Ectopic eruption - A review and case report
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Abstract

Ectopic eruption is a disturbance in which the tooth does not follow its usual course. The purpose of this manuscript is to provide a brief review regarding the incidence, etiology, classification and different management techniques used for correcting ectopically erupting permanent first molar. The following manuscript further presents a case report for correction of ectopically erupting mandibular left permanent first molar by using a simple and effective appliance by the author.

Keywords: Distal tipping, ectopic eruption, halterman appliance, interproximal wedging

Introduction

Tooth eruption is a process whereby the forming tooth migrates from its intraosseous location in the jaw to its functional position within the oral cavity. A variety of eruption problems arise during the transitional dentition period and one such problem is ectopic eruption. Early diagnosis and treatment can prevent a more complicated malocclusion.

Nikiforuk who also classified ectopic eruptions, defined them as “a condition in which the permanent teeth, because of deficiency of growth in the jaw or segment of jaw, assume a path of eruption that intercepts a primary tooth, causes its premature loss and produces a consequent malposition of the permanent tooth.[1] Failure to treat ectopic eruption can result in loss of arch length, inadequate space for the succedaneous premolar, and malocclusion. Ectopic eruption of first permanent molars, an example of an eruption anomaly, is most often diagnosed from the periapical and bitewing radiographic survey. In instances of an otherwise ideal occlusion, the first permanent molar may be positioned too far mesially and may become impacted against the distal root of the second primary molar. The impacted permanent molar may cause premature root résorption, pulp obliteration, neuralgic pain, or premature exfoliation. The chief goal in correcting ectopic eruption is distal displacement of the permanent molar to its normal position in contact with the distal aspect of the second primary molar. Even if the second molar is subsequently prematurely lost, a space maintainer can be used to prevent untoward tooth movement until eruption of the second premolar. Sometimes, the primary second molar can be retained even with extensive resorptive damage.”

Literature Review

Incidence

One of the earliest reports on ectopic eruption was by Chapman who, in 1923, described four cases of ectopic eruption of the maxillary first permanent molars in which he listed four possible causes:
• Small arches,
• Deviant paths of eruption of the permanent molar,
• Lack of forward movement of all primary teeth, and
• Early eruption of the maxillary first permanent molars.[2]

Sweet classified ectopic eruption on the following basis:
• Eruption of mandibular permanent lateral incisors initiating loss of the primary canines
• Eruption of the maxillary first permanent molar initiating loss of the second primary molar,
• Eruption of the maxillary permanent lateral incisor initiating loss of the primary canine,
• Eruption of the mandibular first permanent molar initiating loss of primary second molar.[3]

Young found that ectopic eruption was approximately present 3% of the time. There was little difference in the involvement of the right or left side, however, a significant finding was that in the affected group only one of the 40 cases occurred in the mandible, and in the second group only two of the 35 ectopic eruptions occurred in the mandible. Young further reported that ectopic eruption occurs more frequently in males (35 times in 50 occurrences) than in females (19 times in 52 occurrences). Females were also found to have a higher
probability of untreated correction (20 out of 25 teeth) than males (27 out of 53 teeth). Overall, Young found that two-thirds of the ectopically erupting first permanent molars erupted into position without any corrective treatment.\(^4\)

**Etiology**

There is disagreement among various investigators regarding the etiology of ectopic eruption. Sweet, in 1939, expressed the view that it was related to evolutionary changes, as a result of which a gradual reduction is occurring in the number of permanent teeth in the human dentition. O'Meara stated that multiple factors were probably involved, but that a major factor was insufficient intercanine and anteroposterior growth of the jaws.\(^5\) Nikiforuk and others also share the view of lack of regional bone growth. Pulver's investigation proposes more than one etiologic factor to be responsible for ectopic eruption. Following an extensive study of ectopic eruption, he found that:

- The mean size of the maxillary primary and permanent teeth in the affected individuals are significantly larger. Further, the affected sides showed significantly larger maxillary first permanent molars and maxillary second primary molars than their counterparts within the sample, which were not affected.
- The lengths of the maxilla in affected individuals were significantly smaller than the known standards. Further, the maxillae were positioned in a more posterior relationship to the cranial base.
- Some of the affected maxillary first permanent molars showed delayed calcification.
- There was an abnormal angulation of eruption of the maxillary first permanent molars.\(^6\)

