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Images in Rheumatology

# Not Everything is Osteoporosis: Multiple Low-Impact Fractures in an Adult Female Patient

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Pycnodysostosis is a subtype of osteopetrosis resulting from mutations in the cathepsin K gene (*CTSK*) on chromosome 1q21.[1,2] We report the case of a 47-year-old White female patient attending a rheumatology clinic with a history of multiple low-impact fractures in adulthood, including left and right subtrochanteric fractures and tibial shaft fractures at the ages of 46, 40, 31, and 22 years, respectively. She had no personal or familial rheumatic disease. On physical examination, she was of short stature (148 cm) and had facial features characteristic of pycnodysostosis (midface retrusion due to hypoplastic maxilla and small mandible with an obtuse mandibular angle, prominent eyes with a blueish sclera, high arched palate, and hypodontia), lumbar spine scoliosis, and brachydactyly with spoon-shaped nails (Figure 1). Her blood tests were normal, with blood calcium at 8.7 mg/dL (reference 8.6-10.3 mg/dL), serum phosphate at 3.9 mg/dL (reference 2.5 to 4.5 mg/dL), alkaline phosphate at 102 U/L (reference 46-116 U/L), parathyroid hormone at 44 pg/mL (reference 11-51 pg/mL) and 25-hydroxy vitamin D level at 33.9 ng/mL (reference 30-100 ng/mL). Radiographs revealed tapered phalanges with acro-osteolysis of the distal phalanges on both hands, plated right femur that had healed, and left femur showing healing with intramedullary fixation and bone callus formation (Figure 2). Dual-energy X-ray absorptiometry showed an overall increase in bone mineral density (BMD), with a lumbar vertebrae *T*-score of 2.4 (BMD 1.5 g/cm$^2$). Based on clinical and radiographic features, a diagnosis of pycnodysostosis was established, and genetic testing confirmed the pathogenic variant c.422C>T (p.Ala141Val) in homozygosity in the *CTSK* gene.

Although most cases of pycnodysostosis are diagnosed during childhood, milder cases, such as that of our patient, may go undiagnosed until adulthood. Clinically, patients present with short stature due to skeletal dysplasia of the vertebrae and long bones; and cranial malformations characterized by micrognathia, hypoplastic maxilla, prominent hooked nose, large skull with frontal protuberance, and delayed or absent closure of cranial sutures.[3-5] Additionally, dysplasia of the acromial end of the clavicles from osteolysis, brachydactyly with short phalanges, and wide distal ends resulting in a spoon-like appearance, as well as progressive acro-osteolysis with age, are common.[3] Despite the fractures in pycnodysostosis being typically associated with minimal trauma or low-energy injuries, like fragility fractures in osteoporosis, the antiresorptive agents are contraindicated due to impaired skeletal resorption in the pathophysiology of the disease.[3]

Management of pycnodysostosis focuses on supportive care, fracture prevention, and addressing specific complications associated with the condition. This case highlights the importance of considering pycnodysostosis and other rare congenital osteopathies in the differential diagnosis of adult patients with multiple low-impact fractures. Thus, early recognition of the clinical and radiological characteristics of this pathology can

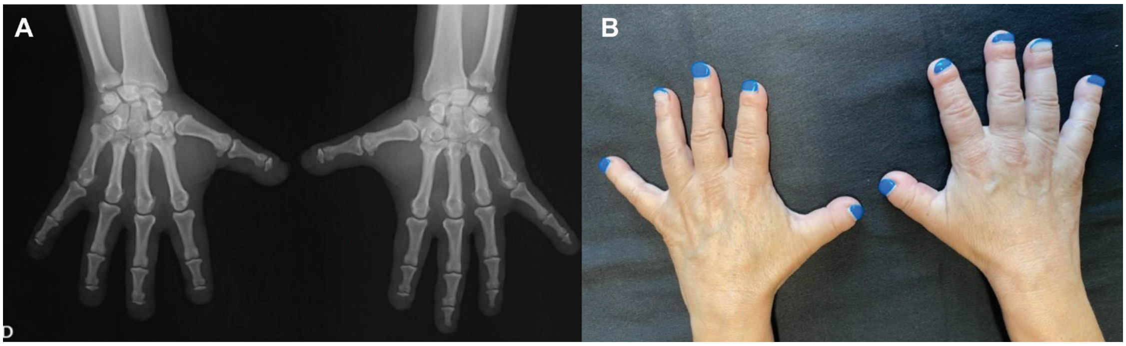


*Figure 1.* (A) Radiographs of the hands. (B) Both hands with short brachydactyly with spoon-shaped nails.

