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A Rare Case of Pycnodysostosis - A Disease With Generalised Osteosclerosis

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ABSTRACT

A 60 years old male came to OPD with left hip pain and swelling after trivial trauma with past history of multiple long bone fractures.On clinical and radiological investigations patient has been diagnosed as rare disorder named Pycnodysostosis, manifests as generalised osteosclerosis of the skeleton as aresult of decreased bone turnover with autosomal recessive mode ofInheritance, first described by Maroteaux and Lamy in 1962. It is characterised by short stature, stubby extremities, facial dysmorphism, frequent pathological fractures of long bones, open anterior fontanelles, blue sclera and absence of mental retardation, proportionate dwarfism, well developed secondary sex characteristics, peculiar facies, prominent forehead, beaked nose , receeding jaw, and most importantly multiple spontaneous fractures associated with trivial trauma. This article reviews the clinical and radiographic characteristics of pycnodysostosis.

KEYWORDS : steosclerosis,pycnodysostosis, pathological fractures, short stature, genetic bone disorder

INTRODUCTION

Here we present a very rare case of pycnodysostosiswhich is an au tosomal recessive osteochondrodysplasia that maps to chromosome 1q21 causing Deficiency of Cathepsin K, a cysteine protease in osteoclasts, is known to cause this condition. This is a case scenario of 60 years old muslim male with history of multiple fractures over the long period , all from trivial trauma. A classical case of autosomal recessive trait with no other family member affected in the family tree.

CASEREPORT

In march,2015 60 years old muslim male presented to civil hospital Ahmedabad with complaint of pain and swelling over left hip with history of trivial trauma.On Radiological examination, patient has fracture femur neck left side with K-nail insitu with significant osteosclerosis, most probably pathological fracture considering the history of trivial fall.

On careful history taking and examination patient had multiple frac tures in past for most of which he was treated conservatively but some of them were operated. Patient had bilateral fracture tibia , one of which was operated with tibia nail and other was treated conservatively. Patient was also operated for fracture shaft femur left side with K-nail and fracture neck femur right side was treated with angle blade plate.

All blood investigations are within normal limits includingComplete blood count, renal profile , thyroid profile, liver profile, serum calcium, magnesium, alkaline phosphatase and phosphate excluding hemoglobinopathies, blood dyscriasis , malignancy and metabolic bone disorder as a cause of osteosclerosis .

