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Tumor-Induced Osteomalacia Treated as Ankylosing Spondylitis and Osteoporotic Compression Fracture

CASE PRESENTATION

A 25-year-old man presented to our clinic in February 2018 with generalized bone pain, progressive muscle weakness, and decrease in body height (from 173 to 160 cm within 3 years) accompanied by thoracic kyphosis since 2016. He had been treated at many hospitals for seronegative ankylosing spondylitis (AS) (human leukocyte antigen B-27: negative, antinuclear antibody [ANA]: 1:80) since 2010 without much improvement. The plain radiographs showed multiple-level stress fractures in the thoracolumbar spine, as well as a shepherd's crook deformity in both proximal femurs (Fig. 1). Bone mineral densitometry obtained by dual-energy x-ray absorptiometry revealed severe osteomalacia (*t* score: −5.8 SD, L1–L4). Further evaluation, including measurements of serum biochemistries and electrolytes, revealed severe hypophosphatemia (phosphate 1.4 mg/dL [reference range, 2.7–4.5 mg/dL]). The calculated maximum reabsorption per unit volume of glomerular filtration rate (TmP/GFR) was 0.463 mmol/L, which was much lower than the reference range in his age group (1.0–1.35 mmol/L). The fibroblast growth factor 23 (FGF23) level was 586 pg/mL (<54.3 pg/mL). The diagnosis of tumor-induced osteomalacia was confirmed.

For definitive treatment, we performed whole-body computed tomography, and an intramuscular, heterogeneous mass with mild central calcification was found in the left heel that had been faintly enhanced on the previous positron emission tomography scan (Fig. 2). Wide excision was performed, and the pathological findings were consistent with phosphaturic mesenchymal tumor (Fig. 3).

The FGF23 levels dropped substantially from 586 pg/mL to 9.36 pg/mL 72 hours after the operation. The serum phosphate level increased gradually from 1.8 mg/dL to 2.8 mg/dL at the same time. The calculated TmP/GFR level also returned to 1.24 mmol/L, which is within the reference range of that in the population of the same age. The patient continues to be followed at our clinic and is treated with daily bone anabolic supplements (Forteo; Lilly USA, Indianapolis, IN), and the bone mineral densitometry level has shown gradual improvement (*t* score: −3.8 SD, L1–L4, 6 months after the operation).

Tumor-induced osteomalacia is a rare paraneoplastic syndrome of renal phosphate wasting and severe hypophosphatemia. Clinical symptoms include muscle weakness, bone pain, osteoporosis, and osteomalacia.[1,2] These symptoms were frequently treated as myofascial pain, lumbar spondylosis, or rheumatic disorders, such as rheumatic arthritis or AS.