The etiology of ectopic eruption can, therefore, be summarized as being a disturbance of the differential growth pattern of the individual. Different tissues and organs grow at different rates and at different times. A delicate balance normally exists between the timing and rate of growth. Differential growth is the basis for normal and harmonious completion of various physiologic processes including the eruption of teeth. Whenever this balance is disturbed, whether due to congenital factors or environmental interferences, an abnormal situation develops. It is, therefore, evident that whatever the etiologic factor, a disturbance in the balance between the rate of jaw growth, the rate of eruption of the first molars, and/or sizes of the teeth produces ectopic eruption.

Young classified ectopic eruption of the permanent first molar into two forms: (1) reversible; and (2) irreversible (called “jump” and “hold”). In the reversible form, the ectopically erupting permanent first molar frees itself spontaneously from a locked position and erupts into occlusion. This reversible pattern occurs in approximately 66% of ectopically erupting permanent maxillary first molars. In the irreversible form, the permanent first molar remains in a locked position until active treatment is provided or premature exfoliation of a primary second molar occurs.\(^4\)

**Management**

When an impacted first permanent molar has not erupted through the alveolar bone, it should be watched carefully. Although most ectopic teeth will eventually erupt into normal position, intervention is advisable immediately after the tooth penetrates the alveolar crest. It has also been shown that at age seven most children’s permanent molars with reversible ectopic eruption laid freed themselves. Therefore, postponing treatment to a later age is not recommended. Sim stated that early treatment may prevent a space loss of 6 to 8 mm.\(^7\)

Several methods of treating ectopically erupting maxillary permanent first molars have been suggested.

**Interproximal wedging**

After the occlusal surface of the first permanent molar becomes exposed in the oral cavity, the eruption path of the impacted tooth can often be favorably influenced by inserting a brass ligature wire gingival to the contact of the permanent and primary molars.\(^8,9\) The 0.026 in, brass ligature is threaded around the contact area and held firmly with a cervical force. The active end is cut to a 2 or 3 mm length and is placed in the gingival crevice, minimizing irritation to the buccal tissue. The wire is tightened or a new one placed at three- to seven-day intervals to cause distocclusal movement of the first permanent molar. When the contact opens so that the wire can no longer be retained, a larger wire is used or the patient is reappointed in three or four days, after which time the contact will have been re-established and the ligature treatment can resume.

Glenn recommends placing a polyurethane S-2 Alastik” separating module around the contact of the distal of the primary second molar and the mesial of the ectopic permanent molar.\(^10\)

A helical orthodontic separating spring can be used to correct ectopically erupting permanent molars. The helical spring is designed primarily to separate the teeth prior to orthodontic banding. However, it can be adapted to correct most ectopic eruption patterns of the maxillary and mandibular first permanent molars provided there is sufficient dental development for its insertion. The advantages of this technique include pré-fabrication on the appliance, the ease of its insertion, and patient comfort. The head of the spring is placed on the marginal ridge or near the middle of the contact area and held firmly with a cervical force. The active arm is directed below the contact point of the ectopically positioned tooth.

After it has been fitted, the spring is activated by bending the free arm to touch or slightly cross the occlusal arm. The
spring should be left in place until the tooth is free from contact with the adjacent tooth and is erupting normally.

**Distal tipping**

Humphrey has described another technique for correcting ectopically erupting first permanent molars. A preformed steel orthodontic band is adapted to the second primary molar on the affected side. A soft Elgiloy wire is welded and then soldered to the band with a silver bar solder. An S-shaped loop is placed in the wire. The loop is opened slightly and is flame heated prior to cementation. The distal extension of the wire is placed in a preparation in the central occlusal pit of the ectopically erupting molar. It may be necessary to reactivate the appliance in seven or ten days. An occlusal amalgam or preventive resin restoration is later placed in the first molar. Bayardo recommends soldering two 0.25 Elgiloy wires, one on the buccal and the second on the lingual, to an orthodontic band, which has been adapted to the primary second molar. Each wire has a helical loop and an extension, which engages the ectopic molar. The springs are activated weekly for six weeks.

