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Infantile osteopetrosis with typical radiological findings: Rare case report

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Abstract
Osteopetrosis is a rare hereditary metabolic bone disorder of sclerosing bony dysplasia characterized by generalized skeletal sclerosis caused by a defect in bone resorption & remodeling due to defect in osteoclast function. Many subtypes of OP have been described.
The correct and early diagnosis of infantile osteopetrosis is important for management of complications and for future genetic counselling. Diagnosis is largely based on clinical and radiographic evaluation, confirmed by gene testing where ever applicable.

Keywords: Infantile osteopetrosis, macrocephaly, sandwich vertebra, Erlenmeyer flask deformity

Introduction
Osteopetrosis is an uncommon genetic metabolic bone disease characterized by a deficiency in bone resorption and remodeling that results in extensive skeletal sclerosis. Although the precise incidence is unknown, it is thought to affect ~ 1 case per 100,000–500,000 people[1]. Based on age and clinical characteristics, three different clinical forms of the disease (infantile, intermediate, and adult onset) are identified. We report a case of infantile autosomal recessive osteopetrosis, which is the more severe form and typically manifests in the first few months of life [1].
Accurate and timely diagnosis of infantile osteopetrosis is crucial for future genetic counseling as well as for managing associated problems. The diagnosis is mostly based on Radiographic and clinical examination, which is supported, where appropriate, by gene testing.

Case report
A 2-year-old boy was brought to the pediatric department with history of delayed mile stone and abdominal distention. He was the fifth child born to a couple who were consanguineous in the first degree. Upon clinical examination, there was aberrant dentition, frontal bossing, and macrocephaly with small thorax. On per abdominal examination there was enlarged spleen. He needed the help of his parents in order to walk. Genetic testing was done and shows TCIRG1 gene mutation. Child was referred to radiology department for skeletal radiography and abdominal ultrasound scan.

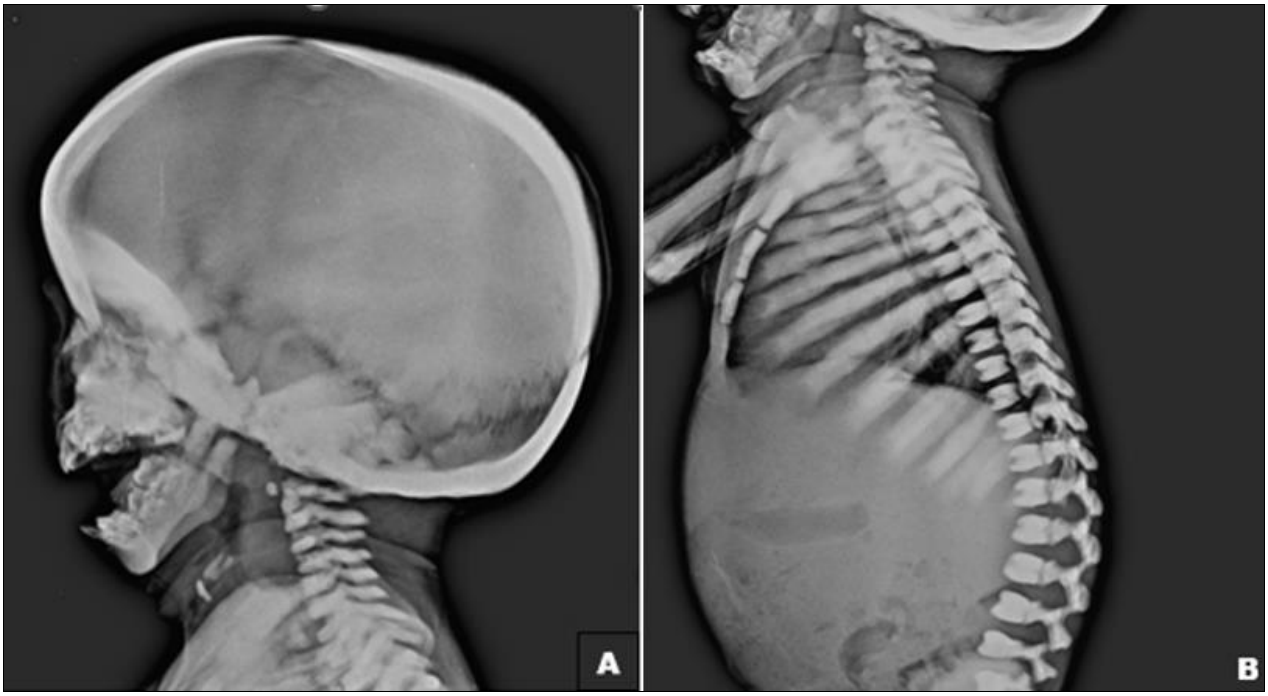


Fig 1: Lateral radiographs of the skull (A) and the spine (B) shows a general increase in bone density, primarily involving The medullary region. Observe the traditional end obone, or "bone-within-bone appearance," in the spine, known as "sandwich Vertebra," which is defined by dense endplate sclerosis and sharp edges.