Tumor-induced osteomalacia is frequently misdiagnosed primarily because

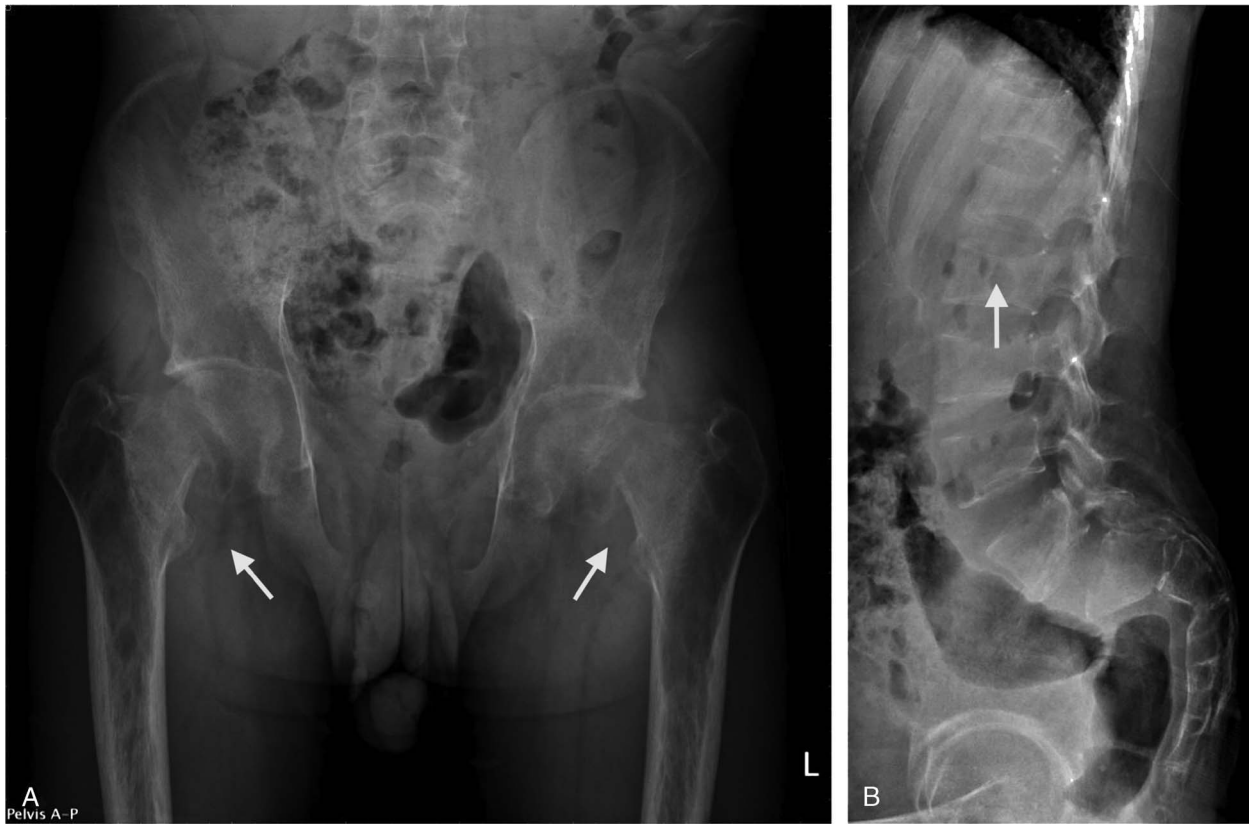

FIGURE 1. A, Plain radiograph of the pelvis reveals severe osteoporosis, and the shepherd's crook deformity of both proximal femurs is indicative of repeated microfractures. B, Lateral view of the lumbar-sacral spine showing multiple compression fractures of the vertebral bodies.

