Unilateral delayed eruption of maxillary permanent first molars: four case reports

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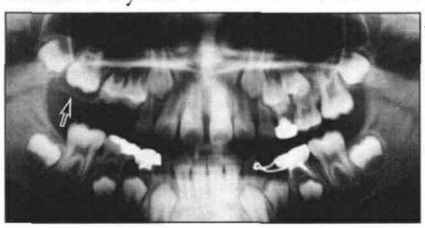
Delayed eruption or impaction of permanent teeth is one of the severe problems that can occur during the mixed dentition period. These conditions can occur in any permanent tooth, but the incidence of delayed eruption of the permanent first molars, especially maxillary permanent first molars, is very low. Johnsen[1] found only one case of delayed emergence of a maxillary first molar as a result of local etiologic factors in a review of the records of 1032 young people ranging in age from 8 to 18 years. Dachi and Howell[2] examined 1685 sets of radiographs at the University of Oregon and found no case of impacted permanent first molars. Grover and Lorton[3] found only one case of an unerupted maxillary first molar in their survey of the panoramic radiographs of 5000 Army recruits ranging from 17 to 26 years of age. Kramer and Williams[4] examined 3745 panoramic radiographs of oral surgery patients, and found three cases of an impacted mandibular first molar but no impacted maxillary first molar cases.

Permanent first molars are known as the "key teeth" in occlusion, and it is very important that the delayed permanent first molars be guided to the correct position in the dental arch. We encountered four cases of unilateral delayed eruption of maxillary permanent first molars at the Pedodontic Clinic of Niigata University Dental Hospital. We diagnosed the patients as having delayed eruption if either more than one year had elapsed since the antimere had erupted fully or it did not erupt at all. According to the research carried out by the Japanese Society of Pedodontics in 1988,[5] the mean age at the time of eruption of the maxillary permanent first molars is 6 years 8 months ±8 months for Japanese boys and 6 years 7 months ±8 months for Japanese girls. Fenestration of the gingiva was performed surgically in each patient and occlusal guidance by traction was used for one. This paper presents the clinical and histopathological findings in these four cases of unilateral delayed eruption of maxillary permanent first molars.

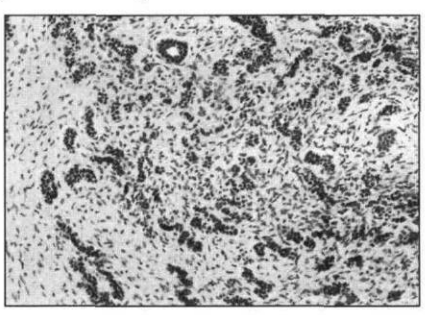
Case reports

Case 1

A 7-year, 11-month-old Japanese girl visited our clinic with the complaint of unerupted maxillary right permanent first molar. The maxillary left permanent first molar had erupted at the age of 6 years, 4 months. Intraoral examination revealed no swelling or redness of the gingiva in the region of the maxillary right permanent first molar. The extent of root formation of the maxillary first molars was one-half on the unerupted right side and three-fourths on the left side. Radiographs revealed a radiolucent area surrounding the crown of the unerupted first molar (Fig 1). When the girl was 8 years old, the overlying gingiva was surgically excised and the thin alveolar bone which covered the mesial half of the occlusal surface was also removed to expose the tooth. The specimens were sent for pathological examination. In the submucosal layer, there were numerous small islands or cords of odontogenic epithelium among the mesenchymal fibrous tissue (Fig 2). The pathological diagnosis was ameloblastic fibroma. Five months after fene-stration,the maxillary right permanent first molar erupted spontaneously.



◀ Fig 1. Case 1. Panoramic radiograph showing a radiolucent area surrounding the crown of the unerupted maxillary right permanent first molar.



▶ Fig 2. Case 1. Photomicroghaph of the excised gingiva (H&E, original mag. 50x). There are numerous small island or cords of odontogenic epithelium amond the mesenchymal fibrous tissue.

