Clinical Challenges in Diagnosing Tooth Eruption Failure: A Case Report

Yuxin Jiang, Sung Kim, Tanya Al-Talib, John Kersey

University of Nevada, Las Vegas School of Dental Medicine

Introduction

Failure of eruption (FOE) is a rare cause of posterior open bite, with incidence rates of 0.01% for missing first molars and 0.06% for missing second molars[1]. FOE can be further subdivided into primary failure of eruption (PFE) and mechanical failure of eruption (MFE). PFE is a rare, genetically associated condition in which teeth fail to erupt due to malfunction of the eruption mechanism, in the absence of mechanical obstruction or ankylosis[2]. PFE often associates with mutation in PTHR1 gene. In contrast, MFE has a similar clinical appearance but results from physical obstruction or ankylosis. This case describes a 14-year-old Hispanic female with a unilateral posterior open bite from unerupted teeth, where both PFE and MFE are considered. Accurate diagnosis is critical to ensure proper management and avoid ineffective orthodontic treatment.

Case Report

Patient Background

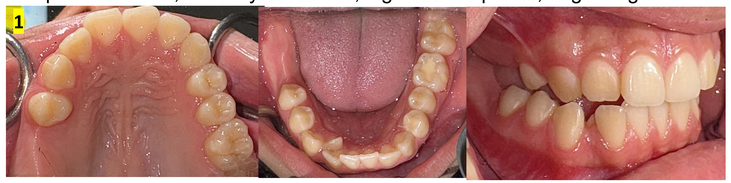
Chief Concern: "I haven't gone to dentist for many years now. I want a full dental exam." Patient and mom did not realize that patient did not have back teeth on the right side until 10/2025. According to the mother, there is no family history of a similar presentation.

Medical Conditions, medications and allergies: none

Clinical and Radiographic Examination

Intraoral Evaluation *(see Figure 1)*:

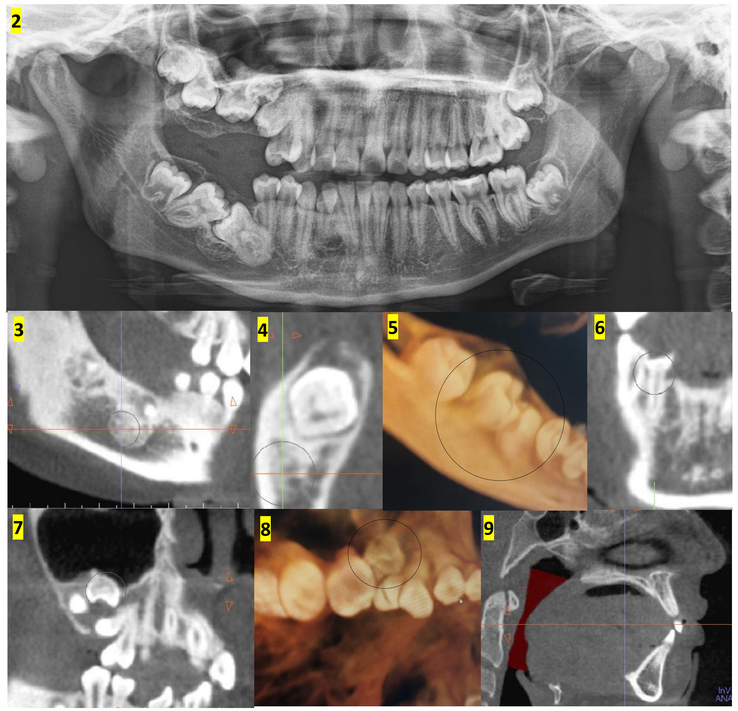
- Right, unilateral posterior open and cross bite due to unerupted posterior teeth
- Mallampati score of 4, Brodsky score of 1, high vaulted palate, large tongue



Radiographic Evaluation of Panoramic image (*see Figure 2*) and CBCT:

CBCT images were obtained to rule out possible pathology around #30 and were reviewed by Dr. Sung Kim, Oral and Maxillofacial Radiologist.

- #2, #3, #4, #30 and #31 are impacted
- Localized sclerosis of the bone around #30 (*see Figure 3-5*): No pathology is identified in association with #30 and #31. The buccal cortical plate and surrounding trabecular bone are normal. The well-defined, sclerotic region associated with #30 shows no mass effect. No ankylosis was found at #30 and #31.
- Erupted supernumerary tooth #27a (see *Figure 6*): Patient's #27a is rotated and no periapical lesions are found.
- Impacted supernumerary crown #3a (*see Figure 7 and 8*): #3A has fused to the sinus floor. The supernumerary crown lacks roots and is likely ankylosed. Its anatomy resembles an unerupted primary maxillary molar; however, due to the absence of prior records, it cannot be confirmed whether it represents a retained primary molar that failed to erupt.
- Constricted oropharynx (see *Figure 9*) : The oropharyngeal airway is constricted in the AP dimension at the level of the soft palate. Minimal cross-sectional area is approximately 55mm^2 . Pediatric Sleep Questionnaire was completed and indicated that patient is at high risk for sleep apnea. Patient is referred to her pediatrician for sleep apnea screening.



Discussion

In 2007, Frazier-Bowers et al. developed a diagnostic table to help distinguish between PFE and MFE[2]:

Table 1. Overview of types of posterior eruption problems

Classification	# of affected teeth	Impact on adjacent teeth	Presence of ankylosis	Affected teeth visible intraorally	Treatment Response	Proposed Cause
PFE	Unilateral, or bilateral, can involve whole quadrants	Distal teeth also affected	No	Usually some portion of at least 1 tooth	No response to orthodontic force	Failure of eruption mechanism
MFE	Usually only 1st molar	Adjacent teeth normal	Yes	Maybe	Other teeth respond, affected teeth might response to luxation	Ankylosis, possible other obstruction

Based on *Table 1*, patient has features consistent with both PFE and MFE. In the maxilla, an ankylosed #3a may be contributing to the eruption failure of #4; however, all posterior teeth distal to #4 are also affected. In the mandible, no ankylosed teeth are identified. However, it remains unclear whether #31 has failed to erupt or is mesially tilted due to sclerotic bone impeding eruption of #30.

Establishing a definitive diagnosis is critical, as it determines whether the affected and adjacent teeth will respond to orthodontic forces. In cases of PFE, orthodontic intervention should be avoided until growth is complete, after which multidisciplinary options such as extractions, implants, or segmental osteotomies may be considered[3]. In contrast, orthodontic treatment may be effective in some cases of MFE.

To aid diagnosis, the patient was advised to obtain previous dental records to evaluate for ankylosed primary teeth or signs of infraocclusion around age 6. If such information is unavailable, genetic testing of the PTHR1 gene may be performed to help differentiate between PFE and MFE.

References

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