

Pycnodysostosis with Osteomyelitis of Maxilla: Case Report of Radiological Analysis

Abstract

Pycnodysostosis is an autosomal recessive, rare genetic osteosclerotic disorder that caused by mutation in gene coding for Cathepsin K. The bones in pycnodysostosis are abnormally dense and brittle because of insufficient reabsorption process. This syndrome has a number of characteristic clinical and radiographic signs that differentiate it from other osteosclerotic conditions. This is a rare case report of a male patient with a history of multiple fractures of bones and osteomyelitis of maxilla which is a rare entity.

Keywords: Maxilla, osteomyelitis, pycnodysostosis

Introduction

Pycnodysostosis, a rare genetic osteosclerotic disorder was first reported in 1923 by Montanari, and he called it as atypical achondroplasia, later described by Maroteaux and Lamy in 1962.^[1] This disorder was also named “Toulouse–Lautrec syndrome” after the French artist Henri de Toulouse–Lautrec who had this disease.^[2] It is an autosomal recessive disorder that manifests as generalized osteosclerosis of the skeleton as a result of decreased bone turnover. It is caused by a mutation in the gene that codes the enzyme lysosomal cysteine protease-Cathepsin K on chromosome 1q21 which is important for normal bone cells called osteoclasts, to reabsorb into the bone and build new bone.^[3,4] It leads to degradation of collagen type 1 that constitutes 95% of the organic bone matrix rendering individuals afflicted with this disorder to be unable to adequately reabsorb the organic matrix. This process, also called remodeling, is vital for normal bone maintenance. The bones in individuals afflicted with pycnodysostosis are abnormally dense and brittle as a result of this insufficient reabsorption process.^[5] These patients present with multiple fractures owing to dense, abnormally brittle bones. It is usually diagnosed at an early age with incidence estimated to be 1.7 per 1 million births.

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It is equally distributed between women and men and at the best of our knowledge about 200 cases have been reported in the literature.^[6] We report a case with pycnodysostosis, present the maxillofacial clinical features, osteomyelitis of the jaw bone, and multiple fractures of bones.

Case Report

A 58-year-old male reported to our department with pus discharge in the right maxillary posterior teeth for 6 days. Family history revealed nonconsanguineous marriage of parents, and he was the youngest among siblings and was only affected child among them. The patient was treated for osteomyelitis of the left posterior body of mandible 1½ years back following traumatic extraction of associated teeth. After treatment, the patient was asymptomatic and lost to follow-up. He had history of frequent long bone fractures. Drug, medical, and family history were noncontributory. The patient was conscious cooperative, well oriented to time, place, and person. All vital signs and parameters were within the normal limit.

On general physical examination, the patient was well built and nourished with short stature, short fingers, and toes. Various facial features were frontal bossing, beak-shaped nose, and proptosis of bilateral eyes. Oral findings were complete edentulous maxillary and mandibular arches, intraoral draining sinus was present with the right maxillary 3rd molar region.

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The patient had narrow palate with deep groove and macroglossia [Figure 1a-g].

Based on the history and clinical presentation, a provisional diagnosis of bone dysplasia was made and differential diagnosis of osteogenesis imperfecta, cleidocranial dysostosis, osteopetrosis, and pycnodysostosis was made [Table 1].

The various base line investigations such complete blood count, random blood sugar, liver function test, and kidney function test were done along with serum alkaline phosphatase enzyme to rule out other bony disorders, and culture sensitivity of pus was done. All blood investigations were within normal limits. Under radiological examination, panoramic radiograph (orthopantomogram [OPG]), skeletal survey, and noncontrast computed tomogram (NCCT) head and neck were performed. OPG revealed an ill-defined osteolytic lesion involving the right posterior maxillary alveolus, atrophy of alveolar ridges, and generalized increase in bone density. NCCT revealed marked atrophy

of alveolar arches of maxilla and mandible with increased bone density; a destructive lesion was present in the right side of maxilla with sclerosed bone surrounded by a rim of radiolucency suggestive of bony sequestrum. Complete opacification of the ethmoid sinuses and partially pneumatized sphenoid sinuses with thickening, sclerosis, and remodeling of were seen. Widening of cranial sutures, obtuse bilateral mandibular angles were seen on anteroposterior and lateral skull views and NCCT images. Multiple healed fractures of the ribs and bilateral shaft of tibia were noticed; bilateral clavicles were shortened with hypoplasia of lateral ends. The hand-wrist radiograph showed increased bone density with mild acro-osteolysis of distal phalanges and dislocation of metacarpophalangeal joint of the right thumb [Figure 2a-f and Table 2].

