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An acid etch composite resin retained wire for correction of an ectopically erupting permanent first molar

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Abstract

In some cases, an ectopically erupting permanent first molar can be orthodontically repositioned before irreversible resorptive damage to the primary second molar occurs. A new fixed unilateral appliance is described which serves such a purpose.

A permanent first molar is defined as erupting ectopically when, in its eruptive course, it invades the alveolar position of the primary second molar.[1-4] If unchecked, distal radicular and even coronal resorption of the primary molar may result, along with mesial tipping and extrusion of that tooth. Extraction of the primary second molar may be necessary, and orthodontic distal repositioning of the permanent first molar may be required to prevent loss of arch length and malocclusion.

Ectopic eruption is found in about 3% of the population[1] in varying degress of severity, and frequently occurs bilaterally. Pulver theorized that etiologic factors related to ectopic eruption of permanent first molars include smaller than normal anteroposterior maxillary length, posterior position of the maxilla in relation to the cranial base, mesioangular eruption or delayed calcification of the permanent first molar, and larger than normal tooth size.[1]

Sometimes a permanent molar erupting ectopically may "self correct," leaving only a radiolucent defect on the primary molar as evidence of the phenomenon. In cases with only moderate resoprtion of the primary second molar it is possible to orthodontically move the permanent first molar into its correct position and avoid premature loss of the primary molar. Since it is not possible to predict when such ectopic eruption will resolve without treatment, orthodontic intervention is usually advisable once resorption of the second primary molar becomes radiographically evident.

Levitas[5] and Sim[6] described a method of threading a brass separating wire in the contact area of affected teeth, facilitating correction with periodic tightening of the wire. Braden[3] cited difficulties with such treatment and recommended use of a bilateral fixed maxillary arch wire with springs for distal movement of the first molars. Humphrey[7] described a unilateral appliance consisting of a stainless steel band with a soldered wire spring. The band is cemented to the primary second molar and the spring is designed to engage a small occlusal preparation in the erupting permanent first molar. After activation of the wire, the first molar is moved distally. Disadvantages of the Humphrey appliance are problems with activation and adjustments of the spring, possible occlusal interferences, and the need for preparation of a small pit in the first molar. This paper describes an appliance which functions similarly to the Humphrey device, but avoids activation difficulties and requires no preparation or subsequent restoration of the first molar.

Case

A 7-year, 9 month-old-boy was examined in a pedodontic office. The patient's medical history was unremarkable and did not influence dental treatment considerations. Oral radiographs revealed several small approximal carious lesions and bilateral ectopic eruption of the maxillary permanent first molars (Figure 1). The right primary second molar demonstrated extensive resorptive changes with involvement of the pulp spaces, while the distal aspect of the left primary second molar was less severely resorbed (Figure 1, see page 62).

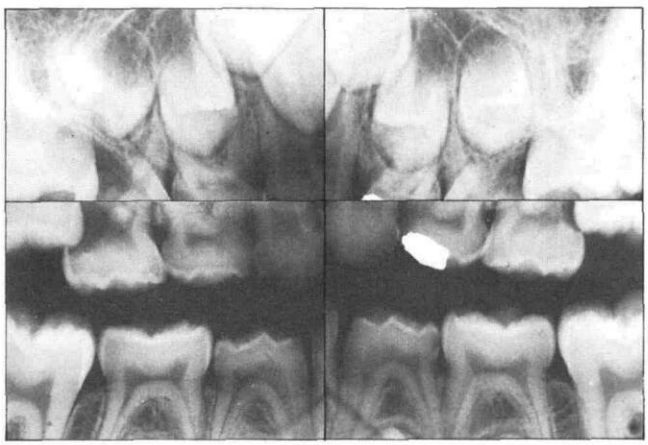


Figure 1. Bilateral ectopic eruption is evident, with extensive resorption of the right primary second molar, and moderate involvement of the left primary second molar.

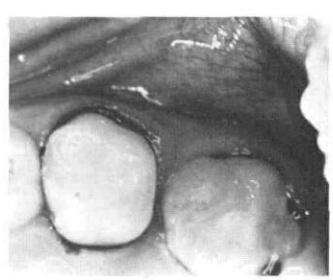
The patient complained of sporadic discomfort in the region of the right permanent first molar, and probing elicited a sanguinopurulent exudate. It was decided to extract the right primary second molar and fabricate an activated distal extension space maintainer as described by Croll,[2] and by Croll and Johnson.[8] That treatment was performed in one visit with no complications.

In an effort to preserve the left primary second molar, it was decided to fabricate a unilateral appliance to distally reposition the left permanent first molar using the following technique.

