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

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.
Management of ectopic eruption of bilateral mandibular first permanent molars

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 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. Some cases of grade I remained impacted. In another study, the angles between the long axis of the mandibular first permanent molar and the lower horizontal line were measured from five to 10 years of age and ranged from 66° to 73°. Moreover, the impacted first permanent molars appeared to be hardly self-corrected as the angles decreased.

The pre-treatment angles in our study were 20° (α1) and 24° (α2) (Figure-2a, Table). Zou, et al 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 144° (γ1) and 132° (γ2) on the initial panoramic radiograph (Figure-2a). Although our patient was six years old, the outcome was irreversible.

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

<table>
<thead>
<tr>
<th></th>
<th>α1</th>
<th>α2</th>
<th>β1</th>
<th>β2</th>
<th>γ1</th>
<th>γ2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-treatment</td>
<td>20°</td>
<td>24°</td>
<td>-50°</td>
<td>-46°</td>
<td>144°</td>
<td>132°</td>
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<tr>
<td>Post-treatment</td>
<td>42°</td>
<td>44°</td>
<td>-22°</td>
<td>-20°</td>
<td>122°</td>
<td>116°</td>
</tr>
<tr>
<td>One-year follow-up</td>
<td>41°</td>
<td>52°</td>
<td>-20°</td>
<td>-10°</td>
<td>120°</td>
<td>108°</td>
</tr>
</tbody>
</table>
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.

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References