Fig 1.1

Fig 1.2

Fig 1.3
Fig 1.1,1.2,1.3 – clinical features of Pycnodysostosis

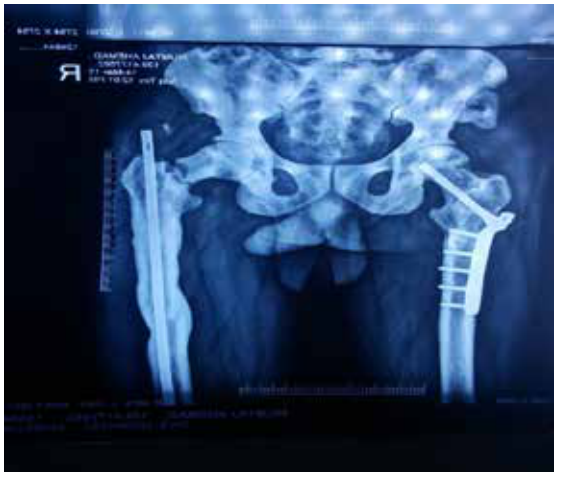

Fig 2.1

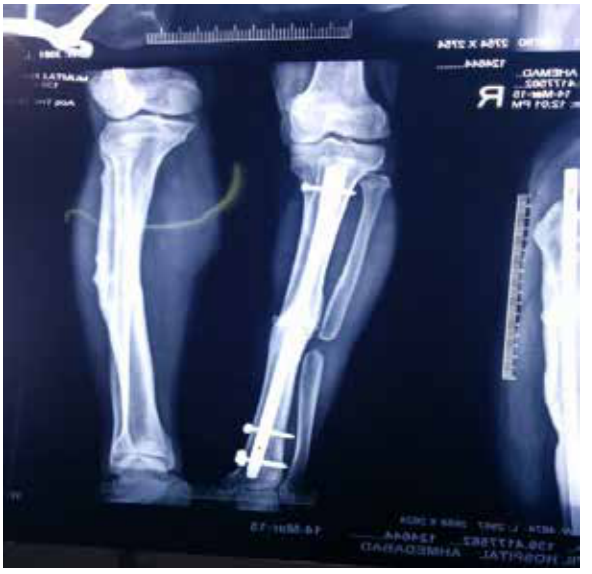

Fig 2.2

Fig 2.3

Fig 2.4

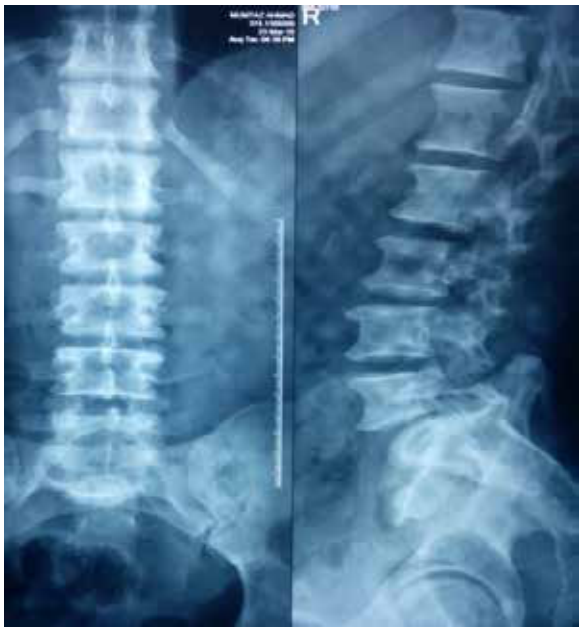

Fig 2.5

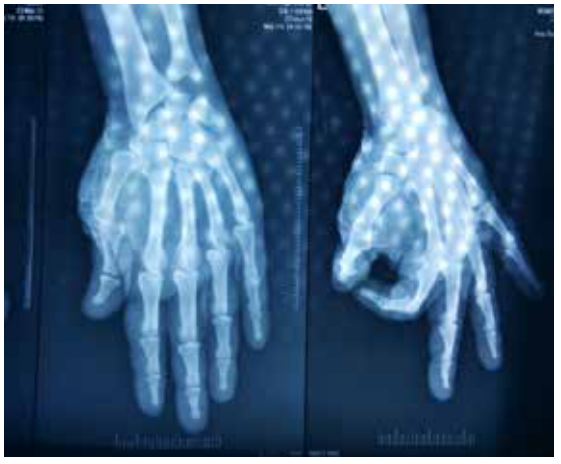

Fig 2.6
Fig 2.1 – 2.6 – Radiographical Findings

On detailed past history we found that patient develop multiple fracture throughout his life with just trivial trauma. So we conclude there must be some congenital cause.

On general examination patient had proportionate dwarfism his height was 145 cm with an upper to lower limb ratio of .78. pt had classical frontal bossing, with wide cranial sutures , beaked nose ,the hands and feet had short digits with overlying cutaneous wrinkles .joint movements were within normal limits.

On Radiological findings there is generalized thickening of cortices of long bones , without obliteration of medullary canals. Radiograph of skull showed protruding parietal bones , open fontanels with wormian bones. Fracture neck femur with k –nail in situ noted left side ;Right side tibia nail in situ with previous tibia fractures had healed with anterior angular deformities. Radiograph of hands revealed aplasia of the tufts of some phalanges and shortening of others. the rest of the long bones demonstrated clear osteosclerosis.

From all clinical and radiological findings ,patient was diagnosed to have Pycnodysostosis , a rare autosomal recessive disorder with generalized osteosclerosis.

Management
Patietnt was first managed for fracture neck femur with previously k- nail in situ with girdle stone excision procedure due to the sclerosing nature of the disorder, it was not possible to remove k- nail and attempt bipolar prosthesis which is the ideal line of management for this fracture

Discussion:
Pycnodysostosis is a rare inherited disorder, with an incidence estimated to be 1.7 per million births.[1,2]It was first described in 1962 by Maroteaux and Lamy as a form of dwarfism with craniofacial malformations similar to cleidocranial dysostosis.[2]Other authors have labeled it the Toulouse-Lautrec syndrome, as the French painter Henri de Toulouse- Lautrec is claimed to have suffered from the disorder.[2-4]

Pycnodysostosis is an autosomal recessive disease[1-6]characterised by systemic osteosclerosis owing to decreased bone turnover. During the 1990s, the genetic defect was located on chromosome 1q21 which led to specific genetic testing and accurate diagnosis.[1,2]A mutation in the gene that codes for the enzyme cathepsin K inhibits the normal functioning of osteoclasts. Cathepsin K is a lysosomal cystine protease expressed in osteoclasts that is primarily responsible for degrading collagen type 1 (which forms 95% of the organic bone matrix).[1,2,5]Defective osteoclasts cause impaired bone resorbtion and remodelling, which is essential for normal bone maintenance, both during growth and healing. Bones in affected individuals are therefore abnormally dense and brittle and easily fracture.[1]Sparing of the medullary cavity within the long bones is characteristic of the disorder, resulting in normal haematopoietic function.[1,2,4,5]

The disorder is normally diagnosed at a young age owing to the characteristic phenotypical appearance with proportionate dwarfism and dysmorphic facies.[2]It is, however (as in our case), sometimes diagnosed late, as a result of inclination to fractures and infections resulting from increased bone density and impaired bone vascularity.[2]Cognitive functioning and life expectancy for pycnodysostosis sufferers is normal.