Technique

1. A stainless steel band was fitted on the left primary second molar.
2. An impression was taken in irreversible hydrocolloid material, the band was securely seated in the impression with sticky wax, and a model was poured in dental plaster.
3. An .030 stainless steel wire segment was bent and soldered to the buccal aspect of the band. The wire extended distally beyond the permanent molar and after making two right angle bends, its terminal end was formed into a loop which rested on the occlusal surface of the first molar (Figure 2a). The distal extension of the wire included an activation loop measured to fit the prongs of three-pronged orthodontic pliers (Figures 2a-2c).
4. Prior to cementing the appliance, the occlusal surface of the permanent molar was cleaned with nonfluoridated pumice, and the grooves were carefully probed for carious lesions.
5. The appliance was cemented to the primary second molar and excess cement removed (Figure 2a).
6. After phosphoric acid etching of the occlusal surface of the permanent first molar, composite resin bonding material was liberally applied with a brush, followed by syringe injection of filled composite resin so as to completely cover the small terminal wire loop (Figure 2b). The resin remained untouched for 5 minutes after initial polymerization.
7. A three-pronged pliers was applied with the single prong on the superior aspect of the activation loop (Figure 2c). By gently squeezing the pliers, the wire was activated, resulting in a force directed distally on the first molar.
8. The patient was examined every two weeks for evaluation of tooth movement and additional activation of the wire as necessary.
9. Thirty-eight days later, after sufficient distal repositioning of the permanent first molar, the appliance was removed and the composite resin trimmed from the occlusal surface of the first molar (Figure 3). Two weeks later, the permanent molar was in its proper position (Figure 4).

Figure 3. Immediately after removal of the appliance and trimming of the composite resin, the permanent first molar is seen in its new distal position. The tooth is now able to erupt normally and the composite resin tags will remain to prevent Class I carious lesions.



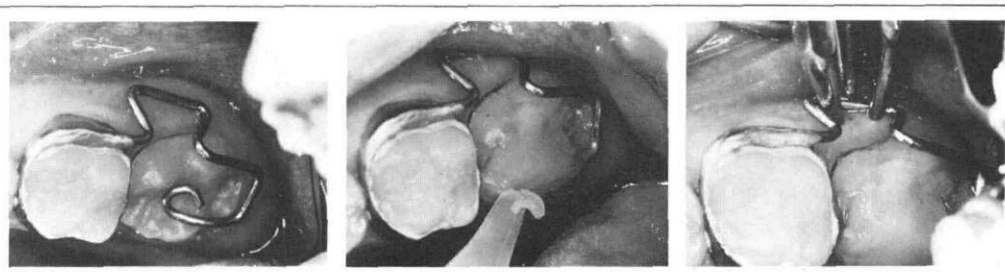


Figure 2a. The appliance is cemented. Note the activation loop in the distal wire extension and the terminal loop resting on the occlusal surface of the first molar. **2b.** After acid etch procedures are performed and composite resin bonding agent is applied with a brush, filled composite resin is injected over the terminal loop. **2c.** The wire is activated with three-pronged pliers after complete setting of the resin material.

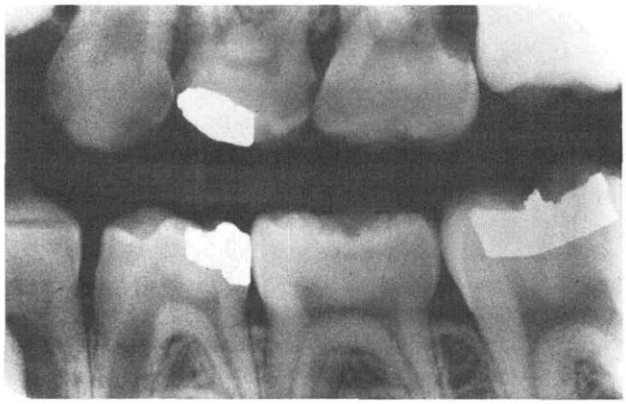


Figure 4. Two weeks after removal of the appliance, the permanent molar is seen in its normal position.

Discussion

In cases where the occlusal surfaces of an ectopically erupting molar is not exposed for application of resin, a gingivectomy can be performed. Adequate hemostasis can be achieved immediately with an electrosurgery unit, but if such an instrument is not available, the patient can be reappointed after suitable tissue healing.

The composite resin retained wire appliance procedure not only avoids the need for preparation of an occlusal pit in the first molar, but at the time of removal of the device, the composite resin tags in the occlusal grooves remain and serve as "sealants" for prevention of Class I carious lesions.

In nine cases we have treated, there have been contacts between the second primary molars and the adjacent first primary molars, therefore reciprocal forces did not cause significant mesial displacement of the second primary molars. If such contacts do not exist the practitioner should consider cross arch anchorage or some other type of stabilization to prevent movement of the primary teeth. In several cases we have soldered a small wire segment to the lingual aspect of the band. That wire was designed to extend mesially and rest on the occlusal surface of the first primary molar, thus limiting reciprocal mesial tipping of the second primary molar.

The authors recognize that in this reported case the first molar was rotated slightly in a mesiopalatal direction along with its distal movement. On further eruption, after removal of the appliance, the molar attained normal buccolingual alignment. Care should be taken in appliance design and wire activation to avoid rotational forces. Careful placement of the pliers at the time of activation will help to assure that forces are applied parallel to normal arch alignment.

The appliance has been used for nine patients with excellent results. Not only was there no need for local anesthesia, but in one case brass wire separation was contraindicated because the patient was at risk of bacterial endocarditis due to cardiac defects. In that case, antibiotic coverage was required only for the impression and seating of the appliance.

Summary

A fixed unilateral appliance with an acid etch composite resin retained wire loop for correction of an ectopically erupting permanent molar is described. The appliance avoids disadvantages of other appliances and has performed well in nine cases.

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