CASE REPORT

Management of ectopic eruption of bilateral mandibular first permanent molars: A case report and literature review

Dandan Zhang, Qiongling Shi, Linxian Fang, Wenxiang Jiang, Jie Han, Zhifang Wu

Abstract

Ectopic eruption of the first permanent molars is a local eruption disturbance. The frequency of ectopically erupted first permanent molars is predominant in boys and primarily affects the maxilla. Interceptive treatment for irreversible ectopic eruptions should be initiated early to prevent space loss and the impaction of the second premolars. Herein, we report the case of a six-year-old girl with irreversible ectopic eruption of the bilateral mandibular first permanent molars treated with a modified lingual arch. The mandibular first permanent molars were successfully distalised after six months of treatment, and one year of follow-up showed a satisfactory outcome. The modified lingual arch satisfies not only the clinical aspects of treatment but also the patient's well-being. However, the lingual arch may disturb tooth eruption in the mixed-dentition stage.

Keywords: Ectopic eruption; Mandibular first permanent molar; Modified lingual arch.

DOI: https://doi.org/10.47391/JPMA.6989
Submission completion date: 05-10-2022
Acceptance date: 06-04-2023

Introduction

Ectopic eruption (EE) of the first permanent molar, characterised by the permanent tooth being locked under the distal contour of the second primary molar, is a local eruption disturbance.[1]

Currently, EE is understood as a multifactorial pathological disorder, including genetic and local factors.[2,3] Ectopic eruption can cause many problems such as premature loss of the second primary molars and subsequent loss of dental arch length, mesial tipping or rotation of the first permanent molars, supra-eruption of the opposite molar and unfavourable occlusion.[1] Thus, early initiation of interceptive treatment for irreversible ectopic eruptions should be undertaken to prevent more complicated malocclusions.

Stomatology Hospital, School of Stomatology, Zhejiang University School of Medicine, Hangzhou, China.
Correspondence: Zhifang Wu. e-mail: 11418288@zju.edu.cn
ORCID ID. 0000-0001-7380-039X

Some studies reported that most of ectopic eruption occurs in the maxilla, and only 8.8%–21.7% occur in the mandibule.[1-3] A previous study reported that the prevalence of EE in boys was higher than that in girls, with a male to female ratio of 1.4:1.[4] This presented case is of a six-year-old girl with irreversible ectopic eruption of bilateral mandibular first permanent molars. A modified lingual arch was used to perform distal tipping of the first permanent molars.

Case Report

A six-year-old girl was referred to The Stomatology Hospital, Zhejiang University School of Medicine, China, for a routine oral examination in April 2020. Intraoral examination revealed a mixed dentition, and both mandibular first permanent molars were locked under the distal contour of the primary second molars. Mobility or symptoms were not observed in the primary second molars (Figure-1a). A panoramic radiograph revealed that the mesial edges of 36 and 46 were impacted under the distal bulge of 75 and 85, and mesio-occlusal surfaces of 36 and 46 were in contact with the cervical root area of 75 and 85 (Figure-2a). The distal roots of 75 and 85 exhibited mild resorption, graded as I resorption according to Barberia-Leache classification.[4]

Figure 2b shows all the reference lines and points used for the measurements. One investigator measured all the parameters. Twenty panoramic radiographs were selected randomly and measured twice with a two-week interval to estimate the intra-rater reliability. Kendall coefficient[5] was used to evaluate the consistency of the measurement

Figure-1: Intraoral photograph showing the eruption of bilateral mandibular first permanent molars. 1a: pre-treatment; 1b: 4 months in active treatment; 1c: 5 months in active treatment; 1d: post-treatment; 1e: one-year follow-up.

