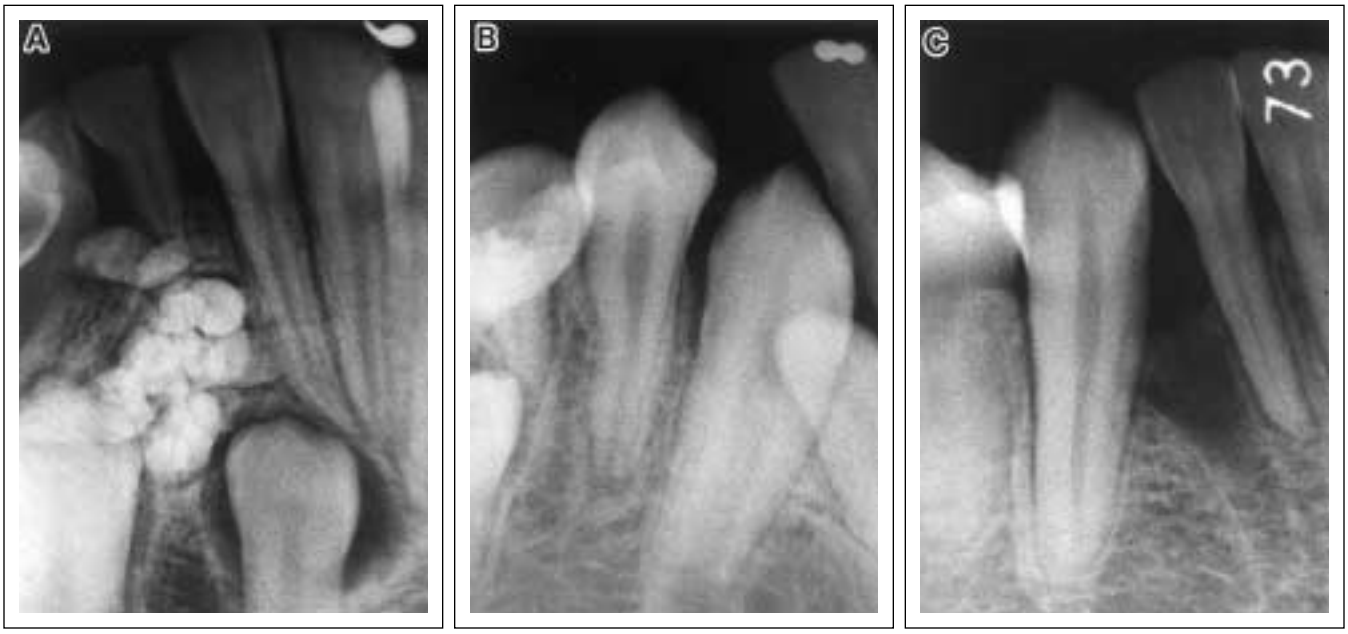

Figure 5 Case 5. A radiograph showing a large odontoma over the tooth germs of the right permanent lateral incisor and canine at the age of 10y4m (A). One year and seven months after removal of the odontoma, both permanent affected teeth had not erupted yet and were surgically exposed (B). The right canine aligned well within the dentition after the lateral incisor was extracted due to space deficiency (C).

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