Several bone diseases should be considered in the differential diagnosis of pycnodysostosis, most importantly cleidocranial dysostosis, osteogenesis imperfecta and osteopetrosis.[1,2]Cleidocranial dysostosis presents similarly to pycnodysostosis, with persistent open fontanelles and cranial sutures; however, it always involves the clavicle (a bone only rarely affected in pycnodysostosis)[1]and does not result in overall increased bone density.[2]Osteogenesis imperfecta patients present with multiple fractures; however, these are more severe than in pycnodysostosis, and have associated features such as choanal atresia and blue sclera.[1]Osteopetrosis also causes generalised osteosclerosis and increased bone density; however, the medullary cavities in the long bones are obliterated, and patients present with anaemia. Increased density of the skull base causes attenuation of foraminae, with resultant compression symptoms of the cranial nerves.[2]

The diagnosis is primarily based on the aforementioned clinical and radiographic features. However, a cathepsin K gene mutation analysis[1,2]remains the gold standard confirmatory test.

Clinical features of pycnodysostosis are short stature, fractures, large head with frontal and parietal bossing, open anterior fontanelle and cranial sutures, obtuse mandibular angle, prominent eyes with bluish sclerae, underdeveloped facial bones, dental anomalies, short, broad hands and feet with dystrophic nails and trunk deformities such as kyphosis, scoliosis, increased lumbar lordosis, recurrent chest infections, stridorous breathing, snoring and narrow chest. Laboratory investigations usually give results within normal limits.

Life expectancy for a Pycnodysostosis patient is normal.

Radiological findings may show some degree of widening of the distal femur. The skull shows open anterior fontanelle and sutures with small facial bones, non-pneumatised paranasal sinuses and flattened mandibular angle.[6-7] Terminal phalanges in the hand are partially or totally aplastic with loss of ungual tufts. The acromial ends of the clavicles may be aplastic. Other abnormalities include failure of complete segmentation of the atlas, axis, and the lower lumbar spine, coxa valga and abnormal radioulnar articulation.

Histologically, the appearance is similar to that of osteopetrosis but

the medullary canals are present and microscopic evidence of atten uated haversian canal system is seen.

The diagnosis of pycnodysostosis is primarily based on clinical- fea tures and Radiographs; however a CTSK gene mutation analysis is the confirmatory test. Various novel mutations of cathepsin K gene in pa tients with pycnodysostosis have been reported in literature.[8-9]

There is no specific treatment as of date for this disorder and treatment is supportive. Since bone fractures are a primary threat to those affected by Pycnodysostosis, it is important that care is taken to prevent or minimize tendencies for a fracture to occur. Such precautions include careful handling of an affected child, along with exercise and activities that are safe and do not require too much impact. Dental hygiene and regular dental checkups are especially helpful for affected individuals due to various dental anomalies.[10]

Conclusion

Pycnodysostosis is a rare condition that is diagnosed primarily on its clinical and radiographic features. The importance of recognition of these features in the diagnosis and prevention of future complica tions is stressed in this case report.

REFERENCES

1. Mujawar Q, Naganoor R, Patil H, Thobbi AN, Ukkali S, Malagi N. Pycnodysostosis with unusual find¬ings: a case report. Cases Journal 2009;2:6544. | 2. Hernandez-Alfaro F, Arenaz-Bua J, Serra Serrat M, Mareque Bueno J. Orthognathic surgery in pycno¬dysostosis: a case report. Int J Oral Maxillofac Surg 2011;40:106-123. | 3. Stark Z, Savarirayan R. Review osteopetrosis. Orphanet Journal of Rare Diseases 2009;4:5. | 4. Sutton D. Textbook of Radiology and Imaging. 7th ed. Kidlington, Oxford, UK: Churchill Livingstone, 2003:1123-1124. | 5. Ihde LL, Forrester DM, Gottsegen CJ, et al. Sclerosing bone dysplasias: Review and differentiation from other causes of osteosclerosis. Radiographics 2011;31:1865-1882. | 6. Ferreira Costa AL, De Castro Lopes SL, De Almeida SM, Steiner CE. Pycnodysostosis: An early case report with emphasis on the radiographic findings. I nternet Journal of Dental Science 2006;3:2. | 7. Elmore SM: Pycnodysostosis: a review. J Bone Joint Surg [Am] 1967, 49:153-161. | 8. Motyckova G, Fisher DE: Pycnodysostosis: Role and Regulation of Cathepsin K in Osteoclast Function and Human Disease. Curr Mol Med 2002, 2:407-421. | 9. Chavassieux P, Seeman E, Delmas PD: Insights into material and structural basis of bone fragility from diseases associated with fractures: how determinants of the biomechanical properties of bone are compromised by disease.Endocr Rev 2007, 28:151-164. | 10. Dormans J, Flynn J: Rockwood and Wilkin's Fractures in Children. 6th edition. Edited by Beaty JHKasser JR. Lippincott Williams & Wilkins; 2005:195. | 11. Fratzl-Zelman N, Valenta A, Roschger P, Nader A, Gelb BD, Fratzl P, Klaushofer K:Decreased bone turnover and deterioration of bone structure in two cases of pycnodysostosis.J Clin Endocrinol Metab 2004, 89:1538-1547. | 12. Maroteaux P, Lamy M: Pyknodysostosis. | a. Presse Med 1962, 70:999-1002. | 13. Wolpowitz A, Matisonn A: A comparative study of pycnodysostosis, cleidocranial dysostosis, osteopetrosis and acro-osteolysis. | a. S Afr Med J 1974, 48:1011-1018. |