Maxillary second molar impaction in the adjacent ectopic third molar: Report of five rare cases

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Abstract

Maxillary second molar impaction in the adjacent ectopic third molar is a rare condition that practitioners might face in the field of pediatric dentistry and orthodontics. The early diagnosis and extraction of the adjacent ectopic third molar have been advocated, and prior research has reported a high rate of spontaneous eruption following third molar removal. However, some challenges in the daily practice are that the early diagnosis of this type of tooth impaction is difficult with conventional radiographic examination, and sometimes the early surgical removal of the maxillary third molar must be postponed because of the risks of damaging the second molar. The objective of this study is to report a case series of five young patients with maxillary second molar impaction and to discuss the difficulty of early diagnosis with the conventional radiographic examination, and unpredictability of self-correction.

Keywords: Delayed tooth eruption, maxillary second molar, teeth impaction

Introduction

Impaction of permanent maxillary second molars is a rare condition with a prevalence rate of 0.08%,[1] and in 70% of the cases, the neighboring ectopic third molar was determined to be the obstacle for normal eruption.[2] Management of delayed eruption of permanent maxillary second molars can be a challenge in the field of pediatrics and orthodontics. The recommended approach is the early surgical removal of the third molar,[3-5] followed by orthodontic treatment when spontaneous eruption does not happen.[2] There are only a few reports discussing this clinical finding, and they have indicated a high success rate for the spontaneous eruption of the second molar after early third molar extraction.[2,4,6,7] The objectives of this report are to discuss the diagnosis and prognosis of maxillary second molar impaction in five young patients.

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Case Reports

Case 1

An 8-year-old boy was referred for an orthodontic screening. Clinical examination exhibited negative space discrepancy and submerged mandibular deciduous molars. The orthopantomogram (OPG) indicated that the development of the permanent teeth was within normal limits [Figure 1a]. At age 10, a new OPG was requested, and a radiopaque mass covering 17, suggestive of ectopic 18, could be observed. Contralateral 28 could not be identified in the OPG [Figure 1b]. Computed tomography (CT) demonstrated that 18 and 28 were impeding the eruption of 17 and 27 [Figure 1c]. Surgical removal of 18 and 28 was indicated, but it needed to be postponed 2 years due to the high risk of damaging the impacted second molars germs. One year after extracting 18 and 28, as well as 14, 24, 34, and 44 for orthodontic reasons [Figure 1d], 17 had not exhibited eruptive progress while 27 was actively erupting. Orthodontic treatment, including the traction of 17, was performed. Good occlusion was achieved [Figure 1e].

Case 2

An 11-year-old girl came for the first orthodontic consultation. The OPG showed that ectopic 18 was blocking 17 [Figure 2a]. The removal of 18 was immediately performed. One year and 2½ years later, tooth 17 did not show any significant improvement in its position [Figure 2b and c]. Orthodontic traction was subsequently indicated 3 years postsurgery when the patient was 14 years old [Figure 2d].

Case 3

A 9-year-old boy was referred for an orthodontic screening. OPG showed that 17 and 27 were impacted in 18 and 28, respectively [Figure 3a]. The oral and maxillofacial surgeon

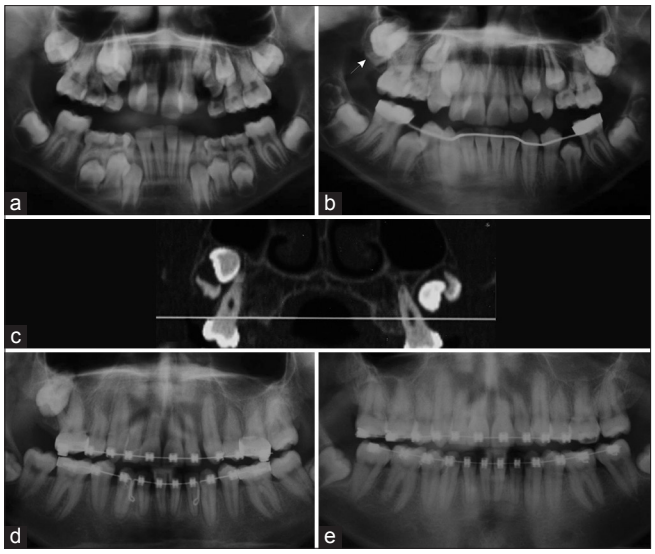

Figure 1: Case 1 - (a) Pretreatment orthopantomogram at 8-year-old, (b) follow-up orthopantomogram at 10-year-old, (c) computed tomography coronal view at 10-year-old, (d) orthopantomogram taken 1-year after the extraction of maxillary third molars and of four first premolars at age 13, (e) end of orthodontic treatment at 15-year-old

