

Delayed Spontaneous Eruption of Severely Infraoccluded Primary Second Molar: Two Case Reports

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Infraocclusion occurs at an early age and becomes worse with age, causing increased damage in young children. Extraction of affected teeth is the preferred treatment modality for prevention of possible complications. It is rare for a primary molar to temporarily exhibit secondary failure of eruption, followed by regeneration of full eruptive capacity. This report was written to describe two patients who experienced spontaneous eruption of an infraoccluded primary molar at approximately 7 years of age. While watchful waiting is not always a suitable treatment option, we propose that extraction be deferred until the first permanent molar erupts, unless significant problems occur.

Keywords: *infraocclusion, ankylosis, primary molar, spontaneous eruption.*

INTRODUCTION

Infraocclusion is a condition in which the occlusal surface of a tooth is located below neighboring teeth. The adjacent teeth are able to erupt, while the affected tooth maintains its position.¹ The reported incidence of infraocclusion in the literature ranges from 1.3% to 38.5% and varies with age.¹⁻³ The mandible demonstrates a higher incidence of infraocclusion than the maxilla.^{1,4}

The mechanism underlying the occurrence of infraocclusion is not fully understood, but the principal etiology is regarded as ankylosis between the roots of the infraoccluded tooth and the surrounding bone.⁵⁻⁷ Several factors are believed to contribute to infraocclusion, including genetic predisposition, deficient eruptive force, disruption of periodontal ligament metabolism, local inflammation, and disruption of the interaction between normal resorption and hard tissue.^{1,8-12} Diagnosis is typically made based on clinical presentation, with severity classified as mild, moderate, or severe depending on the position of the occlusal surface of the infraoccluded tooth relative to adjacent teeth.^{4,12,13} Slight ankylosis involves submergence of less than 2 mm, whereas moderate ankylosis causes infraocclusion to the contact area. Severe ankylosis results in clinical submergence well below the adjacent contact area. This infraocclusion may cause significant occlusal problems, such as inclination of adjacent teeth, leading to space loss and over-eruption of opposing teeth. The infraocclusion may progressively worsen with age and continuing adjacent vertical alveolar growth.^{9,10,13,14}

It is extremely rare for a primary molar to temporarily exhibit secondary failure of eruption followed by regeneration of full eruptive capacity. This report describes two patients who experienced severe infraocclusion of a mandibular primary second molar, followed by spontaneous eruption of the submerged tooth without treatment. In addition, we discuss issues that should be considered when planning potential interventions in patients with severe infraocclusion of a primary molar.

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Case reports

These two patients presented for assessment at the Department of Pediatric Dentistry of Kyungpook National University, Daegu, South Korea. There were no specific findings with respect to the patients' family, medical, or dental histories.

Case 1

A 6-year-old girl was referred from a local clinic for management of a submerged primary molar. Intraoral examination showed that the patient had early mixed dentition with an infraoccluded mandibular left second primary molar (Figure 1A). Initial panoramic radiographs revealed the presence of all permanent successors, including a rotated mandibular left second premolar (Figure 1B). In addition, delayed development of the left maxillary first molar was observed, but follow-up was chosen based on the root development stage. The primary molar was inferiorly positioned with complete root apices in close proximity to the developing successor crown (Figure 1C). There was no periodontal ligament space in the furcation and there were no obstacles in its eruption path. Based on clinical and radiographic findings, the provisional diagnosis was ankylosis of the primary molar. In accordance with the Messer and Cline classification,⁴ the tooth exhibited severe infraocclusion because it was located under the adjacent contact area. The treatment of choice was extraction of the infraoccluded tooth, followed by a