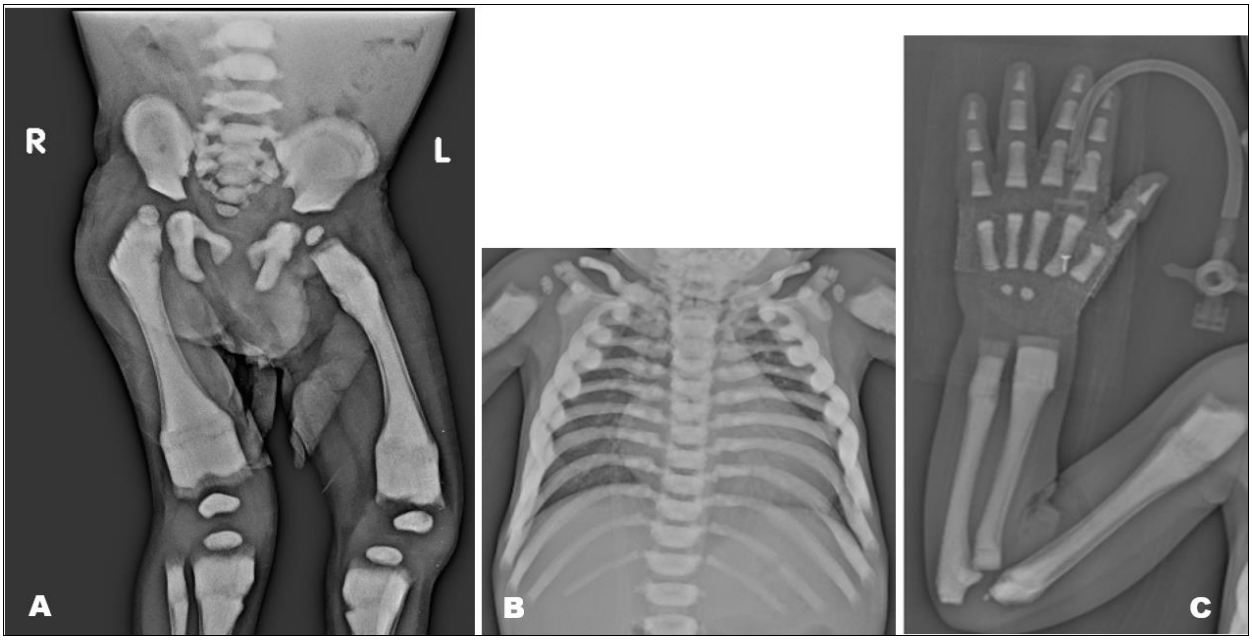
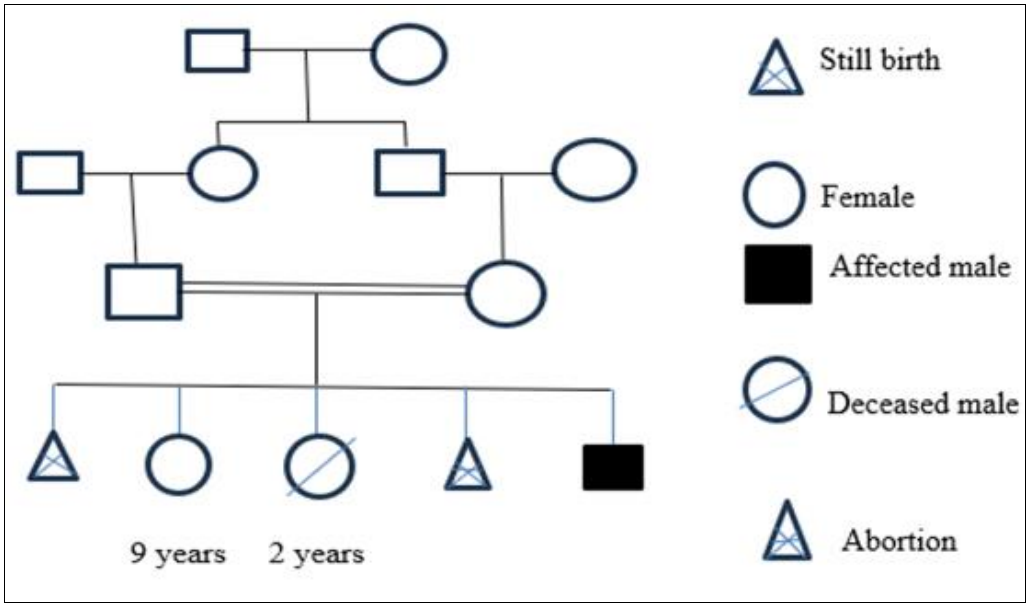


Fig 2: The pelvis and both lower limbs in an AP view (A), chest wall (B) and Right hand (C) in an AP view. Observe the sclerosis of The pelvis, lower limb long bones (A), and upper limb long bones (C). The upper limbs, hand's short tubular bones (C), pelvis and Proximal femora (A), and other structures exhibit the characteristic "bone-within-bone" appearance. Note the Erlenmeyer flask Deformity, with abnormal radiographic appearance of trabecular bone (A).