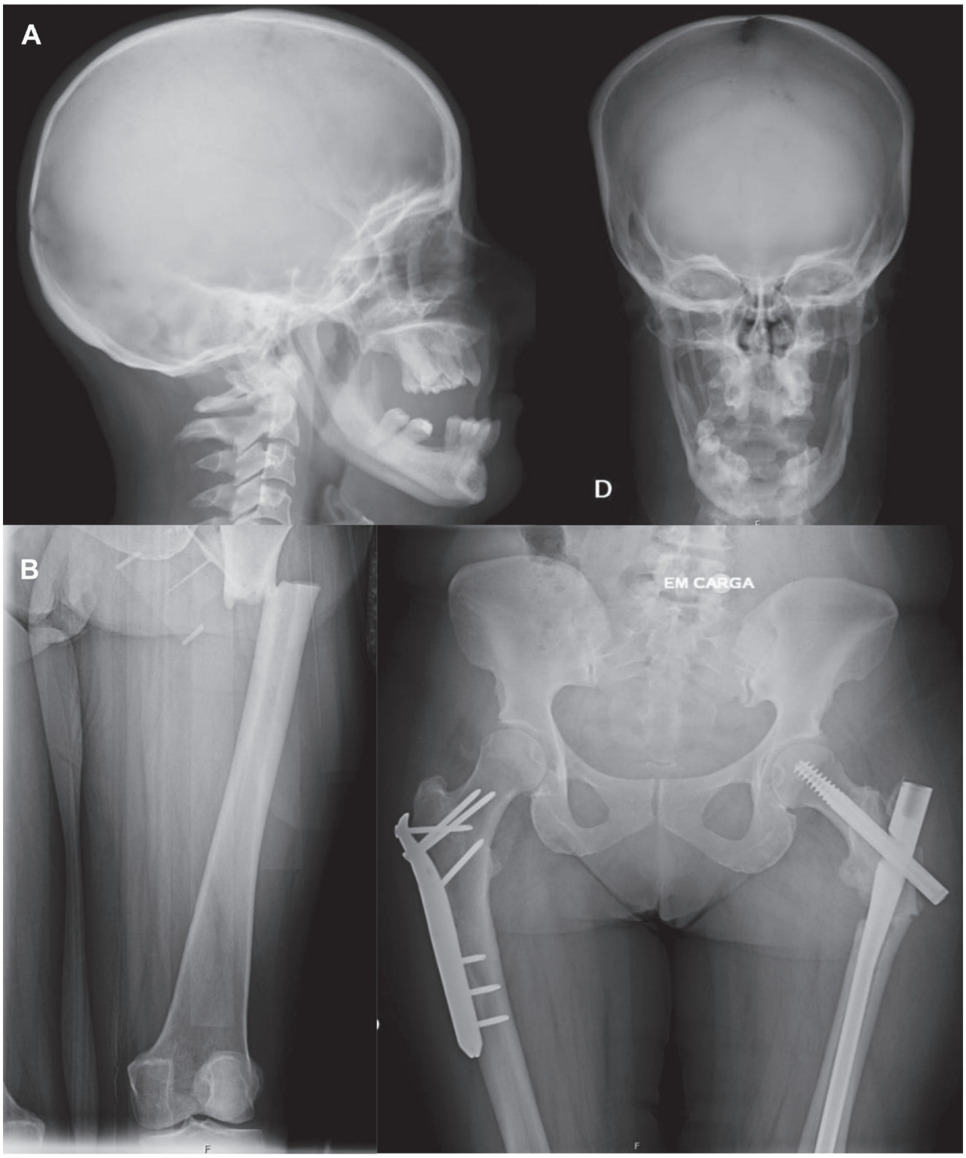


*Figure 2*. Radiographs of (A) the skull and characteristic facial features, including midface retrusion due to hypoplastic maxilla, a small mandible with an obtuse mandibular angle, a high-arched palate, and hypodontia; and (B) the inferior limbs after bilateral femur pathological fractures. D: right side.

help avoid debilitating complications and improve morbidity and quality of life.

### CONTRIBUTIONS

All authors have made a substantial contribution to the conception and design of the case, as well as to the drafting or critical revision of the manuscript, and accept public responsibility for the content. All authors have reviewed the final manuscript.


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The authors declare no conflicts of interest relevant to this article.

### ETHICS AND PATIENT CONSENT

Institutional review board approval was not required according to the authors' institutions. Informed consent was obtained from the patient.

## REFERENCES


1. Manfredi L, Marlin S, Fauroux B, Garabedian N, Couloigner V, Leboulanger N. Pycnodysostosis presenting as atypical stridor. Eur Ann Otorhinolaryngol Head Neck Dis 2016;133:87-90.
2. Taka TM, Lung B, Stepanyan H, So D, Yang S. Orthopedic treatment of pycnodysostosis: a systematic review. Cureus 2022;14:e24275.
3. Hald JD, Beck-Nielsen S, Gregersen PA, Gjørup H, Langdahl B. Pycnodysostosis in children and adults. Bone 2023;169:116674.
4. LeBlanc S, Savarirayan R. Pycnodysostosis. 2020 Nov 5 [Updated 2023 Apr 6]. In: Adam MP, Feldman J, Mirzaa GM, et al, editors. GeneReviews® [Internet. Accessed April 12, 2024]. Seattle: University of Washington; 2020:1993-2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK563694/
5. Gonzaga AKG, Costa CSO, Morais HGF, et al. Clinical and radiographic characteristics of pycnodysostosis: a systematic review. Imaging Sci Dent 2024;54:13-24.