Nutritional Rickets in a 10-Year-Old Child: A Case Report

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Abstract

Rickets is a skeletal disorder in children caused by defective mineralization of newly formed bones, leading to soft, weak bones that are prone to deformities. Nutritional rickets is the most common form and can present with frontal bossing, pectus carinatum, swelling of the ankle and wrist joints, and leg bowing. Dental manifestations may include spontaneous abscesses in primary dentition with no history of trauma or caries, as well as hypoplasia in permanent dentition. This case report describes a 10-year-old male patient with nutritional rickets, focusing on the dental and skeletal manifestations, treatment strategies, and the role of socio-economic and behavioral factors in the management plan.

Background

Rickets is a skeletal disorder in children caused by defective mineralization of newly formed bone, resulting in soft, weak bones that are prone to deformities. This condition is characterized by abnormal serum levels of calcium, phosphate, and vitamin D, all of which are essential for healthy bone development.

Symptoms of rickets include frontal bossing, pectus carinatum (pigeon chest), swelling in the wrists and ankles, and leg bowing. Dental manifestations may include delayed tooth eruption, enamel defects, and hypoplasia. Additionally, rickets can cause abnormal tooth morphology, such as enlarged pulp horns or tubular dentinal defects that extend into the dentino-enamel junction, leading to spontaneous abscesses without a history of caries or trauma.

Despite available preventive measures, rickets remains prevalent worldwide, with nutritional rickets being the most common form due to insufficient sun exposure, inadequate dietary intake of calcium, and vitamin D deficiency. In the early 2000s, the incidence in the U.S. was 24 per 100,000. Rickets may also be linked to conditions that affect nutrient absorption, genetic factors, and certain medications.

Clinical management focuses on correcting deficiencies through supplementation of vitamin D, calcium, and/or phosphate. Orthopedic intervention, such as braces, may help correct bone deformities, while more severe cases may require surgeries like osteotomy, chest wall correction, and spinal surgery.

Clinical Presentation

A 10 year 4 month old male presented to the University of Michigan Pediatric Dentristry Clinic for a recall exam, accompanied by his foster mother.

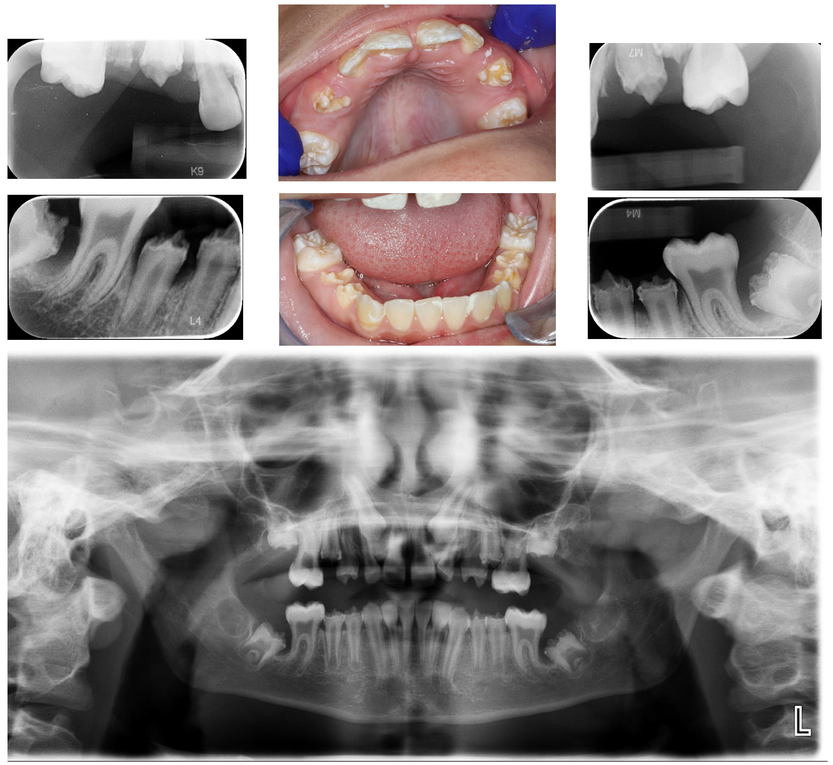
- **Chief concern:** "Here for a check-up". No pain, no sensitivity.
- **Medical history:** Autism spectrum disorder, nutritional rickets, developmental delay
- **Medications:** Abilify, calcium, vitamin D
- **Allergies:** None known
- **Social history:** Had been living with his foster mother, her partner and their 6 other children for 18 months.
- **Family history:** There were no significant health conditions for his biological father and mother. The patient had 6 siblings, and 3 of his siblings had autism. He was the only one who had rickets in his family.
- **General observation:** Displayed an abnormal walking pattern, characterized by a waddling gait, possibly due to his autism or his bowed legs associated with rickets.

Clinical findings:

- Permanent dentition
- Bilateral Cl II molar occlusion, OB: 50%, OJ: 1 mm
- Poor oral hygiene (plaque score: 50%)
- Generalized mild gingivitis
- No clinical caries
- Severely hypoplastic enamel was noted on the premolars and second molars (#4, #5, #12, #13, #18, #20, #21, #28, #29, #31), while the incisors and first molars appeared within normal limits. *This finding was significant, suggesting a time-specific disturbance that occured postnatally or after infancy rather than a genetic cause.*

Radiographic findings:

- Ectopic #6 and #11, with mesial positioning and potential transposition with lateral incisors.
- Unfavorable path of eruption of #18, #31 and #4 and #13 with risk of impaction.
- Lower bone density distal to #19 and #30



Treatment Plan

- **For the severely hypoplastic teeth,** monitoring was recommended at the time, as there was no history of pain or sensitivity, and the teeth were hard upon exploration. Once the hypoplastic teeth became more erupted, the application of sealants or flowable composite was to be considered to strenghten the teeth and improve oral hygiene, as the defects tended to retain more plaque. Given the severity of the hypoplastic enamel, particularly on the second molars, full-coverage restorations may be indicated in the future to ensure adequate protection and function.
- **Referral to Orthodontics** was advised to address concerns regarding the transposition of #6 and #11, and the unfavorable path of eruption of #4, #13, #18, and #31. An anterior CBCT was indicated to evaluate the position of the upper laterals and canines.
- **Periodontics was consulted** and recommended observation of the lower second molars. The operculum of these teeth appeared to have compromised the distal aspect of the first molars. However, it was advised to wait and see if the second molars would upright on their own, potentially bringing some bone with them to help restore the first molars as well.
- **For the maintenance phase,** given the patient's high risk of caries, regular exams, prophylaxis and fluoride varnish every 3 months were recommended for optimal monitoring and care.

Considerations

In this case, patient's socio-economic and behavioral factors were taken into consideration. The patient was in foster care at the time, and the orthodontic consultation had been declined due to financial limitations. If restorative or orthodontic treatments were to be pursued in the future, it was important to remain mindful that the patient might face difficulties in tolerating treatments due to behavioral challenges and medical condition.

Conclusion

Dental manifestations of rickets in primary dentition include abnormal tooth morphology, such as enlarged pulp horns or tubular dentinal defects extending into the dentino-enamel junction, which can lead to spontaneous abscesses. In permanent dentition, hypoplasia is commonly observed. Once diagnosed, it is essential for the pediatric dentist to monitor the condition through regular checkups and provide any necessary prophylactic treatments. Early intervention can prevent complications and support long-term dental health.

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