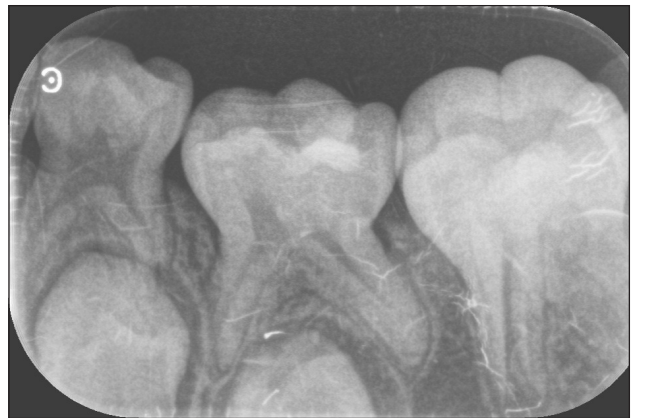
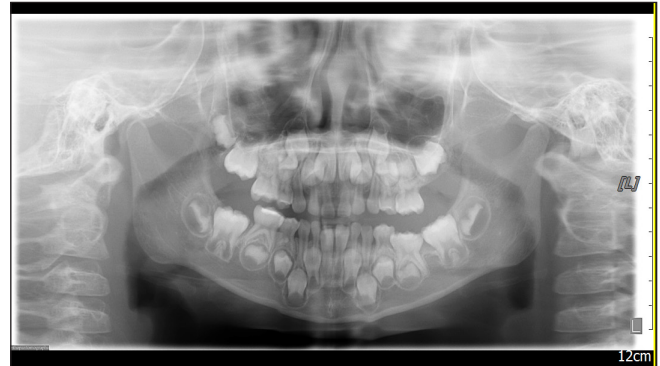


Fig. 1. Case 1 (A) Initial intraoral view showing severe submergence of the left mandibular second primary molar. (B) Panoramic view showing the presence of all permanent successors, including a rotated mandibular left second premolar. (C) Periapical view showing complete root apices in close proximity to the developing successor crown. (D) Intraoral photograph showing spontaneous re-eruption of the submerged tooth at the 7-month follow-up. (E) Panoramic view showing that the left mandibular primary molar reached occlusal level. (F) Periapical view showing a normal periodontal ligament space. (G) Intraoral view showing that the primary molar maintained normal occlusion.

space maintainer. However, this treatment was postponed because the affected tooth was located close to the permanent successor; we suspected the potential for problems with the permanent successor's development if extraction were performed at that time. While awaiting the development of the permanent successor, spontaneous re-eruption of the submerged tooth occurred without intervention by the 7-month follow-up; simultaneously, eruption of the adjacent permanent first molar had occurred (Figure 1D, E). A normal periodontal ligament space was observed radiographically (Figure 1F). Subsequently, the primary molar maintained normal occlusion, and no treatment was needed with the exception of periodic recall check (Figure 1G).

Case 2

A 6-year-old boy presented with an unerupted mandibular right second primary molar. An intraoral examination revealed a slight pit extending inside of the gingiva (Figure 2A). Gingival tissue covered the distal portion of the infraoccluded tooth, which had led to the development of caries (Figure 2B). Radiographic examination revealed a distally displaced second premolar tooth germ, which was underdeveloped relative to the antimere (Figure 2C). The permanent successor was positioned inferiorly and distally to the coronal portions of the infraoccluded primary molar. Extraction of the primary molar was planned due to the severity of infraocclusion at a young age, as well as evidence of caries in the tooth. However, extraction of the tooth was postponed because it was located near the tooth germ of the permanent successor; moreover, the patient's mother reported that the patient did not complain of pain or discomfort with respect to the affected tooth. Signs of spontaneous eruption were observed with development of the successor by the 9-month follow-up, as determined by routine radiographic and clinical examination (Figure 2D, E). Panoramic radiographs also showed a displaced eruption path and favorable development of the permanent successor (Figure 2F). Because of this spontaneous eruption, treatment for caries was completed easily.

