Ectopically Erupted Maxillary First Molars Treated by Molar Derotation/Distalization

Anil Sharma, Sudhir Mittal, Tapsya Juneja, Saibel Farishta

ABSTRACT

For clinical handling, it is important to determine whether certain etiologic factors, alone or in combination, are of more importance than others in causing ectopic eruption of a maxillary first permanent molar. Etiologic factors involved in ectopic eruption of maxillary first permanent molars have been investigated. This article presents three cases of ectopic eruption of molars, which have been treated by molar derotation and/or distalization.

Keywords: Ectopic eruption, Maxillary molars, Molar derotation, Molar distalization.

INTRODUCTION

Ectopic eruption is a developmental disturbance in the eruption pattern of the permanent dentition. During the initial stages of the mixed dentition, the permanent first molars erupt in the dental arch using the distal aspect of the deciduous second molars as an eruption guide. Maxillary first molars show an occlusal and mesial eruption path. In this way, the distal angulation of the tooth germ in the maxilla is corrected during eruption, and the maxillary first molars erupt in an upright position relative to the occlusal plane. However, in 4% of children the maxillary first molars deviate in their eruption path toward mesial, stimulating a partial root resorption of the adjacent deciduous second molar. This eruption disturbance is known as ectopic eruption of permanent first molars. Approximately, half of the cases are reversible and the first molars erupt spontaneously into the dental arch. In irreversible cases, the maxillary first molars are unable to resorb deciduous second molar enamel, thus, remaining retained. First permanent molars, impacted in such a manner, are often diagnosed as ectopic eruptions. Depending upon whether or not the locked permanent first molar corrects itself without treatment and erupts into a normal position, ectopic eruptions are classified as reversible or irreversible (“hold” and “jump” cases).

ETIOLOGY

The etiology of first molar ectopic eruption is not completely understood. A combination of factors contributes to the ectopic eruption of the maxillary first molar:
1. Larger than normal mean sizes of all maxillary primary and permanent teeth
2. Larger affected first permanent and second primary molars
3. Smaller maxilla
4. Posterior position of the maxilla in relation to the cranial base
5. Abnormal angulation of eruption of the maxillary first permanent molar
6. Delayed calcification of some affected first permanent molars.

Bjerklin and Kurol (1983) analyzed these etiologic factors and could identify two key factors: the mesial angulation of the first permanent molar was clearly increased in cases of ectopic eruption and the width of the first permanent molar compared to those of children with normal eruption was more. Further, extraction of the second deciduous molar had no influence on the angulation of the first permanent molar.

Cleft lip and/or palate, supernumerary teeth, hypodontia, and infraocclusion of primary molars are also commonly associated with ectopic eruption of permanent 1st molars.

Prevalence

Cheyne and Wessels (1947) reported ectopically erupting permanent first molars in 1.8% (nine out of approximately 500 children) of their study group. This study only included those teeth that were actually locked apical of the distal aspect of the second primary molar at the time of examination. Young (1957) introduced the terms “jump” and “hold” to further classify the abnormality. She found a prevalence of 3.2% children with...
one or more ectopically erupting first molars. Around 66% of the cases were classified as self-correcting “jump” cases. Bjerklin and Kurol (1982) reported a prevalence of 4.3%. Almost 60% of these were reversible ectopic eruptions. All authors agree that ectopic eruption is mostly seen in the maxilla, which may be unilateral or bilateral. Reports about sex correlation are not consistent in results.1,3,5,6

Carr observed a more frequent occurrence in cleft lip and palate patients (29% girls and 22.9% boys).7

Clinical Implications

Christensen and Fields recommend a 3 to 6 months observation period, if the resorption on the primary molar is not too severe.8 Bjerklin and Kurol (1983) reported that those cases that self correct, usually correct before 7 years of age.4 They concluded that the type of ectopic eruption can be reliably predicted at ages between 7 and 8. Kurol and Bjerklin (1982) followed and evaluated the prognosis for atypically resorbed second primary molars after reversible ectopic eruption of the maxillary first molar.9 Most of their sample teeth showed severe resorption, but only two out of 92 were lost prematurely. Only 14% showed further resorption. In the rest of the cases arrest of resorption could be demonstrated clinically and histologically.

The treatment goals for irreversible ectopic eruption are movement of the permanent molar distally in order to regain space and correction of the mesial tipping of the permanent molar to allow normal eruption.10 Cross-arch anchorage may be necessary to prevent loss of leeway space.11 Moyers feels that distal slicing of the primary molar is not indicated because it will result in space loss and the permanent molar will erupt in a tipped position that will favor the development of malocclusion.12

Space loss after premature exfoliation of the primary second molar can be prevented with adequate space maintainers (Nance, distal shoe, etc.). If necessary, a space regaining appliance needs to be fabricated. Garcia-Godoy performed successful treatment with a band and spring appliance placed on the first primary molar.13

Kurol and Bjerklin (1984) evaluated the effects of early treatment of ectopically erupting first permanent molars with the Kloehn type of cervical headgear. They found that the most favorable time for treatment seems to be when the second premolar is close to eruption or erupting at the end of the treatment period. However, due to the possibility of inhibited sagittal growth of the maxilla with this type of treatment, careful cephalometric evaluation is considered important before the start of treatment.