A radiographic examination of the axial and appendicular skeleton showed that the cortices were mostly spared but that there was widespread osteosclerosis in the medullary section of the bone. Figures-1 A, B, and figures- 2 A, B, C show specific radiographic abnormalities. The Ultrasound scan of abdomen and pelvis showed Hepatomegaly and splenomegaly without any focal lesions. A blood picture showed a moderate case of anemia. The parents of our patient were notified that information related to the case will be sent for publication. This study was not funded in any way. The ethical committee in the area approved the study.

Family tree of the child is drawn below



Discussion

Clinical assessment, history, family history & physical examination is very important because generalized bone mineralization abnormalities such as osteogenesis imperfects, some osteosclerotic disorders as osteopetrosis, and hypophosphatasia may present with near normal proportions[2]. Our patient of 2 years age presented with near normal stature and proportions, with positive family history & with classical radiological signs. Our patient had diffuse sclerosis involving both the skull vault, no multiple limb fractures despite increased bone density, metaphyseal flaring leading to (Erlenmeyer flask deformity), and "Bone-within-bone" appearance typically seen in ribs, and tubular bones. End-plate sclerosis in the spine causes the appearance of sandwich vertebrae. They manifest as several dense white lines at metaphysis and parallel to the iliac crest in the appendicular skeleton. Except for numerous fractures, there is a clear correlation between the radiographic data

reported in our case and those published in the study by Panda and colleagues [3].

The main clinical symptoms of the disease are pancytopenia caused by the infiltration of bone marrow (increased risk of bleeding and repeated infections), which may be associated with extramedullary hematopoiesis, compression syndromes of cranial nerves (mainly optic and vestibulocochlear nerves), pathologic fractures, dental problems and delayed growth.

The transplant of hematopoietic progenitors is the only currently available lasting treatment. Treatment with vitamin D (calcitriol), gamma-interferon, erythropoietic bone marrow transplant and corticoid may also be useful.

Genetic profiling:

Half of cases infantile autosomal recessive osteopetrosis involve mutation of *TCIRG1* gene, mutations of *CLCN7*, *OSTM1* gene & mutation of *PLEKHM1* gene in varying clinical & radiological findings.

Conclusion

Despite significant progress in understanding the genetic abnormality causing osteopetrosis in recent years, appropriate clinical and radiological examination continues to be a crucial factor in diagnosing infantile osteopetrosis.

Ethical Disclosures

The authors declare that for this research no experimentation has been carried out on human beings or animals.

Confidentiality of data: The authors declare that no patient data appear in this article.

Conflict of Interest: The authors have no conflicts of interests to declare.

References

1. Stark Z, Savarirayan R. Osteopetrosis. Orphanet J. Rare Dis.,2009:4:5. 10.1186/1750-1172-4-5.
2. Krakow D, Rimoin DL. The skeletal dysplasias. *Genet. Med*,2010:12:327–341.
3. Panda A, Gamanagatti S, Jana M, Gupta AK. Skeletal dysplasias: a radiographic approach and review of common non-lethal skeletal dysplasias. *World J. Radiol*, 2014:6(10):808–825.
4. Van Wesenbeeck L, Odgren PR, Coxon FP, Frattini A, Moens P, Perdu B, *et al*. Involvement of PLEKHM1 in osteoclastic vesicular transport and osteopetrosis in incisors absent rats and humans. J. Clin. Invest,2007:117:919–30. http://dx.doi.org/10.1172/JCI30328
5. Aker M, Rouvinski A, Hashvia S, Ta-Shma A, Shaag A, Zenvirt S, *et al*. An SNX10 mutation causes malignant osteopetrosis of infancy. J Med Genet,2012:49:221-226. http://dx.doi.org/10.1136/jmedgenet-2011-100520
6. Faden MA, Krakow D, Ezgu F, Rimoin DL, Lachman RS. The Erlenmeyer flask bone deformity in the skeletal dysplasias. Am. J. Med. Genet. A,2009:149A:1334–1345. http://dx.doi.org/10.1002/ajmg.a.32253.