Case 2

An 8-year, 3-month-old Japanese boy was diagnosed as having delayed eruption of the maxillary left permanent first molar based on the panoramic radiograph obtained during a dental check-up at our clinic. The contralateral counterpart had erupted at the age of 7 years, 7 months. There was no swelling or redness of the gingiva in the maxillary left first molar region. Radiographic examination (Fig 3) revealed that the impacted maxillary left first molar was located near the left maxillary sinus, and there was a radiolucent area containing a small, radiopaque mass situated occlusal to the left first molar, preventing eruption. The root development of the maxillary permanent first molars was one-fourth on the unerupted left side and three-fourths on the right side. The tooth formation of the maxillary left permanent second molar adjacent to the affected first molar was also delayed compared with the antimere. On the normal right side, the tooth crown of the maxillary permanent second molar had already calcified, while on the left side the calcification of the tooth crown was at the initial stage. The gingiva overlying the left permanent first molar was excised twice, first when the patient was 8 years, 5 months and then at 9 years, 1 month, and the specimens were sent for pathological examination. Microscopically, islands or cords of odontogenic epithelium that resembled dental papillae were observed among the mesenchymal tissue (Fig 4). A small mass of calcified tissue was identified as immature enamel matrix covered with enamel epithelium. The pathological diagnosis was ameloblastic fibroma with tooth-like structure. After the second operation, the unerupt-ed first molar began to erupt spontaneously.

Case 3

A girl aged 10 years, 3 months was diagnosed with delayed eruption of the right maxillary first molar. The maxillary left permanent first molar had erupted when she was 6 years, 2 months old, but the right first molar had not erupted until she was 9 years, 8 months old, at which time the maxillary right permanent first molar and second premolar had begun to erupt together. The second premolar erupted fully but the first molar did not. Radiographic examination revealed nothing that would prevent the eruption (Fig 5). When she was 10 years, 3 months old, the overlying gingiva of the right permanent first molar was surgically excised and the occlusal surface exposed. After surgery, there was no further eruption and orthodontic traction was applied. At the age of 10 years, 10 months, she showed full eruption of the maxillary right permanent first molar (Fig 6). The excised gingiva was examined microscopically, and it showed hyperplastic myxoid tissue of the submucosal layer. The histopathological diagnosis was myxofibrous tissue of the gingiva (Fig 7).

Case 4

A 7-year, 7-month-old girl was brought to our clinic because of cross bite of the maxillary right permanent lateral incisor. The first oral examination revealed that the maxillary right permanent first molar had fully

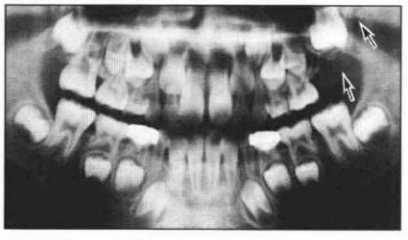


Fig 3. Case 2. Panoramic radiograph showing a radiolucent area with a small radiopaque mass occlusal to the maxillary left permanent first molar. The tooth formation of the maxillary left second molar adjacent to it is also delayed compared with the antimere.

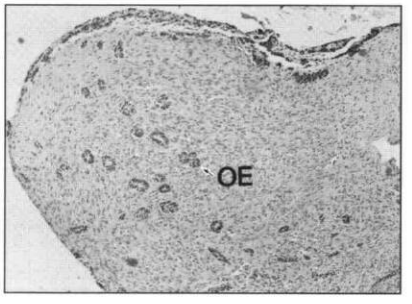


Fig 4. Case 2. Photomicrograph showing the odontogenic epithelial islands (OE) in the mesenchymal tissue which resemble dental papillae (H&E, Original mag. 25x).

Fig 5. Case 3. Periapical radiograph showing the unerupted maxillary right permanent first molar (arrow).

