Correction of ectopic eruption of permanent molars utilizing the brass wire technique

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Abstract

Ectopic eruption of a first permanent molar is a common occurrence in the developing mixed dentition. Proper management is a challenge to the pediatric dentist and is crucial to a healthy occlusion. Non-treatment can result in early loss of the second primary molar, space loss, and impaction of second premolars. Future corrective treatment may be complicated, lengthy, and costly and include: the distalizing and uprighting of the permanent molar by use of headgear and fixed or removable appliances and subsequent long term space maintenance. The brass wire technique is a fairly simple procedure and can be used successfully in moderately and even severely impacted molar cases. This procedure is described in detail with step-by-step guidelines in this paper. (Pediatr Dent 22:408-412, 2000)

A smooth exchange from the primary to the permanent dentition is of utmost importance in managing a pediatric dental patient. Ectopic eruption (EE) of the first permanent molar is a common occurrence in the developing mixed dentition and can be diagnosed first by the pediatric dentist. EE is defined as a tooth erupting in an abnormal position or orientation.[1] EE of the first permanent molar is a local disturbance characterized by eruption of the molar under the distal undercut of the second primary molar and its failure to erupt to the normal occlusal plane.[2] The first permanent molar may become impacted and cease to erupt, causing premature resorption of the neighboring primary molar. Early correction of ectopically erupting permanent molars is an integral part of interceptive orthodontics and is crucial for the proper development of a stable occlusion.[1] If left untreated, EE may cause serious sequelae including early loss of the second primary molar, space loss, and impaction of second premolars. Future corrective treatment may be complicated, lengthy, costly, and include: the distalizing and uprighting of the permanent molar by use of headgear and fixed or removable appliances and subsequent long-term space maintenance. The brass wire technique is a fairly simple procedure and can be used successfully in moderately and even severely impacted molar cases. This procedure is described in detail with step-by-step guidelines in this paper.

Table 1. Ectopic Eruption—Facts for the Clinician

Prevalence:	2%-6%
Predominant locations:	first permanent molar maxillary>>mandibular
Etiology:	mesially inclined large molars, inadequate arch length
Classification:	reversible (or "jump") and irreversible (or "hold")
Sequelae if left untreated:	resorption of adjacent primary molar, molar impaction, associated crowding and inadequate arch circumference, undetected caries, abscess formation
Treatment:	ranges from observation only (reversible type—60%) to wedge techniques or primary molar extraction and subsequent orthodontic distlalization of permanent molar followed by space maintenance

Table 2. Ectopic Eruption – Etiologic Factors

1. Abnormally large first permanent and second primary molars
2. Small or posteriorly positioned maxilla relative to cranial base
3. Mesially directed path of eruption of permanent molar with inadequate anterior movement of primary dentition
4. Asynchronization between eruption of the maxillary first permanent molar and tuberosity growth
5. Delayed development of the first permanent molar
6. Familial tendency
7. Children with cleft lip or palate

Ectopic eruption: etiology, prevalence and terminology (Table 1)

The etiology of first permanent molar EE is not completely understood. No specific etiologic factor has been found to be common to all children with an EE. The most likely causes are abnormally large first permanent and second primary molars combined with inadequate arch size and a mesially angled path of eruption. Other suggested etiologic factors are listed in Table 2.

The reported prevalence of EE of the first permanent molar varies from 1.8% to 6% in normal populations.[2] The maxillary first permanent molar is the most common tooth, but cases of mandibular first and second permanent molars have been reported.

EE may be classified into two types:[3] reversible (or "jump"), and irreversible (or "hold"). The reversible type occurs in over 60 percent of ectopically erupting maxillary permanent mo-

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Fig 1a. Occlusal view of bilateral ectopically erupting first permanent molars in a six year old patient. Brass wire placement is shown. On the patient's right side a 0.020 wire was placed (Malin Co., Brookpart, Ohio, USA). On the left side a 0.028 preformed wire was used (Ortho Organizers, inc, San Marcos, CA, USA) after attempts to place the thicker wire failed. At a later visit the wire was replaced with the 0.028 wire.

Fig 1b. Successful eruption of both molars eight months after initial placement.

Fig 2a. Right bitewing radiograph of patient shown in Fig 1 taken at pretreatment.

lars. When the first permanent molar is impacted with part of its crown visible in the mouth, it is most likely a case of irreversible EE.[1]

Fig 2b. Right bitewing radiograph of patient shown in Fig 1. taken at placement of brass wire. Note, thickness of 0.020 wire, compared with 0.028 wire in Fig 3b.

Fig 2c. Right bitewing radiograph of patient shown in Fig 1. taken at 3 months following removal of brass wire.