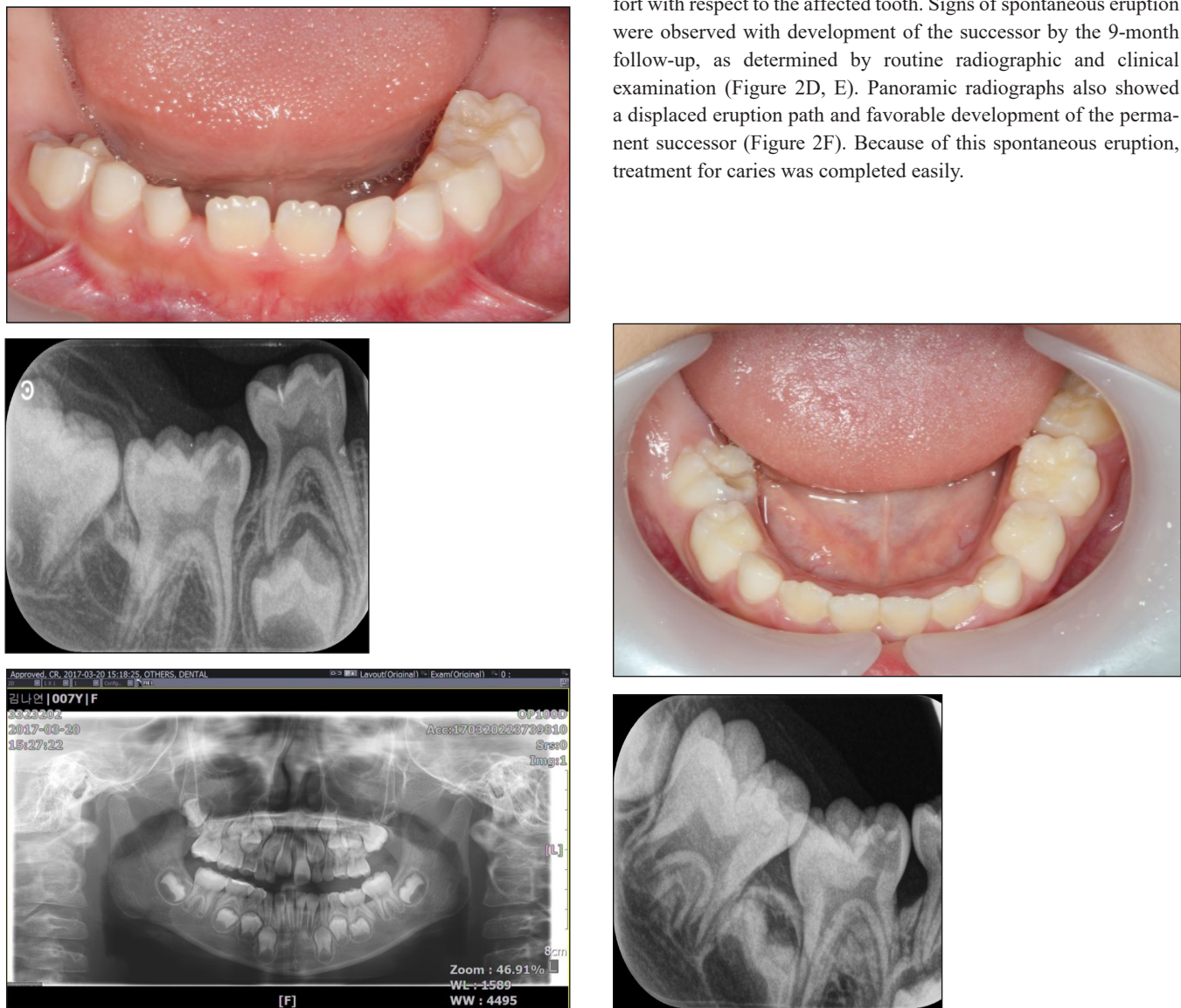


Fig. 2. Case 2. (A) Initial intraoral view showing the non-erupted state of the right mandibular primary molar. (B) Periapical view showing dental caries in the right mandibular second primary molar. (C) Panoramic view showing the mandibular right premolar positioned inferiorly and distally to coronal portions of the infraoccluded primary molar. (D) Nine months later, the affected primary molar re-erupted without intervention. (E) Periapical view showing that the right mandibular second primary molar reached occlusal level. (F) Panoramic view showing re-eruption of the affected molar and favorable development of the permanent successor.