Based on clinical and radiological findings, a final diagnosis of pycnodysostosis with osteomyelitis of maxilla was made.



Figure 1: (a) Short stature with proportionate dwarfism. (b) Proptosis of eyes. (c) Frontal bossing, beak shaped nose. (d) Macroglossia. (e) Short, stubby palm, fingers. (f) Short, stubby feet, fingers. (g) Intraoral draining sinus in the right posterior region of maxillary alveolus and hypoplastic maxilla with grooved palate

Table 1: Clinical features differentiating pycnodysostosis from other entities

Characteristic	Pycnodysostosis	Cleidocranial dysostosis	Osteopetrosis	Osteogenesis imperfecta
Stature	Short stature with proportionate dwarfism	Short stature with no dwarfism	Normal stature	Short stature with no dwarfism
Eye involvement				
Proptosis	Present	Absent	Absent	Absent
Blue sclera	Present/absent	Absent	Absent	Present
Dysplastic nails	Present/absent	Absent	Absent	Absent
Grooved and hypoplastic palate	Present	Absent	Absent	Absent
Macroglossia	Present/absent	Absent	Absent	Absent



Figure 2: Skeletal survey (a-d) shows generalized increase in bone density. (a) Skull lateral view with open cranial sutures, obtuse mandibular angles. (b) Bilateral legs anteroposterior view shows healed fractures of bilateral shaft of tibia. (c) Bilateral hand-wrist anteroposterior view shows short, stubby metacarpals, and phalanges with mild acro-osteolysis and dislocation of metacarpophalangeal joint of the right thumb. (d) Chest posteroanterior view shows bilateral shortened clavicles with hypoplasia of lateral ends and multiple healed fractures of bilateral ribs. (e) orthopantomogram showing complete edentulous with atrophy of maxilla and mandible, obtuse mandibular angles. (f) Noncontrast computed tomogram head coronal section (bone window) shows osteolytic lesion of the right maxilla with sequestra within

Table 2: Radiological features differentiating pycnodysostosis from other entities

Characteristics	Pycnodysostosis	Cleidocranial dysostosis	Osteopetrosis	Osteogenesis imperfecta
Open cranial sutures and fontanel	Present	Present	Absent	Absent
Underdeveloped paranasal sinus	Present	Present	Present	Absent
Hypoplasia of maxilla/mandible	Present	Hypoplastic maxilla	Absent	Absent
Obtuse mandibular angle	Present	Absent	Absent	Absent
Generalized increase in bone density	Present	Absent	Present	Absent
Stubby hands, feet and fingers with acro-osteolysis	Present	Absent	Absent	Absent
Clavicle aplasia/hypoplasia	Clavicle hypoplasia/shortened lateral ends of clavicles (rare finding)	Clavicle aplasia/hypoplasia	Absent	Absent
Fragile bone susceptible to fracture and osteomyelitis	Present	Absent	Present	Present

Discussion

Pycnodysostosis is an autosomal recessive disease characterized by systemic osteosclerosis owing to decreased bone turnover. Defective osteoclasts cause impaired bone resorption and remodeling, which is essential for normal bone maintenance, both during growth and healing. Bones in affected individuals are therefore abnormally dense, brittle, and easily fracture.^[3] This disorder is generally diagnosed at young age, however, sometimes diagnosed late (as in our case), as a result of inclination to fractures and infections resulting from increased bone density and impaired bone vascularity. Cognitive functioning and life expectancy for pycnodysostosis sufferers are normal.

Several bone diseases should be considered in the differential diagnosis of pycnodysostosis, most importantly cleidocranial dysostosis, osteogenesis imperfecta, and osteopetrosis. Cleidocranial dysostosis presents with persistent open fontanelles and cranial sutures;

however, it always involves the clavicle more often than pycnodysostosis and does not result in overall increased bone density.^[7] In our case, though hypoplastic clavicles were present which is the rare finding but generalized increase in bone density was seen, thus ruling out cleidocranial dysostosis.

