CASE REPORT

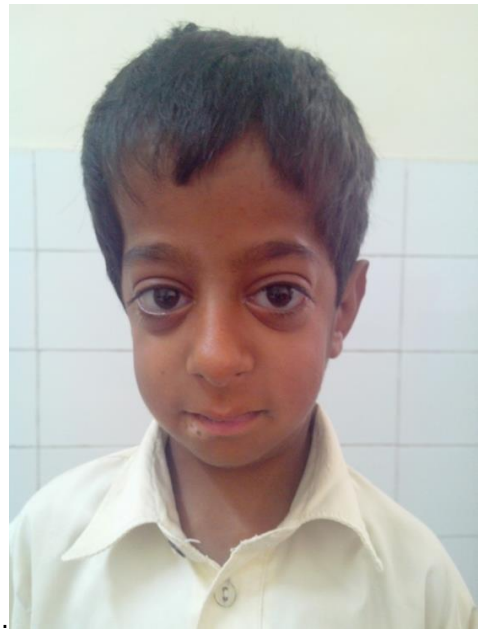
Pycnodysostosis: A Rare disorder

RAJA ATA, ZAHID NOMAN, ASAD MUNIR

ABSTRACT

Pyknodysostosis is a rare autosomal recessive disorder characterized by the post natal onset of short limbs, short stature, and generalized hyperostosis along with acro-osteolysis with sclerosis of the terminal phalanges, a feature that is considered essentiallypathognomonic. Other features include persistence of fontanels, delayed closure of sutures, Wormian bones, absence of frontal sinuses, and obtusemandibular angle with relative mandibular prognathism.In 1996, the defective gene responsible for Pycnodysostosis was located, offering accurate diagnosis, carrier testing and a more thorough understanding of this disorder. It is an autosomal recessive osteochondrodysplasia. Pycnodysostosis is a lysosomal storage disease of the bone caused by a mutation in the gene that codes the enzyme cathepsin K. This syndrome has been frequently reported in history.

Key Words: Pycno or pyknodysostosis,CTSK, Short stature, Chondroblastic osteosarcoma,Acro-osteolysis, Osteopetrosis.



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CASE PRESENTATION

A male child name Awais Raza, 10 years of age,resident of District Chakwal, Punjab, Pakistan, reported in orthopaedic department of Punjab Employees Social Security Hospital, Islamabad, Pakistan, with bilateral healed femur fractures and bowing of both femur. Physical appearance of patient was having short stature, low body weight, hypoplasia of face, enlarged skull,pro-optosis, overcrowding of teeth(double layered) and abnormal thumb nails. Patient was a good weight normal neonate after full term delivery at home. Maternal and Neonatal History was uneventful. Immunization was adequate with normal developmental milestones and intelligence. There was no history of frequent respiratory tract infections, snoring or tuberculosis contact.There was no significant pallor, hepatomegaly or lymphadenopathy. Sexual maturity rating showed pre-adolescent stage. No significant abnormality was noted by family members uptill 3 years back.When patient had a fall that resulted in fracture of left femur and right shoulder. They went to quack for management.A year after he fell down from almost 1 feet height that caused fracture of right femur also and they again went to quack. But after six months they noticed that his legs are not properly aligned, so they recently reported to orthopaedic department of Punjab Employees Social Security Hospital, Islamabad, Pakistan.

X rays and OPG were advised which showed generalized increased density of bone, thickened base of skull, cranial sutures widened, some Wormian bone in skull, obtuse angle mandible(fig2), non-segmented C1 – C2(fig3),hypoplastic terminal tappered phalanges(fig 4), bowing of both femur and loss of corticomedullary junction(fig 5),double layered teeth on OPG (fig 6). Blood CPwas normal,

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calcium was low but increased Alkaline phosphatase. No other significant laboratory findings.

He was diagnosed as Pycnodysostosis based on characteristic clinical and radiological findings.