Table 3. Advantages of the Brass Wire Technique

1. Minimal chair time
2. No laboratory work
3. No impressions
4. Minimal local anesthesia required (no surgery)
5. No damage to permanent teeth (no etching, bonding or banding)
6. No fixed orthodontic tooth movement
7. No requirement for anchorage
8. No need for headgear use
9. No space maintenance

Treatment

Several methods of treating EE have been suggested. Treatment modalities may be divided into two categories: interproximal wedging and distal tipping.[4] The former type of treatment has traditionally been used in cases of minimal to intermediate impaction of the first permanent molar on the distal aspect of the second primary molar. When the impaction is severe, distal tipping techniques with or without second primary molar extraction have been indicated. Distal tipping techniques use fixed or removable appliances (examples include: Humphrey

Fig 3a. Left bitewing radiograph of patient shown in Fig 1. taken at pretreatment.

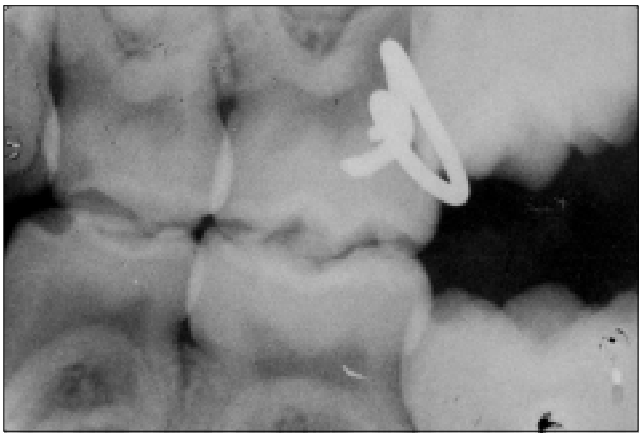

Fig 3b. Left bitewing radiograph of patient shown in Fig 1. taken at placement of brass wire. Note, thickness of 0.028 wire, relative to 0.020 wire (Fig 2b).

Fig 3c. Left bitewing radiograph of patient shown in Fig 1. taken at 3 months following removal of brass wires.

appliance, sectioned wire with open coil spring, slingshot type appliances, hemisection of adjacent primary tooth, and others). A detailed review of these procedures has recently been published.[1] This paper will describe the brass wire technique first presented by Levitas over 30 years ago.[5] The numerous advantages of the brass wire technique are summarized in Table 3.

Clinical procedure

1. Observe for 3-6 months. If EE persists until age seven, treatment is usually mandated. If the first permanent molar is impacted with part of its crown visible in the mouth, it will seldom self correct. During this period, check for undetected caries of the first permanent molar and root resorption of the second primary molar.

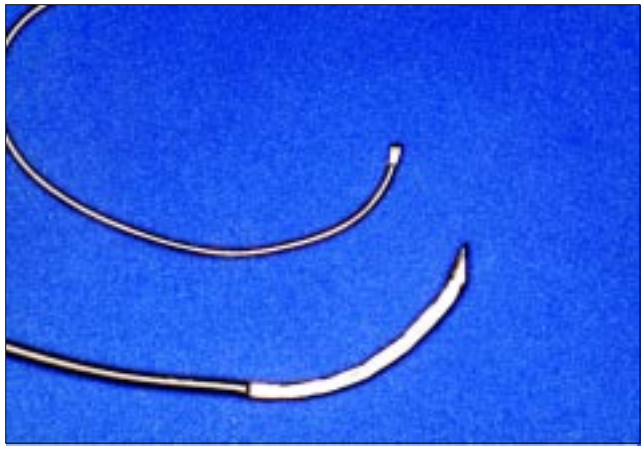

Fig 4. Close-up view of brass wire. The brass wire can be purchased as a single preformed loop (0.020 or 0.025 thickness, Ortho Organizers, inc., San Marcos, CA, USA) or can be prepared from a coil (0.028, Malin Co., Brookpart, Ohio, USA) of wire by flattening out one end with a Howe utility plier. The flat end facilitates insertion from palatal to buccal. Leave extra extension for twisting. Two thicknesses are shown (0.020 and 0.028).

Fig 5a. A brass wire is placed between the contact area of the impacted first permanent molar and the adjacent primary molar with the use of a Mathieu plier or Mosquito needle holder. Placement is from the palatal tissue distal to the primary molar out toward the buccal. Occlusal view before treatment.

Fig 5b. Occlusal view after treatment.

Fig 6a. Bitewing radiograph taken at pretreatment of a severely impacted first permanent molar.

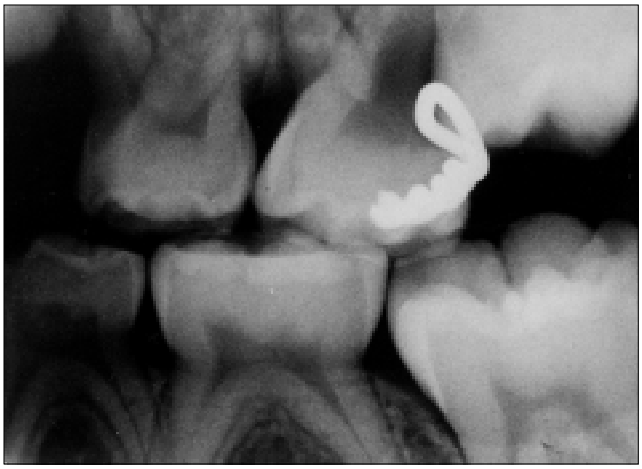

Fig 6b. Bitewing radiograph taken at placement of 0.028 brass wire.