Pomarico and Guimares primo recommended, in case of bilateral ectopically erupting molars, use of bilateral-fixed appliance containing 2 hooks with loops -1 buccal and the other lingual, was placed on the mandibular primary first molars. The hooks were activated in a niche made of light-curing resin on the occlusal surface of the mandibular permanent molars, to bring about the distal drift of these teeth. Kim and Park suggested use of triangular wedging spring, which consists of 3 helical loops in a triangular shape with 0.018-inch Australian wire. The middle helical loop is made for wedging spring action, while the other 2 helical loops are action arms inserted between the second primary molar and ectopically erupting permanent first molar.

Kennedy suggested a modification of the Halterman appliance where a reverse band and loop appliance with a bonded button on the permanent molar and chain elastic can be used for disimpaction.

**Case Report**

A six and half-year-old boy [Figure 1] was brought to the Department of Pediatric Dentistry for initial examination. His medical history was unremarkable. Oral examination revealed a full primary dentition with evidence of eruption of the distobuccal cusp tips of the mandibular first permanent molars [Figure 2]. All other head and neck and intraoral clinical findings were within normal limits.

Periapical radiograph showed ectopic eruption of mandibular left first permanent molar with associated resorption of the primary second molars [Figure 3]. The second molars had resorbed to the point that the pulp tissues were in jeopardy. Neither of the second molar was mobile or sensitive to percussion or digital manipulation, and there were no observable periodontal pathologic alterations. Slight resorptive changes were also detected on the distal root of the mandibular left primary second molar. Because of the extent of resorption, it was felt that long term retention of the primary second molars was doubtful. The goal of treatment was therefore to distally reposition the first permanent molars and retain the damaged primary second molars as long as possible. If either primary molar had to be subsequently lost before normal exfoliation time, a space maintainer would then be used.

**Treatment**

The patient was scheduled for surgical exposure of the permanent first molars. Overlying mucosa was flapped and removed with a scalpel [Figure 4] using local infiltration of xylocaine 2% with 1,80,000 parts epinephrine. After hemostasis, an occlusal button was placed on the exposed occlusal portion of permanent first molar [Figure 5]. Placing the occlusal button was challenging in a young dentition patient because of the location and isolation during acid etching and placement of the bonded attachment. Light-cured composite was used to retain the occlusal button. The occlusal button was placed as far mesially as possible to reduce occlusal trauma, because the mesial inclination of the impacted molar results in occlusal interference if the bonded button were placed more distally. Following this, bands were seated on mandibular primary first molar on either side and an alginate impression was made. Here, mandibular primary first molar was selected for banding as mandibular primary left second primary molar root was resorbed to a greater extent, hence to avoid any anchorage loss it was decided to band mandibular primary first molar on either side.

A standard 0.036 stainless steel arch wire was adapted on the lingual surface and soldered to the band. An U-bend was incorporated near the left mandibular primary second region with a distal extension consisting of a hook shape at the terminal end of wire [Figure 6] The appliance was cemented with distal hook engaging the occlusal button placed on the surgically exposed permanent mandibular left first molar and U-bend was activated. The patient was recalled after 2 weeks and the amount of tooth movement was assessed by observing the gaps between the occlusal button and primary second molar. It was determined that more movement was necessary and so the activation loop were again gently opened. After 3 weeks, considerable movement was appreciated clinically [Figure 7]. The appliance was left in place for another 3 weeks to minimize the chances of relapse. Fifty six days after cementation appliance was removed. Occlusal button was removed and the teeth were sealed with pit and fissure sealant as a preventive measure to reduce the risk of caries. In 4 months, the permanent first molar developed in a proper position [Figure 8].
Figure 1: Patient aged 6 years

Figure 2: Clinical examination

Figure 3: Radiographic examination

Figure 4: Surgical exposure of tooth

Figure 5: Placement of occlusal button

Figure 6: Appliance design

Figure 7: Treatment outcome clinically

Figure 8: Treatment outcome after follow-up
Conclusion

This case report emphasizes that the early correction of ectopic eruption is very essential, especially when roots of second primary molar is severely resorbed even prior to eruption of permanent first molar. In such cases, exposing permanent first molar surgically and distalising it is the safer option rather than waiting for permanent first molar to erupt and later distalise it. This clinical report demonstrates an appliance which is simple to use, less irritating, more effective and more reliable especially in cases where permanent first molar is still unerupted.

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