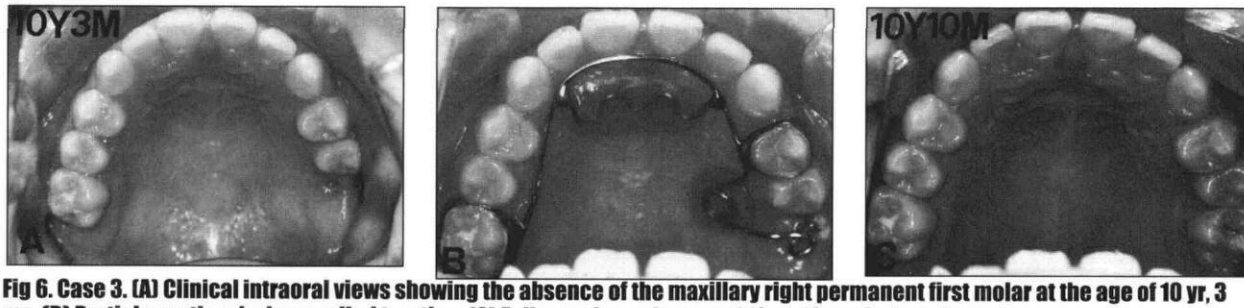


Fig 6. Case 3. (A) Clinical intraoral views showing the absence of the maxillary right permanent first molar at the age of 10 yr, 3 mo. (B) Partial eruption during applied traction. (C) Full eruption at he age of 10 yr, 10 mo 9mirror image).

TABLE. REPORTED CASES OF DELAYED ERUPTION/IMPACTION OF PERMANENT FIRST MOLARS

Author	*Year*	*Age*	*Sex*	*Location*	*Treatment*	*Histology*
Miller[7]	1976	6yr, 6mo	M	mandible	enucleation of the lesion and impacted first molar	ameloblastic fibro-odontoma
		12 y, 6 mo	M	maxilla	curettage	ameloblastic fibro-odontoma
		12 y	M	maxilla	curettage	ameloblastic fibro-odontoma
Grover[3]	1985	28 y	M	maxilla	surgical removal of the odontoma and impacted first molar	odontoma
Goho[8]	1987	7yr	F	mandible	surgical removal of the overlying soft tissue	dense, fibrous connective tissue
Spratley[9]	1988	9y	F	mandible	radical exposure of the tooth	—
Matsuyama[10]	1991	13yr, 2 mo	M	mandible	enucleation of the tumor	ameloblastic fibro-odontoma
		10yr, 6mo	M	mandible	enucleation of the tumor	complex odontoma
		9yr, 2mo	M	mandible	enucleation of the tumor	odontogenic fibroma
		8yr, 8 mo	F	mandible	enucleation of the tumor	ameloblastic fibro-dentinoma

erupted but the left one had not emerged. The panoramic radiograph, obtained when she was 8 years, 1 month old, showed that the root formation of the left first molar was in the beginning stage and that on the right side was one-third. The tooth development of the neighboring maxillary left second molar was also delayed compared with that of the right molar (Fig.8). We observed the left first molar for 9 months and when she was 8 years, 10 months old she was diagnosed as having delayed eruption of the maxillary left first molar. The overlying gingiva was surgically excised. The first molar started to erupt 1 month after the excision. Microscopic examination revealed immature collagen fibers irregularly distributed in the myxoid tissue under the hyperplastic mucosal epithelium, as well as odontogenic epithelial islands (Fig 9). The pathological diagnosis was myxofibrous tissue of the gingiva.