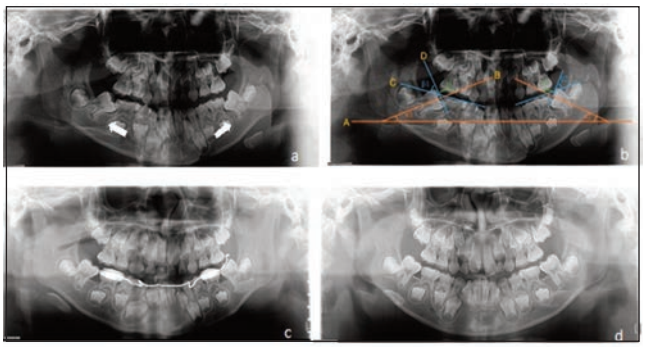

Figure-2: Panoramic radiographs and all the reference lines and points used for measurements. 2a: pre-treatment panoramic radiograph showed mesial tipping of 36 and 46, both under the distal prominence of the crown of the adjacent second primary molars, and root resorption on the distal root of 75 and 85; 2b: measurement methods of the angles on the panoramic radiograph. A, lower horizontal line; B, long axis; C, occlusal plane; D, occlusal lines of the first permanent molar; 2c: five-month active treatment showed 36 and 46 were released from the distal contour of the second primary molar; 2d: one-year follow-up showed good stability and successful eruption of 36 and 46.

Table: Measurement results of pre-treatment, post-treatment and one-year follow-up.

	α1	α2	β1	β2	γ1	γ2
Pre-treatment	20°	24°	-50°	-46°	144°	132°
Post-treatment	42°	44°	-22°	-20°	122°	116°
One-year follow-up	41°	52°	-20°	-10°	120°	108°

results, which showed proper consistency in all the measurements. The lower horizontal line (A) was the line connecting the lower edge of the bilateral gonial (Go) notches.[6] The long axis of the mandibular first permanent molar (B) was a longitudinal line from the midpoint of the crown (the deepest point of fovea depression) and the furcation.[5] The occlusal plane (C) was defined as the average plane of occlusal contacts of the posterior teeth.[5] The angles between the long axis of the mandibular first permanent molar (B) and the lower horizontal line (A) were 20º (α1) and 24º (α2). The angles between the occlusal lines of the primary second molar (C) and the first permanent molar (D) were -50º (β1) and -46º (β2). The mesial angles between the long axis of the first permanent molar (B) and the occlusal plane (C) were 144º (γ1) and 132º (γ2). On the basis of clinical and radiographic examinations, the patient was diagnosed with irreversible ectopic eruption of 36 and 46.

The treatment goal was to upright the two impacted first permanent molars distally, while preserving the physiology of the damaged primary molars. The treatment plan was discussed with the parents, and informed consent was obtained from the parents. A modified lingual arch was used to distalise the permanent molars in June 2020. The appliance was bonded to 75 and 85 with glass ionomer cement. Buttons were bonded to the mesio-occlusal surfaces of 36 and 46. Chain elastics were applied to both buttons and placed on the hooks of the modified lingual arch. Elastic chains with 1.5 N orthodontic forces per molar were replaced every three to four weeks.

The treatment was successful, 36 and 46 erupted within six months post-treatment, and the lingual arch was removed (Figure-1b, 1c, 1d). At the one-year follow-up, oral examination revealed good stability, and the successful eruption of 36 and 46 (Figure-1e, Figure-2d). The root resorption of 75 and 85 had halted (Figure-2d). The same angle measurement was performed on panoramic radiographs immediately post-treatment and one-year follow-up. The results are presented in Table 1.

Discussion

Ectopic eruption of the first permanent molars is a common eruption disorder that occurs in the mixed dentition. As ectopic eruption is always asymptomatic, it is only incidentally discovered on routine clinical or radiographic examination in the early mixed-dentition phase.

An EE retained at the site of the primary second molar at eight years is generally considered irreversible. However, it is still difficult to make accurate predictions for irreversible outcome of ectopic eruption. Many studies have attempted to establish diagnostic tools to predict reversible and irreversible types of ectopic eruption. In 2005, Barberia-Leache et al[4] reported that the severity of root resorption in the second primary molar was a reliable clinical predictor for the irreversible outcome, and the case described in the study was graded as I resorption. However, no significant correlation has been observed between root resorption and the degree of impaction.[4] Some cases of grade I remained impacted. In another study, the angles between the long axis of the mandibular first permanent molars and the lower horizontal line were measured from five to 10 years of age and ranged from 66º to 73º.[6] Moreover, the impacted first permanent molars appeared to be hardly self-corrected as the angles decreased.[6] The pre-treatment angles in our study were 20º (α1) and 24º (α2) (Figure-2a, Table). Another study reported that the angles between the occlusal lines of the second primary molars and the first permanent molars in the reversible and irreversible group were -4.17º and -5.62º and 9.64º in the normal group.[7] The pre-treatment angles were -50º (β1) and -46º (β2) (Figure-2a, Table). Zou, et al[6] explored potential predictors of irreversible outcomes, determining that when the eruptive angulation (EA) of the first permanent molar was >73.05, the outcome was irreversible. The EAs in the present case were 144º (γ1) and 132º (γ2) on the initial panoramic radiograph (Figure-2a). Although our patient was six years

old, all angles measured according to previous studies predicted an irreversible outcome. Thus, prompt initiation of treatment for ectopic eruption is essential.