DISSCUSSION

The term Pyknodysostosis (PKD) is derived from Greek, whereby 'pykons' means dense, 'dys' means defect and 'osteosis' means bone pathology. Maroteaux and Lamy (1962) recognized this condition as an entity in its own right..Previously it was thought to have been a variant of Cleidocranial Dysostosis, Osteopetrosis[1,2,3,4.] Short stature is a hallmark of the disease, and the French artist Henri Toulouse-lautrec (1864-1901)(fig 1)was thought to be afflicted by this disorder[1a]. In one series from japan, its incidence was 1.7/million births[4a].PKD in children is common in males than in females, occurring at a ratio of 2:1 [7].

It is characterized by short stature [1,8,9](measuring less than 150cm in adulthood), generalized diffuse osteosclerosis, long bone fractures, hypoplastic clavicles and short stubby fingers[2,8]. Craniofacial features include a large head with frontoparietal bossing, open soft cranial sutures and fontanelles, depressed nasal bridge, beaked of a nose, obtuse mandibular gonial angle, a high arched grooved palate, maxillary hypoplasia accompanied with relative proptosis, mandibular fractures, osteomyelitis, malpositioned teeth, delayed exfoliation of primary teeth, crossbite, hypercementosis, elongated soft palate, precipitating mouth breathing and heavy snoring in addition to periapical cementoma-like lesions in the mandible[2,4,8]. Intraoral features include a grooved or furrowed palate, delayed exfoliation of deciduous teeth but timely eruption of the permanent dentition giving rise to crowding[2,4,9,10] multiple retained teeth, unerrupted teeth within follicles and an expanded alveolus[10]. Follicles occasionally get infected leading to chronic suppurative osteomyelitis[10,11,12].

Parental consanguity has been identified in more than 30% of the cases as the cause of this autosomal recessive disorder[2,10.]Karyotyping suggest that the gene which determines PKD is located on the short arm of a small acrocentric chromosome probably G-222.It follows mutation in the CTSK gene situated at 1q 21 that codes for cathepsin k lysosomal cysteine protease that is highly expressed in osteoclast leading to disturbed bone resorption and remodeling[13]. A case of a 22-year-old European man with pycnodysostosis who developed a chondroblastic osteosarcoma of the right femur [22]has been reported.

Figure 1: French painter, Toulouse-Lautrec (1864-1901)

RADIOLOGICAL FINDINGS

The skull is dysplastic with sclerosis of its base and separation of the cranial sutures with an open anterior fontanelles. A Wormian bone pattern may be present in parietal area. The mandibular angle is obtuse and may approach to 180^0. The clavicles are usually dysplastic, commonly aplasia of the distal thirdmay be present, and complete absence has been reported. Coxa vara, coxa valgum and genu valgum may be present. Failure of segmentation at lower lumbar spine has been seen[14,15,16].

A unique characteristic of the disease is shortening of terminal phalanges with absence of ungula tufts associated with occasional aplasia of the distal phalanges.

X-ray in this disease shows sclerotic pattern very similar to that of osteopetrosis. In pyknodysostosis, however, the medullary canals, although poorly formed, are present and a faint

trabecular pattern is seen in contrast to osteopetrosis, which has dense sclerotic bone and no medullary canals. Sclerotic bone is also seen in Engelmann's disease, but clinically those patients are tall and have eventual muscle weakness. The distal femurs in pyknodysostosis usually have an Erlenmeyer flask deformity similar to that seen in Gauchers disease[17].

