Case Report: Early Exfoliation of Primary Dentition in a Patient with Possible Hypophosphatasia Diagnosis

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Abstract

Premature loss of primary dentition can result from both local and systemic causes. Early childhood caries, dental trauma, periodontitis, natal or neonatal tooth extraction, and manifestation of systemic diseases are possible causes for premature loss of deciduous teeth. Patients with early loss of primary teeth have increased risk for malocclusion, phonation problems, psychosocial problems, and decreased quality of life. This case report will discuss the assessment and the possible diagnosis of hypophosphatasia of a 4-year-old female patient with early exfoliation of #F and advanced alveolar bone loss in the maxillary anterior region

Background

Characteristics: Hypophosphatasia (HPP) is a rare inherited metabolic disorder, characterized by impaired mineralization of bones and/or teeth and low serum alkaline phosphatase (ALP) activity. Clinical expression largely varies and ranges from stillbirth without mineralized bone to asymptomatic adults. Common clinical features include bone pain, leg bowing, skeletal deformities, delayed walking, short stature, recurrent fractures, muscular insufficiency, or premature tooth loss.

Types: perinatal, prenatal benign, infantile, childhood, adult, and odontohypophosphatasia

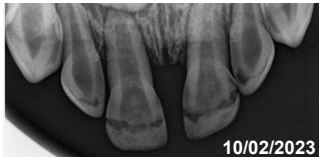
Pathophysiology: HPP is caused by mutations in the ALPL gene on chromosome 1, which controls the production of of tissue nonspecific alkaline phosphatase (TNSALP). Disturbance of production of TNSALP leads to accumulation of substrates such as inorganic pyrophosphate (PPi), pyridoxal-5'-phosphate (PLP), and phosphoethanolamine (PEA), prevents binding of calcium and phosphate, disrupts hydroxyapatite formation, which ultimately causes impaired mineralization

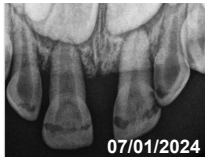
Mode of inheritance: More than 400 ALPL mutations have been identified. More severe phenotypes (perinatal and infantile) are transmitted by autosomal recessive mode while milder forms are transmitted by either autosomal dominant or autosomal recessive mode

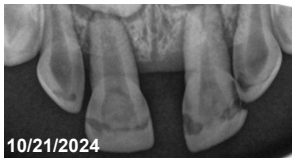
Epidemiology: Prevalence of HPP varies depending on severity. The incidence of severe forms ranges from 1:100,000 to 1:300,000 live births while the mild forms ranges from 1:6,000 to 1:7,000 people

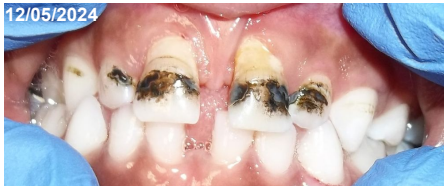
Diagnosis: Alkaline phosphatase (ALP) blood test, pyridoxal 5'0 phosphate (PLP) blood test, X-rays, and genetic testing for variants in the ALPL gene

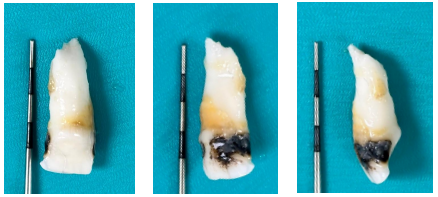
Case Report: Clinical & Radiographic Findings







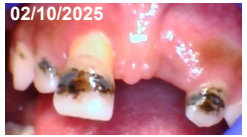




Facial	3	3	3	5	3	4	5	2	5	5	3	2	2	2	2
		#D			#E			#F			#G			#H	
Lingual	2	2	2	4	5	5	5	4	5	3	2	2	1	1	2

Facial	3	2	2	2	2	3	3	2	4	2	2	4	2	2	2
		#I			#J			#Q			#P			#O	
Lingual	3	3	2	1	2	3	2	3	2	2	2	2	2	2	2

Facial	2	2	3	3	2	4	2	2	2	2	2	2	2	2	3
		#N			#M			#L			#K				
Lingual	2	2	3	2	2	3	2	2	2	2	2	2	2	2	3



4y6m female
-Otherwise healthy, no medications, NKDA
-No hx of trauma
-Night time grinding every other night. No hx of additional oral habits
-No family hx of periodontal or bone disease
-No family history of premature loss of dentition

07/01/2024 Recall
#E and #F have 1mm recession on facial,
#E and #F: grade II mobility
SDF was previously applied on 11/29/22, 10/02/23 (stated no tooth mobility noted), and will be applied again on 07/17/24

10/21/2024 Consultation
#D and #G: grade I mobile
#E and #F: grade III mobile

12/05/2024 Oral sedation
#D and #G: grade I mobile
#E and #F: grade III mobile. #F moves protrusively upon occlusion
#O and #P: grade II mobile
#Q: grade I mobile
Patient exhibited tongue thrusting motion against lower anterior teeth during procedure
Probing: Moderate generalized bleeding. Patient expressed great discomfort when probing in the maxillary and mandibular anterior region
Referral: letter sent to patient's pediatrician to rule out potential systemic causes for premature primary tooth exfoliation with advanced bone loss

12/09/2024 On call
Mother reported patient lost #F while getting dressed

02/10/2025 Recall
#D and #G: grade I mobile
#E: grade III with 3mm of recession
#O and #P: grade I mobile
#N and #Q: physiologic mobility
Brought in exfoliated #F. #F shows limited root resorption

Differential Diagnosis

-Hypophosphatasia
-Congenital adrenal hyperplasia - inherited disorder characterized by insufficient production of cortisol. Leads to increased bone resorption and increased risk of periodontitis
List of differential dx is limited due to patient's otherwise healthy medical history. Patient was referred by her pediatrician to University of Michigan Endocrinology and is currently in process of further assessment and diagnosis

Management

Enzyme Replacement therapy - Asfotase alfa (Strensiq)
-Bone targeting recombinant alkaline phosphatase
-Replaces TNSALP
-Subcutaneous 3x/week 1-3mg/kg
- Indicated for severe types: perinatal, infantile, and juvenile
-At present, no fundamental therapy is available to prevent early exfoliation of primary teeth
-Importance of routine dental visits and good OHI
-Additional considerations such as denture fabrication and mouthguard during mixed dentition to prevent strong forces
-Mild form of HPP may occur with only dental manifestations and without bone symptoms. Some patients may reach adulthood without proper diagnosis. **Early exfoliation of primary dentition should prompt the need of medical examination for HPP**

CONCLUSION

Premature loss of primary dentition can be caused by local and systemic etiologies. It is important for pediatric dentists to be able to recognize when to refer for medical assessment when encountering cases of early primary tooth loss to facilitate proper diagnosis of potential systemic disease

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