

Osteopetrosis : A Case Report

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Case Report

Subject: Orthopedics

Abstract:

Osteopetrosis (“marble bone disease”) is a descriptive term that refers to a group of rare, heritable disorders of the skeleton characterized by increased bone density on radiographs. Osteopetrotic conditions vary greatly in their presentation and severity, ranging from neonatal onset with life threatening complications such as bone marrow failure [e.g. classic or malignant ARO (Autosomal Recessive Osteopetrosis)] to the incidental finding of osteopetrosis on radiographs (e.g.osteopoikilosis). Classic ARO is characterized by fractures, short stature, compressive neuropathies, hypocalcemia with attendant tetanic seizures and life threatening pancytopenia. The presence of primary neurodegeneration, mental retardation, skin and immune system involvement or renal tubular acidosis may point to rarer osteopetrosis variants whereas onset of primarily skeletal manifestations such as fractures and osteomyelitis in late childhood or adolescence is typical of ADO (Autosomal Dominant Osteopetrosis). Diagnosis is largely based on clinical features and radiological examination. Treatment is largely symptomatic. Life expectancy in adult forms is normal.

Here is presented a case of osteopetrosis in a 25 year old female patient with the chief complaints of pain, deformity and inability to bear weight on the right lower limb since one month. Radiographic features revealed a transverse subtrochanteric fracture and generalized osteosclerosis. Taking into consideration the history, clinical, radiologic and laboratory findings, a final diagnosis of osteopetrosis was made.

Key Words: fracture, osteosclerosis, osteopetrosis.

Introduction:

The term osteopetrosis is derived from the Greek ‘osteo’ meaning bone and ‘petros’ stone. Also referred to as ‘marble bone disease’, it was first described in 1904 by Albers-Schonberg, a German radiologist [1]. Osteopetrosis comprises a clinically and genetically heterogeneous group of conditions that share the hallmark of increased bone density on radiographs. The increase in bone density is due to defect in remodeling caused by the failure of normal osteoclast

differentiation or function. The increased bone mass can result in phenotypic features such as macrocephaly and altered craniofacial morphology, but more importantly impacts on other organs and tissues, notably the bone marrow and nervous systems [2].

These conditions are rare and their overall incidence is difficult to estimate. Autosomal recessive osteopetrosis (ARO) has an incidence of 1 in 250,000 births, and autosomal dominant osteopetrosis (ADO) has an incidence of 5 in 100,000 births [3, 4]. They range in severity from asymptomatic to fatal in infancy, with the more severe ones having autosomal recessive inheritance and the mildest forms, in adults, inherited by autosomal dominant manner. Fractures and arthritis are common and require treatment by experienced orthopedic surgeons due to the brittleness of the bone, and the relatively frequent occurrence of the secondary complications such as delayed union or non-union of fractures and osteomyelitis [5].

Osteopetrosis is caused by failure of osteoclast differentiation or function and mutation in at least 10 genes have been identified as causative in humans. These defects include mutations in the gene encoding carbonic anhydrase II, the proton pump gene and the chloride channel gene [6]. Skeletal alterations of patients with autosomal dominant osteopetrosis are so characteristic that diagnosis is ascertained usually by standard radiographs. The classic radiological features of osteopetrosis comprise diffuse sclerosis, affecting the skull, spine, pelvis and appendicular bones, medullary compartment often obliterated by immature unresorbed bone, bone modeling defects at the metaphyses of long bones, such as funnel -like appearance (Erlenmeyer flask deformity) and characteristic lucent bands, bone- in-bone appearance particularly in the vertebrae and phalanges, focal sclerosis of the skull base, pelvis and vertebral end plates-sandwich vertebrae and “rugger-jersey” spine and transverse fractures [7].

Hence, in view of the rarity of this condition, this paper intends to present a case report of osteopetrosis in a 25 year old female patient.

Case Report:

A 25 year old female patient came with a presenting complaint of pain and deformity in the right thigh with inability to bear weight since one month. She was apparently normal one month ago when she slipped and fell while stepping out of the train onto the platform at the railway station in her hometown, Nandyal, Kurnool district, Andhra Pradesh, India. She was treated initially by a traditional bone setter for one month and later brought to Santhiram Medical College and General Hospital, Nandyal, Kurnool district by her family members. She had no history of fractures in the

past. She was on mixed diet and was not a known smoker /alcoholic.

On general examination, she was moderately built, moderately nourished, with pallor, no icterus/clubbing/cyanosis/pedal edema/generalized lymphadenopathy. Systemic examination was clinically normal.

Local examination of the right lower limb showed that there was proximal thigh tenderness, crepitus, deformity and abnormal mobility. No active straight leg rising was possible. There was no distal neurovascular deficit.



Figure 1: Radiograph showing transverse subtrochanteric lateral fracture of the Right femur.