DISCUSSION

Infraocclusion of primary molars is observed relatively often in the pediatric dental clinic. However, it is rare for a mandibular second primary molar to become ankylosed before eruption of the first permanent molar.⁵ Infraocclusion may become magnified with skeletal growth due to compensatory eruption of adjacent teeth.^{9,10} Therefore, earlier infraocclusion increases the potential for problems such as tipping of adjacent teeth, bony defects, and delayed eruption of permanent successors.^{13,14} As severe infraocclusion at a young age causes many problems, the most widely recommended management is extraction to prevent adverse results.^{4,15,16}

However, in the patients described in this report, infraoccluded mandibular primary second molars spontaneously erupted before extraction of the affected molar could be performed. In both patients, infraocclusion resolved within 7 to 9 months. Because the patients exhibited early mixed dentition, there were no severe complications, with the exception of mild supra eruption of opposing teeth, which resolved naturally with eruption of the affected molar. Although the affected primary molar erupted into normal functional occlusion in case 1, the re-erupted tooth was inclined to the lingual side in case 2. There was a difference between the two cases in the displacement of subsequent permanent teeth, but all experienced natural re-eruption together with the adjacent permanent first molar.

Most infraocclusion is thought to be due to ankylosis.^{5,17} Assuming that infraocclusion in our patients was caused by ankylosis, there may have been a causal factor that caused resorption of the ankylosed area; both patients experienced re-eruption because there were no obstacles in the eruption paths. Most infraoccluded primary molars with a permanent successor exfoliate normally due to the movement of the erupting successor.¹⁸ The ankylosed condition of the primary tooth is resolved during the physiological resorption process, which is delayed, indicating that ankylosis is typically a transient phenomenon.¹⁹ The dental developmental stages of the successors in our patients, however, corresponded to Stage D (Demirjian method), which is a preeruptive rather than a prefunctional eruptive phase.²⁰ Successional permanent tooth germs develop on the lingual aspect of their deciduous predecessors, within the same bony crypt. Preeruptive movements occur in an intraosseous location and are reflected in the patterns of bony remodeling within the crypt wall.¹⁹ Bodily movement of the permanent tooth germ may have influenced absorption of the ankylosed part by an unknown mechanism.

Based on the findings in these patients, we propose that extraction be deferred until the first permanent molar erupts, thereby allowing space maintenance wherever possible. Early extraction may be technically difficult and may result in root fracture or damage to the developing crown of the successor.^{21,22} The developing follicle is in very close proximity to the primary tooth, as we have shown in this report. Kirshenblatt revealed that an aggressive surgical approach to the extraction of severely infraoccluded teeth may result in permanent damage to the succedaneous teeth.²² Moreover, young children rarely cooperate with surgical treatment. Appropriate considerations (e.g., the need for general anesthesia) should be given to behavior management of the child. Space loss may occur after extraction; therefore, space maintenance should be implemented until the permanent successor has erupted. Moreover, early extraction of infraoccluded primary molars will require space management for a longer period, throughout the transitional dentition. Finally, there is a possibility of eventual spontaneous re-eruption prior to extraction of an affected tooth. Belanger reported a similar case in which early ankylosis of a mandibular second primary molar spontaneously resolved.²³

We are not suggesting that this is a normal occurrence in all patients with severe infraocclusion, but we wish to highlight this unusual finding with respect to a poorly understood clinical presentation. A watchful waiting strategy cannot always be used in treatment of infraoccluded teeth; however, considering that spontaneous re-eruption is extremely rare, elucidating the mechanisms underlying its occurrence might enable iatrogenic triggering of re-eruption, thus providing new forms of therapy. During watchful waiting, careful observation and monitoring are essential to enable intervention at the first sign of any undesirable outcomes, thereby preventing significant problems later in dental development.

CONCLUSION

This report described spontaneous eruption of severely infraoccluded primary molars in two 6-year-old children. The findings in this report suggest that infraoccluded primary molars may have eruptive potential and can become functional within the dentition. While a watchful waiting strategy cannot always be used in treatment of ankylosis, it may be useful in primary dentition if there are no complications before the eruption of permanent first molars.