Discussion

There are systemic and local factors that influence delayed eruption of permanent first molars. The systemic factors[6] include a familial tendency to retardation of eruption and metabolic or endocrine disturbances. Local factors[1] are odontogenic tumors (such as ameloblastic fibroma, odontogenic fibroma, and odontoma), cysts, malformed teeth, supernumerary teeth, delayed tooth development, insufficient arch space, inclination against the second primary molar, and mucosal barrier due to gingival fibrosis[6]. The table summarizes the reported cases[3,7–10] of the impaction or delayed eruption of the permanent first molars, including mandibular molars. Because the age at detection in most reported cases is around 10 years, pediatric dentists are more likely than general practitioners to encounter and diagnose such cases. In most cases, odontogenic tumor was a contributing factor, as shown in the Table. When the delayed eruption is caused by local factors, unilateral failure usually occurs. In our cases, the failure of eruption was unilateral, for which local factors are indicated as the most likely cause. In two cases each,

the pathological diagnosis was ameloblastic fibroma or myxofibrous tissue. These odontogenic tumors and fibrous tissue impeded tooth emergence. Kramer et al.[11] pointed out that a dental follicle may become thickened when a tooth fails to erupt and that the thickened follicular fibrous tissue is often myxoid.

The tooth development of all the unerupted maxillary permanent first molars was delayed compared with that of their counterpart. In two cases, the maxillary permanent second molars adjacent to the affected first molars also showed delayed development. This indicates that delayed tooth formation on the affected side may be one reason for delayed eruption.

As to the treatment of the delayed eruption of the maxillary permanent first molars, surgical intervention is required. The surgical objective is to remove the impediment and to assist eruption by exposing the crown. After exposure of the crown, we usually observe the site for 3 months, using radiography if the wound closed following surgical exposure. In some cases, as in case 2, a second surgical exposure may be necessary. If no tendency to erupt is recognized, then traction is applied as in case 3. When the tooth development of the adjacent second molar is also retarded and there are no pathologic findings on the radiograph, we can keep the patient under periodic observation as in case 4. Our treatment in all four patients involved exposure of the tooth crown, and traction was applied in one case. All four delayed maxillary first molars erupted satisfactorily.

Conclusions

When we encounter a case of delayed eruption of first permanent molars, we remove the overlying tissue or pathological lesions surgically to expose the crown after checking the radiograph. When the development of both the first and second molar is retarded and there are no pathological radiographic findings, we periodically observe the patient and then decide whether surgical intervention is necessary. After surgical intervention, we observe the condition and if we cannot recognize any tendency to erupt, we apply traction.

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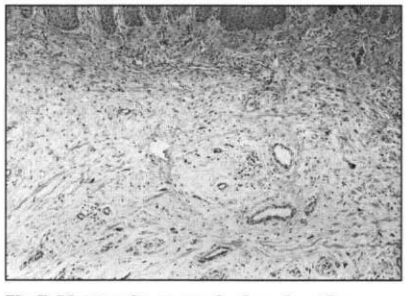

Fig 7. Photomicrograph showing the hyperplastic myxoid tissue of the submucosal layer (H&E, orig. mag 25x).

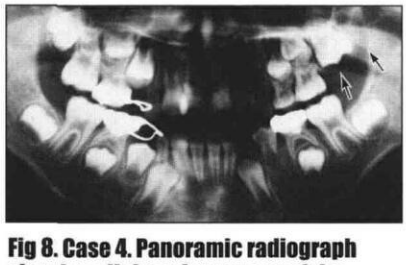

Fig 8. Case 4. Panoramic radiograph showing slight enlargement of the follicular sac of the maxillary left permanent first molar. The root formation of the molar is in the beginning stage while that of the right counterpart is one-third. The tooth development of the neighboring maxillary left second molar is delayed compared with the antimere.

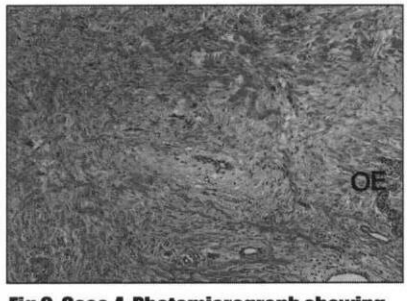

Fig 9. Case 4. Photomicrograph showing immature collagen fibers irregularly distributed in the myxoid tissue and odontogenic epithelial islands (OE) (H&E, orig mag. 25x)