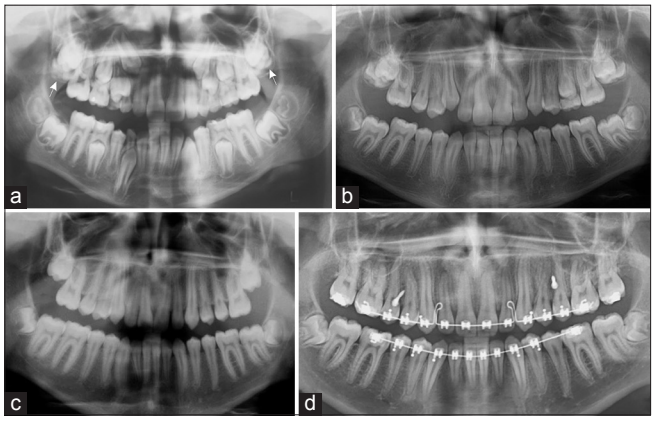

Figure 3: Case 3 - (a) Pretreatment orthopantomogram at 9-year-old, (b) follow-up orthopantomogram at 12-year-old, (c) orthopantomogram taken 24 months after the extraction of maxillary third molar at age 14, (d) end of orthodontic traction

contra-indicated early removal of 18 and 28 at this age due to high risk of damaging the impacted second molars root formation. Three years later, at age 12, the impaction was still present [Figure 3b]. At this time, 18 and 28 were removed. Two years later [Figure 3c], no significant eruption of 17 and 27 could be observed. Orthodontic treatment, including the traction of 17 and 27, was necessary to level and align the maxillary second molars [Figure 3d].

Case 4

A 14-year-old boy was referred by general dentist for orthodontic screening because he presented delayed eruption of 17, 27, and 47. However, OPG showed that 27 was blocked by ectopic 28 [Figure 4a]. Ectopic molar was immediately

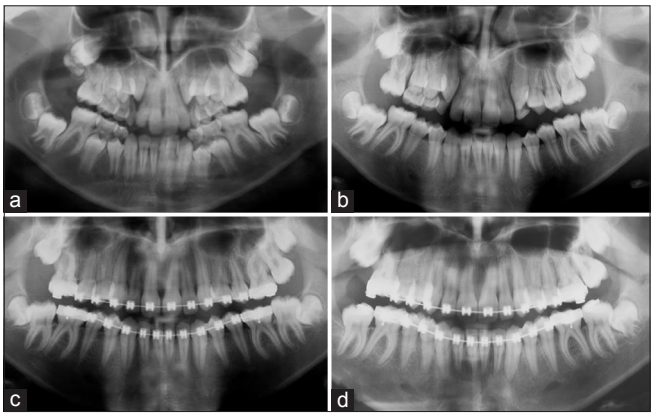

Figure 2: Case 2 - (a) Pretreatment orthopantomogram at 11-year-old, (b) orthopantomogram taken 12 months after the extraction of maxillary third molars at age 12, (c) orthopantomogram taken 24 months after the extraction of maxillary third molars at age 13, (d) orthopantomogram taken 24 months after the extraction of maxillary third molars at age 14, orthodontic traction was necessary

Figure 4: Case 4 - (a) Pretreatment orthopantomogram at 14-year-old, (b) 6 months after third molar extraction at 14 years 6-month-old, (c) orthopantomogram showing spontaneous eruption of 27 after third molar extraction, at 16-year-old

removed. Six months after the surgical removal of 28, 27 presented significant spontaneous eruptive progress [Figure 4b]. Eighteen months later, at age 16 [Figure 4c], all permanent second molars had erupted without orthodontic traction.

Case 5

A 10-year-old boy was referred for an orthodontic screening due to severe negative space discrepancy. OPG showed that 17 and 27 were symmetrically positioned, but the germ of the 28 could not be identified [Figure 5a]. CT scan confirmed the impaction of 27 in the ectopic 28. Early removal of 28 was performed. Two years later, 27 had not erupted [Figure 5b], and orthodontic treatment was needed [Figure 5c].