Figure 2: Postoperative radiograph showing Proximal femoral locking plate



Figure 3: Postero-anterior view of the thoracic cage showing generalized osteosclerosis:

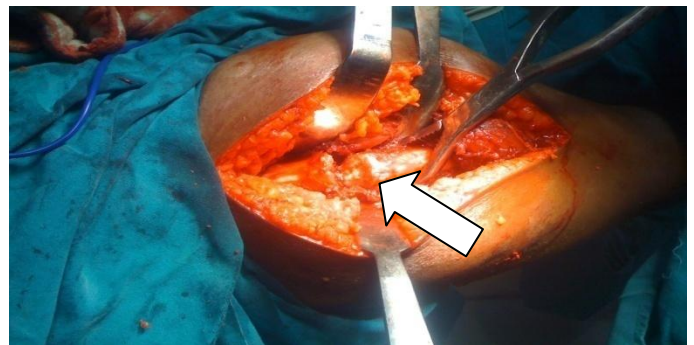


Figure 4: Intra- operative photograph showing the fracture and narrow intramedullary canal:



Figure 5: A and B: Skull x-ray showing thickening of the outer and inner cortical tables:

Radiograph of the right hip with femur was taken. It revealed a transverse subtrochanteric fracture of the proximal femur, with thickened cortical boundaries and reduced intramedullary canal diameter (Fig 1). After observing these features, the patient was subjected to further radiographic examination to study the skull, paranasal sinuses and chest. They revealed increased bone density. Postero-anterior chest radiograph showed a generalized increase in bone density throughout the thoracic cage with normal heart shadow and normal lung fields (Fig. 3). Lateral view of the skull showed thickening of the inner and outer cortical tables (Fig.5).

Blood investigations including viral screening were done. As hematologic examination showed Hb of 8gm%, two units of compatible blood was administered prior to the surgery. Red cell indices and iron profile were normal. Serum calcium and serum phosphate levels were normal. The patient was put on proximal tibial skeletal traction with 5 kg weight for two weeks prior to the surgery. After pre-anesthetic check up, she was posted for surgery.

The fracture was fixed by a proximal lateral femoral locking plate (Fig. 2). As seen in Figure 4, intra operative findings reveal narrow intra-medullary canal and absence of callus. Drilling of the cortices was very tedious due to the sclerosis and the purchase of the screws was excellent.

Postoperative period was uneventful. Suture removal was done on 12th PO day. Wound healed well and patient discharged on 13th PO day. Patient was advised strict bed rest for 6 weeks and she was followed up at 6 weeks postoperatively by clinical and radiographic examination which showed implant insitu with no evidence of loosening or infection.

She was further advised follow-up at monthly intervals for the first 6 months and 6 monthly intervals for 2 years. The patient has been, as on today, followed up as per the advice, for 2 months. She was also advised to ambulate with non-weight bearing gait with walker.

The condition was thus, diagnosed as osteopetrosis based on the history, clinical, radiological and laboratory findings. Bone biopsy is not essential for diagnosis, because radiographs usually are diagnostic.

Discussion:

Autosomal dominant osteopetrosis is the most common form with an estimated prevalence of 1 in 20,000 births. Age of onset is late childhood or adolescence [7]. Waguespack et al discussed 62 cases with Autosomal dominant osteopetrosis type II, of whom 19 were ≤ 18 years of age and 43 were ≥ 18 years, with a male predominance. Fracture was the most prevalent clinical manifestation occurring in 84% of all subjects reported by him, with fracture pelvis, hip and femur being the most common [8]. 55% of the patients

reported by Del Fattore et al were males and 45% were females. 10% of the patients reported fractures in 4-10 bones and more than 10 bones were fractured in 15% of them. They also reported generalized osteosclerosis in 43% of the cases [9]. El-Tawil and Stoker reported a fracture rate of 62% (femur most common) [10]. The patient in this case report was a 25 year old female with a transverse subtrochanteric fracture of the proximal end of right femur with history of a fall. Radiologically, skull and thoracic cage had increased bone density.

Differential diagnosis:

Primary sclerosing conditions of bone caused by osteoclast dysfunction need to be distinguished from the large number of conditions in which bone sclerosis can occur as a secondary phenomenon. Some alternative diagnoses include fluorosis, beryllium, lead and bismuth poisoning, myelofibrosis, Paget's disease (sclerosing form), hypoparathyroidism and malignancies (lymphoma, osteoblastic cancer metastases) [7].

The diagnosis of osteopetrosis is based on radiological and clinical features and these findings in this case suffice to make a definite diagnosis of osteopetrosis.

Conclusion:

A proper clinical, hematological & radiological investigation will help to arrive at the definitive diagnosis in a case of osteopetrosis. Treatment is symptomatic and genetic counseling & reassurance should be given to the patient. Special focus should be given to these patients with osteopetrosis due to their fragile bone status resulting from defects in osteoclast function and consequent impaired wound healing.

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