This article presents three cases of ectopic eruption of molars which have been treated by molar derotation and/or distalization.

CASE REPORTS

Case 1

A 9-year-old male patient reported to the clinic for a routine dental check-up. On examination, it was observed that he had an ectopically erupting upper right first molar. The patient gave a history of premature exfoliation of deciduous second molar at the time of eruption of the permanent molar (Fig. 1). The orthodontic consequences of the problem were brought to the notice of the parents and it was decided to intercept the developing malocclusion. Since, the ectopically erupting molar was severely rotated and had migrated mesially using the space created by the exfoliated deciduous second molar, thereby increasing the risk of impaction of upper right second premolar, it was decided to derotate the molar and gain space for the unerupted second premolar. The NiTi molar derotator (Ortho-Organizer) was used for the purpose. It took about 6 months and 10 days for the molars to derotate completely (Fig. 2).

Fig. 1: Pretreatment photograph of patient showing ectopically erupting upper right permanent first molar due to premature exfoliation of deciduous second molar. The patient has a Class II molar relationship.
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Though the molar had derotated completely, the space thus created was still insufficient for the eruption of the second premolar, and the molars were still in a Class II relationship. Hence, it was decided to distalize both the molars using the pendulum appliance (Figs 3A and B).

The pendulum appliance was kept in place for about 5 months, during this period the molars distalized by about 4 mm on the right side and about 3 mm on the left side. Since slightly more distalization was required on the right side, the spring on the right side was activated again and left in place for another 2 months. At the end of 7 months, sufficient space was gained on both the sides for the premolars to erupt subsequently. Also, the molars on both the sides had achieved a good Class I occlusion. The pendulum appliance was discontinued at this time, and the correction thus achieved was maintained with the help of the Nance’s button in the upper arch and a lingual arch in the mandible till all the permanent teeth mesial to the first permanent molars had erupted (Figs 4 to 6).

**Case 2**
A 13-year-old female patient reported to the clinic being concerned about the generalized spacing between her teeth. On radiographic examination, it was observed that the patient had a partial anodontia with congenitally missing maxillary 2nd molars, mandibular central incisors and all third molars. The right maxillary 1st molar had ectopically erupted, and had drifted mesially rotating mesiopalatally thereby completely getting locked behind the second premolar (Fig. 7).

After carefully analyzing the case, it was planned to derotate the ectopically erupted maxillary 1st molar. Also, it was planned...
Fig. 5: Space gained by molar distalization being maintained by the use of a Nance’s button in the maxilla and a lingual arch in the mandible.

Fig. 6: Three years post-treatment of the patient shows a stable Class I molar relationship with all the teeth erupted completely and in a good occlusion. Thus, a developing Class II malocclusion was successfully intercepted and corrected to a good Class I occlusion.

Fig. 7: Pretreatment photograph of the patient showing ectopically erupting maxillary right 1st permanent molar, rotated maxillary premolars and mandibular lateral incisors.
to open up space in the region of the missing central incisors, so that the implants could be placed later, while at the same time consolidate all the spaces distal to the mandibular lateral incisors. Hence, the patient was bonded with the straightwire appliance (MBT prescription 0.022 slot) and a NiTi molar derotator (Ortho-organizer) was used simultaneously to derotate the molars (Fig. 8). It took about 8 months for the molars to derotate completely, after which the derotator was discontinued and the molars were engaged in the main wire. In the lower arch the space was opened up for the central incisors using a NiTi open coil spring. The whole treatment took about 25 months after which the patient was put on removable retainers, which were to be worn for a period of 2 years till the patient completes her growth after which she would receive the implant prosthesis for her missing central incisors (Fig. 9).

Case 3

A 14-year-old patient reported to the clinic with the chief complaint of deep bite and irregular teeth. On detailed examination, it was noted that patient had overerupted upper incisors, severely rotated maxillary 1st premolars and ectopically erupted maxillary right 1st molar which was also severely rotated. Radiographic examination revealed partial anodontia with congenitally missing maxillary right second molar as well as all third molars (Fig. 10). It was planned to intrude the maxillary incisors, to open up the bite as well as derotate all the rotated teeth except the maxillary right 1st premolar which was rotated by 180°. At the end of the treatment the buccal cusp of this tooth would be equilibrated and converted to lingual cusp while the lingual cusp will behave as the buccal cusp. The NiTi molar...
derotator was used to derotate the maxillary right 1st molar. It took about 7 months for the molar to derotate completely (Figs 11 and 12). At the time of writing this article all the teeth had been derotated completely and bite had opened substantially. Slight residual spaces remained, which would be consolidated and final occlusal settling done. The case is still under active treatment for final finishing (Fig. 13).

CONCLUSION

Early diagnosis of ectopic molar eruption is of clinical importance as intervention is usually recommended. Failure to provide appropriate treatment may result in premature loss of the second primary molar, resultant mesial shift of the 1st permanent molar and potential impaction of the second premolar and/or development of Class II malocclusion. There are two treatment strategies: the first option is to release the 1st permanent molar from the second primary molar and distally move the permanent molar to normal inclination and occlusion. Alternatively, the second primary molar may be extracted and space can be regained or maintained as appropriate. If the condition is not intervened at the initial developing stage, it can lead to the development of a full fledged Class II
malocclusion, correction of which would need an orthodontic intervention.

REFERENCES

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