Discussion

Of the 3154 consecutive early orthodontic screenings (children ranging from 9 to 14 years old) in the last 22 years at the Nucleo de Odontologia Pediatrica e Pesquisa, Belo Horizonte, Brazil, we observed impaction of seven permanent

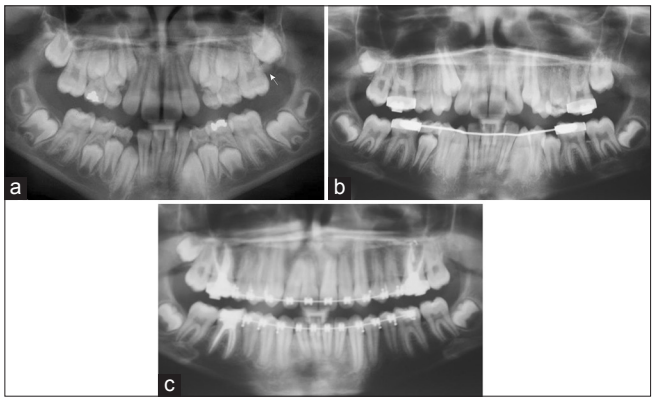

Figure 5: Case 5 - (a) Pretreatment orthopantomogram at 10-year-old, (b) orthopantomogram taken 24 months after the extraction of maxillary third molars at age 12, (c) End of orthodontic traction

maxillary second molars in the adjacent ectopic third molars in five patients. Thus, 0.16% of the children presented this type of tooth impaction, which is two times higher than the previously reported prevalence (0.08%). We infer that the difference in the prevalence rate is associated with the fact that we have retrospectively collected data from 22 years of clinical practice; the cited prevalence study was performed in a cross-sectional design with 5000 American Army Recruits. In addition, only orthodontic young subjects composed our population while the previous prevalence numbers were calculated for an adult population.[1]

The recommended treatment for maxillary second molar impaction is the early extraction of ectopic third molar; the reported self-correction rate is high.[2,4,7] We followed our patients annually, up to 3 years, after the third molar extraction, and the absence of self-eruption was recorded if no radiographic signs of tooth movement could be detected. In our seven impacted teeth, only two presented spontaneous eruption (28.6%), even with earliest possible extraction of the adjacent third molars. Even with an early mean age of third molars' extraction (11 years old), the effectiveness of removing the ectopic third molar was very low. Interesting to note that in Case 4, the diagnosis of impaction of 27 was done at a "late" stage (14 years old), and even with a "late" surgical removal of 28, the tooth presented an unpredictable spontaneous eruption. In Case 1, despite both impacted maxillary second molars were free from the eruptive blockage at age 12, only 27 actively erupted, while 17 needed orthodontic traction. Such observations reinforce the opinion that self-correction of maxillary second molar impaction is unpredictable, regardless the age of third molar extraction.

We need to note that many times, even with an early diagnosis of tooth impaction, employing the surgical approach to remove the ectopic third molar is not possible because of the high risk of damaging the developing germs of the second molars. Moreover, young patients may not present adequate compliance for surgical interventions, and pharmacological sedative management is not the first option in several practices. Thus, delay in the removal of obstructive third molars is likely to occur.

OPG, which is routinely requested as the orthodontic image-screening tool, might underestimate the ectopic position of the maxillary third molars. The benefits of cone-beam computed tomography (CBCT) cannot be the benefits of three-dimensional (3D) imaging, as provided by cone-beam computed tomography (CBCT) cannot be ignored in cases where the early diagnosis of impacted second molars is mandatory. Evaluation of impacted or ectopic teeth is enhanced with 3D imaging.[8] However, because children are particularly sensitive to radiation, it is imperative to adhere strictly to the ALARA directive to keep radiation "as low as reasonably achievable."[8] It can be achieved by following appropriate selection criteria. CBCT shall not be required if the third molars can be clearly visualized in the OPG. But, if CBCT is required to visualize the impacted tooth, using a small volume should suffice. Figure 1b illustrates a case when the OPG did not show the presence of an ectopic 28 blocking the eruption of 27 while the CBCT image clearly presented a new scenario [Figure 1c]. We are reporting, for the first time, the use of CBCT for early diagnosis of maxillary second molars impaction on the adjacent ectopic third molar. Previous papers on this topic have not reported the use of this type of imaging as an adjunctive tool. It does not mean that we recommend taking CBCT every time we suspect impaction of the second molar. For ethical use of ionizing radiation in dental practice, it is imperative always to ensure that any radiograph is justified for the patient. When faced with complex orthodontic cases, the dentist should consider the question, "What would I do if it were my child?"[8]

Conclusion

We recommend that pediatric dentists and orthodontist carefully evaluate the OPG of patients at age 9, 10, and 11 years of age. Special emphasis should be given to the maxillary second molars region. In cases where the third molar cannot be clearly identified, and the crowns of the second molars present an asymmetric position between right and left sides, or an ectopic position, a CBCT scan might be considered. In addition, the clinician should be prepared for orthodontic traction because self-correction may not be the most frequent outcome.

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