The fracture lines in pyknodysostosis are usually transverse and diaphyseal in location. The callus is scanty14, and the fracture line can persist for nearly 3 years after clinical union with an appearance similar to loser line18

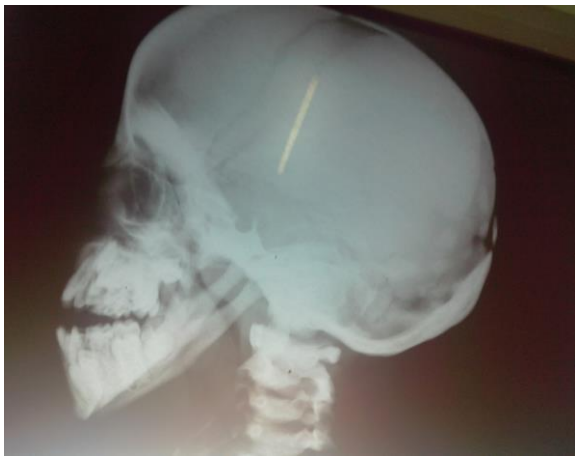

Figure 2: obtuse angle mandible, base of skull is thick, some Wormian bone seen

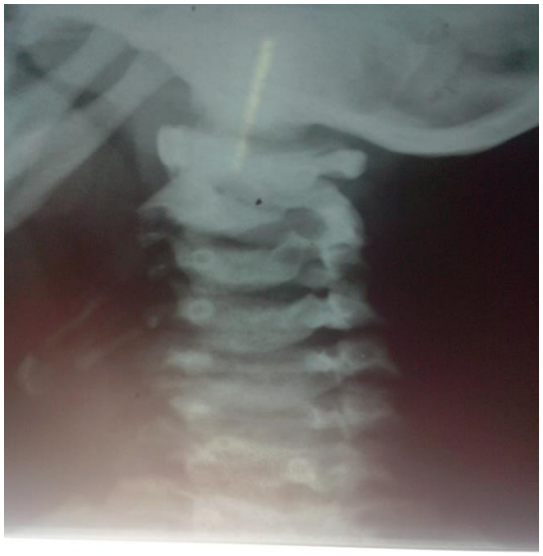

Figure 3: non-segmented C^1 and C^2,flat mandible and thickened base of skull

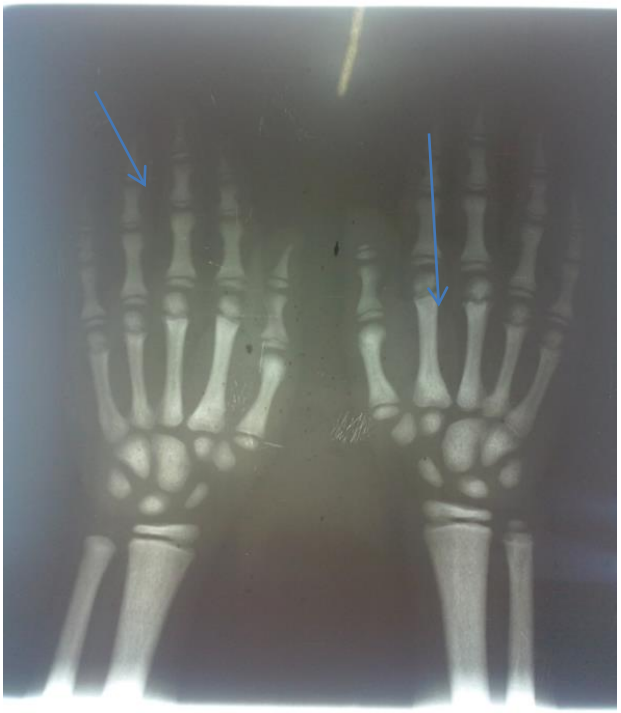

Figure 4: Acro-0steolysis

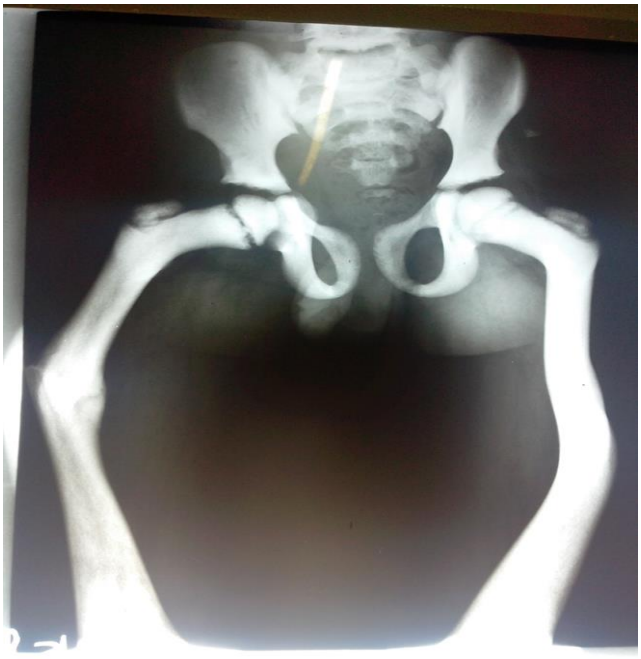

Figure 5: Old Healed Fracture, Bowing of Femurs and Varus Deformity.

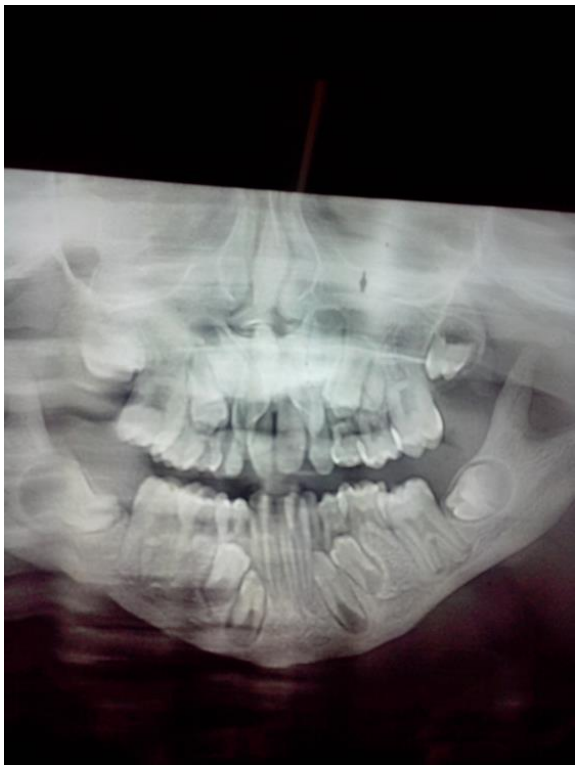

Figure 6: double layer of teeth

TREATMENT

There is no treatment for the cause of Pycnodysostosis; however, injections of growth hormone have been shown to improve height. Plastic surgery can help correct deformities of the face and jaw. Dental care will be necessary as people with PYCD are prone to cavities and may be missing teeth. Orthodontia is an option for improving the overall look to the teeth. People with PYCD need to be careful with their bodies to avoid bone fractures. Exercise should be limited to low-impact activities such as swimming.

Closed treatment with cast immobilization is successful in the treatment of most of these fractures. Taylor and Coworkers[19] treated a femoral fracture in a 11 year old boy with skin traction and $1^{1/2}$ hip Spica cast. At 6-month follow up, clinical union with persistent fracture line was seen. Inadults, both plates and screws and hip screws have been used for proximal femur fractures[4a,16,20.].Delayed union of tibial fractures has been treated with both compression plating and bone graft [18] and intramedullary nailing with cast immobilization[21]. Roth [20]noted that treatment of hip fracture with fixation was technically difficult.

CONCLUSION

Worldwide PKD have been reported in 9-months to 55years of age. Parental consanguinity has been identified in more than 30% of the cases as a of this cause autosomal recessive disorder, pathologically presented asosteochondrodysplasia. There is no specific treatment required for the patients. Reassurance and education of patient and family is important. With extra care about trauma to bones, a patient with PKD can lead a normal and productive life.

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