REFERENCES

1. Kuroi J. Infraocclusion of primary molars: an epidemiologic and familial study. *Community Dent Oral Epidemiol*; 9:94-102, 1981.
2. Steigman S, Koyoumdjisky-Kaye E, Matrai Y. Submerged deciduous molars in the preschool children: an epidemiologic survey. *J Dent Res*; 52:322-6, 1973.
3. Jenkins FR, Nichol RE. Atypical retention of infraoccluded primary molars with permanent successor teeth. *Eur Arch Paediatr Dent*; 9:51-55, 2008.
4. Messer LB, Cline JT. Ankylosed primary molars: results and treatment recommendations from an eight-year longitudinal study. *Pediatr Dent*; 2:37-47, 1980.
5. Brearley and McKibben: Ankylosis of primary molar teeth. prevalence and characteristics. *J Dent Child*; 40:54-63, 1973.
6. Douglass J, Tinanoff N. The etiology, prevalence, and sequelae of infraocclusion of primary molars. *ASDC J Dent Child*; 58:481-3, 1991.
7. Darling AI, Levers BG. Submerged human deciduous molars and ankyloses. *Arch Oral Biol*; 18:1021-40, 1973.
8. Biedermans W. Etiology and treatment of tooth ankyloses. *Am J Orthod*; 48:670-684, 1962.
9. Tieu LD, Walker SL, Major MP, Flores-Mir C. Management of ankylosed primary molars with premolar successors: a systematic review. *J Am Dent Assoc*; 144:602-11, 2013.
10. Peretz B, Absawi-Huri M, Bercovich R, Amir E. Inter-relations between infraocclusion of primary mandibular molars, tipping of adjacent teeth, and alveolar bone height. *Pediatr Dent*; 35:325-328, 2013.
11. Rasmussen P, Kotsaki A. Inherited primary failure of eruption in the primary dentition: report of five cases. *ASDC J Dent Child*; 64:43-7, 1997.
12. McDonald R, Avery D, Dean J. Eruption of the teeth: local, systemic, and congenital factors that influence the process. *McDonald and Avery's Dentistry for the Child and Adolescent*, 8th ed, St. Louis; 184-6, 2004.
13. Kennedy DB. Treatment strategies for ankylosed primary molars. *Eur Arch Paediatr Dent*; 10:201-10, 2009.
14. Hvaring CL1, Øgaard B, Stenvik A, Birkeland K. The prognosis of retained primary molars without successors: infraocclusion, root resorption and restorations in 111 patients. *Eur J Orthod*; 36:26-30, 2014.
15. Ponduri S, Birnie DJ, Sandy JR. Infraocclusion of secondary deciduous molars—an unusual outcome. *J Orthod*; 36:186-9, 2009.
16. Parisay I, Kebriaei F, Varkesh B, Soruri M, Ghafourifard R. Management of a severely submerged primary molar: a case report. *Case Rep Dent*; 2013, 2013.
17. SK Mishra, MK Jindal, Rajat Pratap Singh, Thomas R Stark, GS Hashmi. Submerged and impacted primary molars. *Int J Clin Pediatr Dent* 3:211-3, 2010.
18. Kuroi J, Thilander B. Infraocclusion of primary molars with aplasia of permanent successor. A longitudinal study. *Angle Orthod* ;54(4):283-94,1984.
19. Kuroi J, Magnusson BC. Infraocclusion of primary molars: a histologic study. *Scand J Dent Res*; 92(6):564-76,1984
20. Demirjian A, Goldstein H, Tanner JM. A new system of dental age assessment. *Hum Biol*; 45:211-27, 1973.
21. Raghoebar GM, Boering G, Jansen HW, Vissink A. Secondary retention of permanent molars: a histological study. *J Oral Path Med*; 18:427-31, 1989.
22. Kirshenblatt S, Kulkarni GV. Complications of surgical extraction of ankylosed primary teeth and distal shoe space maintainers. *J Dent Child (Chic)*; 78(1):57-61, 2011.
23. Belanger. Early ankylosis of a primary molar with self-correction: case report. *Pediatr Dent*; 8(1):37-40, 1986.