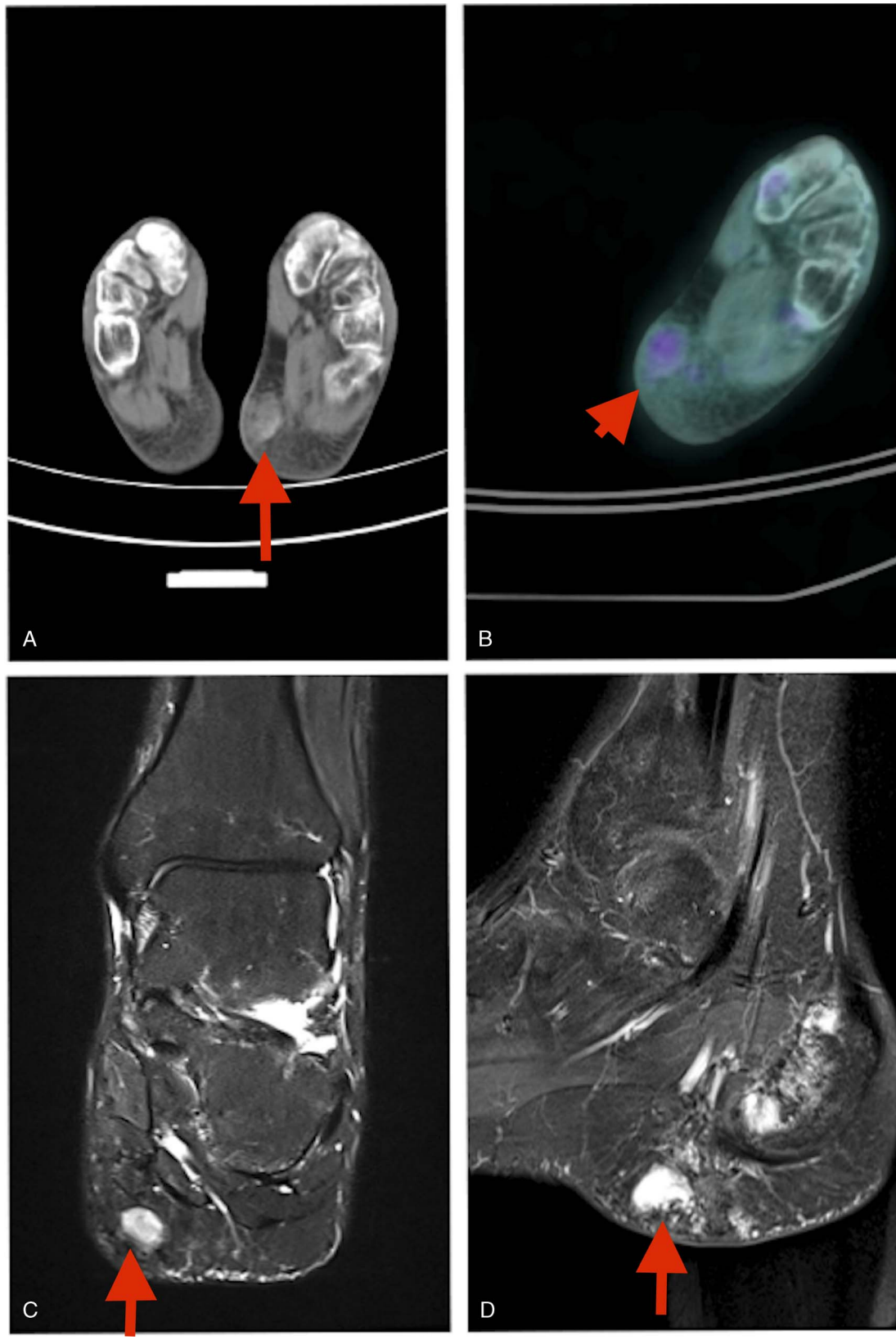

FIGURE 2. A, Whole-body computed tomography scan showing a heterogeneous, calcified soft tissue mass in the left heel (arrow). B, The lesion was faintly enhanced on the previous positron emission tomography scan but was thought to be trauma related (arrowhead). C and D, The left heel mass shows high intensity on T2-weighted imaging and strong enhancement with contrast medium on the coronal and sagittal views of the left ankle magnetic resonance imaging (arrows).