Fig 6c. Bitewing radiograph taken at 3 month post treatment demonstrating the successful treatment of a severely impacted first permanent molar utilizing a 0.028 brass wire.

Fig 6d. Periapical radiograph taken 6 months post treatment. No symptoms were present. Primary second molar was stable and functioning well as a "space maintainer."

2. A bitewing radiograph should be taken prior to placement of the brass wire to determine the position of the marginal ridge and interproximal contact area of the molars.
3. Local anesthesia may be required dependent on the severity of the impaction and the temperament of the patient. It should include local infiltration of the buccal fold, as well as palatal anesthesia.
4. A brass wire is placed between the contact area of the impacted first permanent molar and the adjacent primary molar with the use of a Mathieu plier or Mosquito needle holder. Placement is from the palatal tissue distal to the primary molar out toward the buccal. The brass wire can be purchased as single preformed loops (0.020 or 0.025 , Ortho Organizers, inc, San Marcos, CA, USA), or can be prepared from a coil of wire (Malin Co., Brookpart, Ohio, USA) by flattening out one end with a Howe utility plier. The flat end facilitates insertion from palatal to buccal. Leave extra extension for twisting.
5. The other end of the wire is then bent over the marginal ridge area and twisted with the buccal end. The wire is tightened until snug. The excess wire is cut and the twisted end is tucked into the proximal area to minimize irritation of the buccal mucosa. The clinician should standardize the direction of the twist for future tightening without unraveling.
6. The separator must encircle the area of contact. Its prolonged activation acts to separate the contacting molars.[1] A bitewing radiograph should be taken after wire placement to confirm its correct position, especially in moderate to severe impaction cases.
7. An initial attempt should be made to place a 0.028-inch wire. If unsuccessful, a thinner wire (0.020) may be used with its replacement with the thicker wire at a future visit. If unsuccessful, two other wedging techniques may be attempted. One method uses preformed metal separators of various diameters coupled with the use of elastic seperators.[6] Another method uses a clinical aid consisting of a catheter to place the wire interproximally.[7]
8. The patient should be seen at 3-4 week intervals for wire tightening. Careful supervision is important. The wire may induce infection and early loss of the primary molar. However, proper oral hygiene is adequate in most cases to prevent any inflammation or infection.
9. Tightening of the wire is tolerated by most patients but some may complain of mild pain and discomfort. Pediatric patient management techniques should be used. Many orthodontists refer these cases to the pediatric dentist because of difficulty in managing young children through these type of procedures.

10. The wire may be removed when the permanent molar is deimpacted and will actually slip through the contact area during routine activation. A bitewing and periapical radiograph may be taken to assess the stability of the primary molar and its ability to act as space maintainer. The patient should be seen three months later to assess the primary molar. Primary molars may function for many years even though they sustained severe root resorption and even coronal resorption without any symptoms. In the event that the second primary molar is lost prematurely due to mobility or infection, space can be maintained with a simple band and loop appliance.

Discussion

This report presents one treatment option for ectopically erupting molars. It has been traditionally reserved for minimum to moderate cases of molar impaction. However, this paper suggests that this procedure may be used successfully in more instances than previously reported. It may succeed even when crown or severe root resorption of primary molar occurs. Before other more complicated and costly techniques are used an attempt to use this technique should be made. Success is dependent on proper placement and the use of a wire of thick diameter. When the relative simplicity of this technique is weighed against the severity of the consequences of untreated cases or the use of complicated fixed techniques with subsequent space maintenance, an attempt first should be made to use the brass wire technique. This report should facilitate early treatment of this relatively common disturbance.

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clinical section

Abstract of the Scientific Literature

Topical Fluoride and Restorative Care in Children

This purpose of this retrospective study was to evaluate the association between the use of professionally applied topical fluoride (PATF) and the use of interproximal restorations in primary/permanent teeth of children. Insurance claims from Delta Dental Plan of Michigan for 15,190 children were analyzed from 1990 through 1997. This data represents about 25% of the population of the state of Michigan. Benefits include examinations, prophylaxes, and fluoride treatments at 100% coverage. Fluoridated water covers about 85% of the people in Michigan. There was no association between the frequency of the use of PATF and restorative care. Children who received PATF twice yearly were no different from children who received little to no PATF in relation to receiving interproximal restorations. Thus there was no protective effect of PATF detected in this insured population.

Comments: The patients of dentists who always used fluoride were nearly as likely to receive restorations as those who did not use any fluoride. There are several references in the late "90 stating not to use PATF routinely in low-risk children. LHS

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Professionally applied topical fluoride and restorative care in insured children. J Public Health Dent 60(1):33-38, 2000.

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