Various methods have been suggested for the treatment of ectopically erupted first permanent molars: 8-10 brass ligature, grinding of the distal surface, Halterman appliance, or light wires. A modified lingual arch was provided to guide the ectopic erupted bilateral mandibular first permanent molars into normal position in the present case. After a six-month treatment period, the molars were upright and oral examination revealed the successful eruption of 36 and 46 at one-year follow-up.

The angles (α1, α2, β1, β2, γ1, γ2) in the post-treatment and one-year follow-up panoramic radiographs revealed gradual improvements (Table). Root resorption halted at one year follow-up (Figure-2d). The modified lingual arch has a simple design and is non-traumatic for the patient. However, a lingual arch may disturb the tooth eruption in the mixed-dentition phase. In this case, the eruption of the incisors required close monitoring.

Conclusion

Early diagnosis and intervention for irreversible ectopic eruption of the first permanent molars are crucial to avoid more complicated malocclusions in the future. Many interceptive orthodontic treatments are available for EE correction. This case describes using a modified lingual arch, which satisfies not only the clinical aspect of the treatment, but also patient's well-being.

Disclaimer: None.

Conflict of Interest: None.

Funding Disclosure: None.

References

1. Caliskan S, Tuloglu N, Ozdemir C, Kizilaslan S, Bayrak S. Ectopic eruption of maxillary permanent first molars: Predictive factors for self-corrected and impacted outcome. Int J Clin Pract 2021; 75: e13880.
2. Aldowsari MK, Alsaidan M, Alaqil M, BinAjian A, Albeialy J, Alraawi M, et al. Ectopic Eruption of First Permanent Molars for Paediatric Patients Attended King Saud University, Riyadh, Saudi Arabia: A Radiographic Study. Clin Cosmet Investig Dent 2021; 13: 325-33.
3. Helm A, Martín-Vacas A, Molinero-Mourelle P, Caleya AM, Gallardo NE, Mourelle-Martínez MR. Ectopic Eruption of Maxillary First Permanent Molars: Preliminary Results of Prevalence and Dentoskeletal Characteristics in Spanish Paediatric Population. Children (Basel) 2021; 8: 479.
4. Barberia-Leache E, Suarez-Clúa MC, Saavedra-Ontiveros D. Ectopic eruption of the maxillary first permanent molar: characteristics and occurrence in growing children. Angle Orthod 2005; 75: 610-5.
5. Chen X, Huo Y, Peng Y, Zhang Q, Zou J. Ectopic eruption of the first permanent molar: Predictive factors for irreversible outcome. Am J Orthod Dentofacial Orthop 2021; 159: e169-e177.
6. He SY, Liu F, Li YC, Su XL, Guo QY. The eruption characteristic of first permanent molar studied by panoramic radiographs. J Pract Stomatol 2018; 34: 685-9.
7. Sun J, Nam O, Kim M, Lee H, Choi S. Predictive Factors of Ectopic Eruption of the Maxillary First Permanent Molar. J Korean Acad Paediatr Dent 2016; 43: 284-90.
8. Society of Paediatric Dentistry, Chinese Stomatological Association. [Experts' consensus on ectopic eruption of the maxillary permanent first molar]. Zhonghua Kou Qiang Yi Xue Za Zhi 2022; 57: 213-9.
9. Meng M, Zhou X, Zhang Q, Zou J. Management of ectopically erupting permanent molars in a seven-year-old girl: A case report. J Pak Med Assoc 2021; 71: 2809-11.
10. Kim WS, Kim Y, Cho JH, Oh H, Hwang HS. Unlocking ectopically erupting permanent first molars using light wires. J Am Dent Assoc 2020; 151: 857-62.