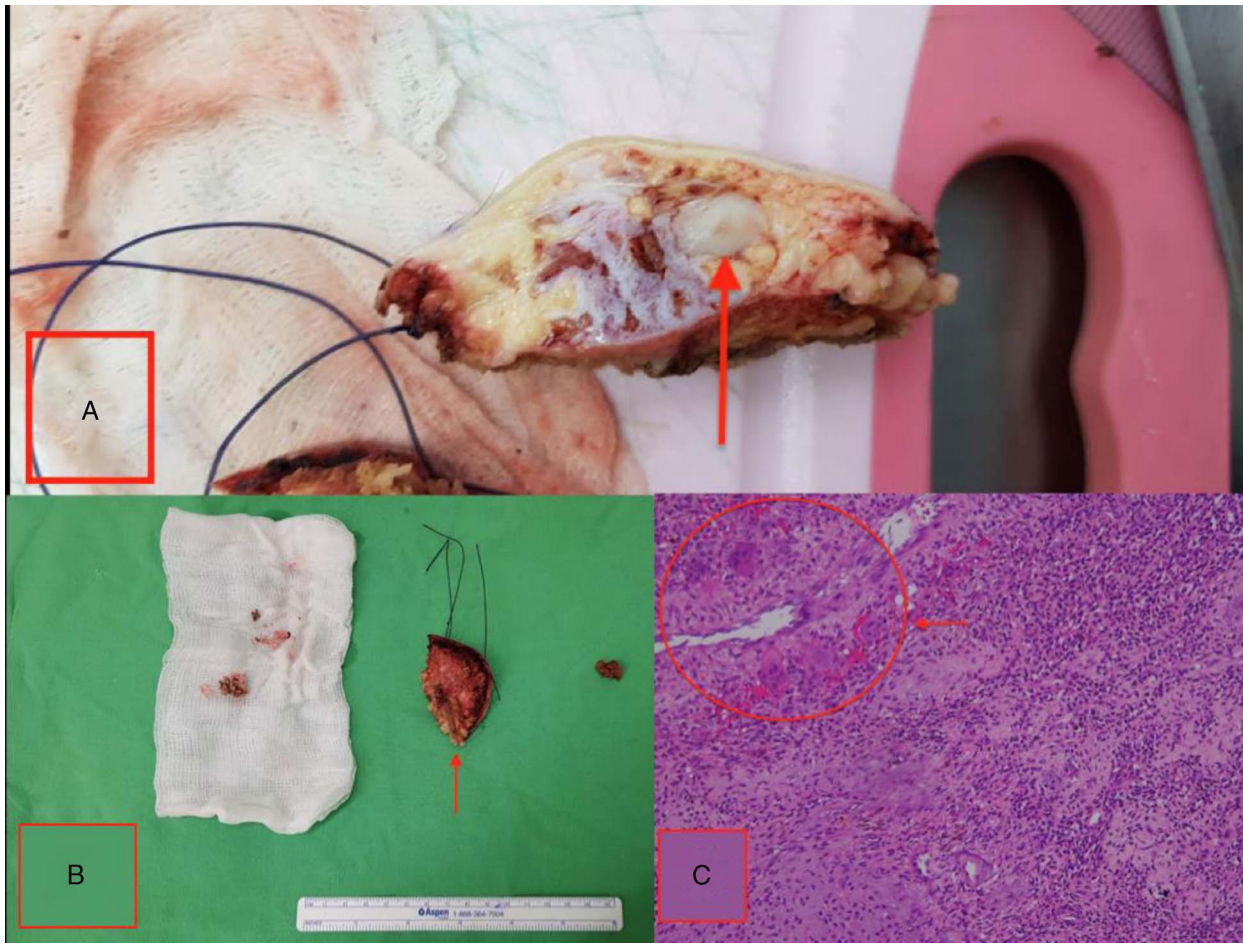

FIGURE 3. A and B, The tumor measures approximately 2.8 × 2.0 × 1.7 cm. On excision, an ill-defined, firm, gritty lesion is noticed in the subcutis layer (arrow). The cut surface appears focal dark brown to whitish. C, This is a phosphaturic mesenchymal tumor characterized by grungy calcification, bland spindle to satellite cell proliferation, hemangiopericytoma-like vessels, hemosiderin deposits, and islands of metaplastic bone and cartilage surrounded by osteoclast-like giant cells with a focal myxoid change.

of its rarity, nonspecific presentations, unusual anatomical sites, resemblance to common benign lesions, and poor recognition on the part of physicians.[3,4] We present this case, where the patient was treated for AS for more than 7 years, to reiterate the need to avoid considering only osteoporosis and low back pain as musculoskeletal disorders or inflammatory joint diseases. Other rare diseases must also be considered. Routine laboratory examinations for phosphate levels can be decisive. Currently, with improvements in image modalities and nuclear medicine, we also have several modes of tumor localization and FGF23, which is a very sensitive and specific marker and helps in intraoperative and postoperative assays to monitor the treatment responses. Once tumor-induced osteomalacia is suspected, the tumor can be localized and surgically removed. Renal phosphate wasting can be resolved, bone quality recovered, and quality of life improved.

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