In osteogenesis imperfecta, there is an occurrence of more severe multiple bone fractures as compared to pycnodysostosis, and associated features such as choanal atresia and blue sclera are almost always present.^[5] In this case, the patient had a history of multiple bone fractures but other features defining osteogenesis imperfecta were absent. Hence, we ruled out osteogenesis imperfecta. Osteopetrosis presents with a generalized increase in bone density. There is no delayed closure of cranial sutures, no phalangeal, or clavicle hypoplasia in osteopetrosis. Other associated features include splenomegaly, hepatomegaly, lymphadenopathy, and jaundice.^[4] As these features were not seen in our case, so osteopetrosis was also ruled out.

Osteomyelitis is the most serious complication that may occur due to any local condition which interferes with the blood supply of the bone causing tissue necrosis and infection. With advancing age, these patients are at the increased risk of developing osteomyelitis of jaws following tooth extractions, due to poor bone healing. In addition, due to the defective osteoclastic activity, the resultant bone formation gradually jeopardizes the vascular supply by slowly eliminating the medullary spaces.^[4] Similarly, in our case, the patient had a history of traumatic extraction of teeth followed by osteomyelitis of the same region because of interference of blood supply to affected bone.

There may be dental abnormalities in these patients, with hypoplasia of the enamel, obliterated pulp chambers, and hypercementosis. Protrusion of the incisors with anterior open bite may be found, and dental crowding associated with extensive caries and periodontitis is frequent. These conditions cause the premature loss of dentition that may already be complete by the fourth decade of life.^[8] In this case, the patient was with complete edentulous alveolar ridges because of early exfoliation of teeth and extraction of some carious teeth. Hence, periodontitis and extensive caries could be the cause of edentulous alveolar ridges. The short stature of pycnodysostosis is caused by the increased bone volume of the sella turcica that is responsible for pituitary hypoplasia and growth hormone deficiency. Recently, growth hormone therapy has resulted in a significant improvement in final height in pycnodysostosis.^[9]

For osteomyelitis, the patient was kept on antibiotic course of capsule clindamycin 300 mg three times a day and advised to keep good oral hygiene. Patient is under follow-up and asymptomatic.

To date, there is no specific treatment, and the management of this disease remains only symptomatic. The bone fractures and osteomyelitis are the main threats to patients affected by pycnodysostosis, thus it is important to prevent or minimize the risk of fracture and atraumatic teeth extractions should be done under aseptic conditions. Dental hygiene and regular dental checkups are particularly useful for those affected due to various dental abnormalities.^[2] Pycnodysostosis is a rare clinically distinct entity with a number of different clinical signs and is usually underdiagnosed. Geneticists as well as orthopedists, hematologists, endocrinologists, and even neurosurgeons should be aware of this condition.^[10]

Conclusion

Early diagnosis of such condition will be helpful for better management of these patients as well prevent future complications. In addition, a specific treatment for the disorder must be established in the future to prevent complications and improve the quality of life for patients in the current era of advanced molecular research.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

- Balaji MS, Sundaram RK, Karthik P, Asokan K. Pycnodysostosis: A bone dysplasia with unusual oral manifestation. *Indian J Dent* 2014;5:218-21.
- Aynaou H, Skiker I, Latrech H. Short stature revealing a pycnodysostosis: A case report. *J Orthop Case Rep* 2016;6:43-5.
- Tummala P, Rao KB, Lakshmi BS. Pycnodysostosis: A case report of radiological analysis. *IOSR J Dent Med Sci* 2013;12:6-8.
- Khoja A, Fida M, Shaikh A. Pycnodysostosis with special emphasis on dentofacial characteristics. *Case Rep Dent* 2015;2015:817989.
- Mujawar Q, Naganoor R, Patil H, Thobbi AN, Ukkali S, Malagi N, *et al.* Pycnodysostosis with unusual findings: a case report. *Cases J* 2009;2:6544.
- Appelman-Dijkstra NM, Papapoulos SE. From disease to treatment: from rare skeletal disorders to treatments for osteoporosis. *Endocrine* 2016;52:414-26.
- Bernard B, Hiddema W. Pycnodysostosis with the focus on clinical and radiographic findings. *S Afr J Radiol* 2012;16:74-6.
- Rohit S, Praveen Reddy B, Sreedevi B, Prakash S. Osteomyelitis in pycnodysostosis – Report of 2 clinical cases. *J Clin Diagn Res* 2015;9:ZD15-7.
- Karamizadeh Z, Ilkhanipoor H, Bagheri F. Effect of growth hormone treatment on height velocity of children with pycnodysostosis. *Iran J Pediatr* 2014;24:161-5.
- Turan S. Current research on pycnodysostosis. *Intractable Rare Dis Res* 2014;3:91-3.