

Tumoral Calcinosis: Uncommon Masses in ESRD

Purposes

1. Discuss the entity known as Tumoral Calcinosis and its association with ESRD (end stage renal disease).
2. Identify the characteristic features of Tumoral Calcinosis on imaging studies and histopathology slides.
3. Describe the most common differential diagnosis of this entity.
4. Discuss treatment and management of Tumoral Calcinosis.

Introduction

Tumoral Calcinosis (TC) is an uncommon familial disease, characterized by dense, lobular calcified benign masses in soft tissue of the extensor surface of a bursa with characteristic imaging of amorphous, multilobulated cystic calcifications in the musculoskeletal system, commonly periarticularly.^{1,2} It is most frequently seen in African Americans without sex predominance and usually appear in childhood or young adulthood in the first and second decade of life¹.

Symptomatic manifestation is uncommon unless there is compressive neuropathy.¹ Large periarticular lesions may result in reduced range of motion.^{1,2} The most common locations of TC are the shoulder, hip, elbow, foot and wrist, but the temporomandibular joint, spine, hand and knee can also be involved.¹ We report 3 cases of TC associated with ESRD presented at our institution.

Case 1

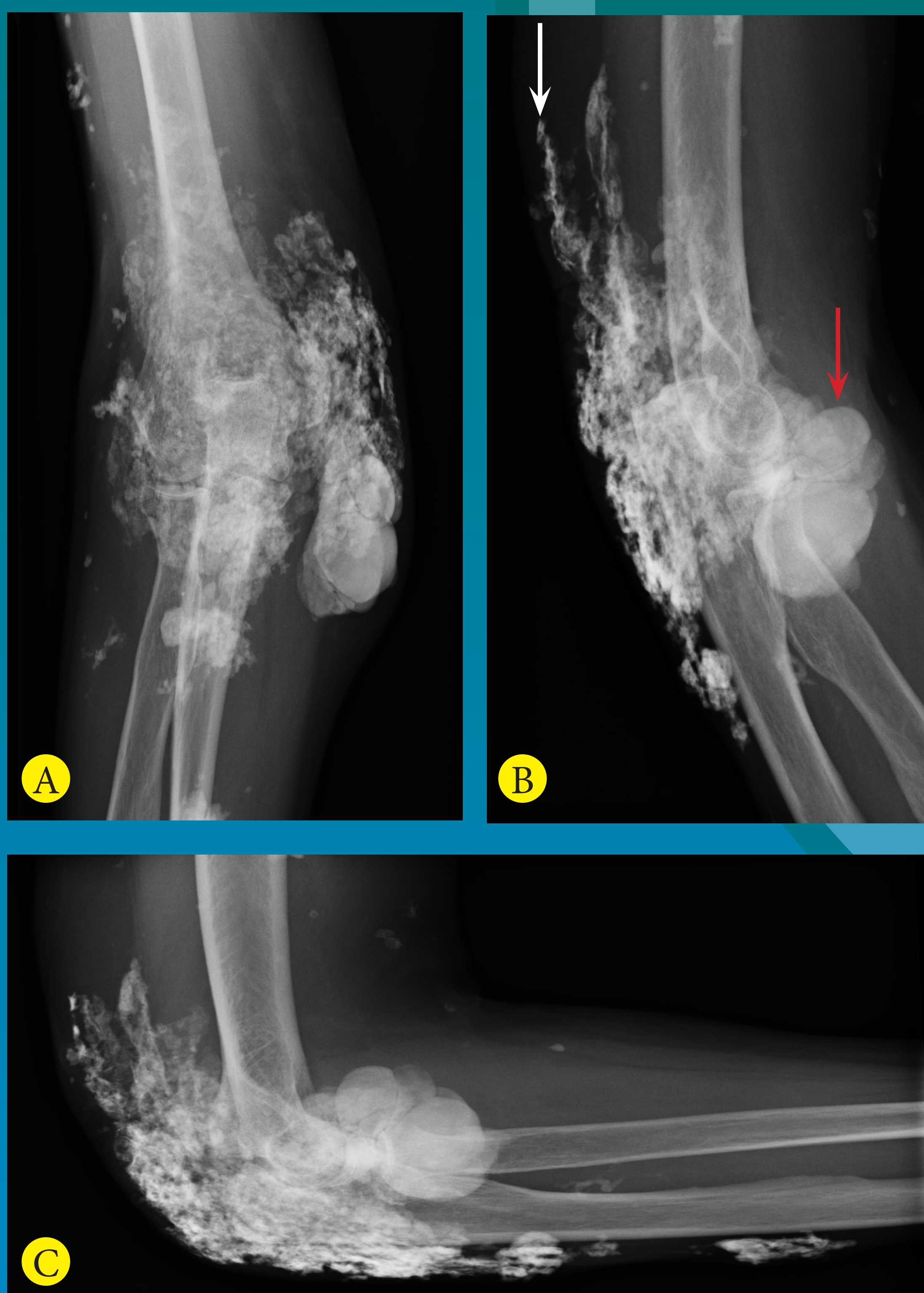


Figure 1 Right elbow Radiographs. (A) Antero-posterior; (B) Oblique and (C) Lateral views. Reveal extensive soft tissue calcifications with both mas-like depositions (red arrow) which may represent TC and sheet-like depositions (white arrow) which are consistent with calcinosis syndrome.

Case 2

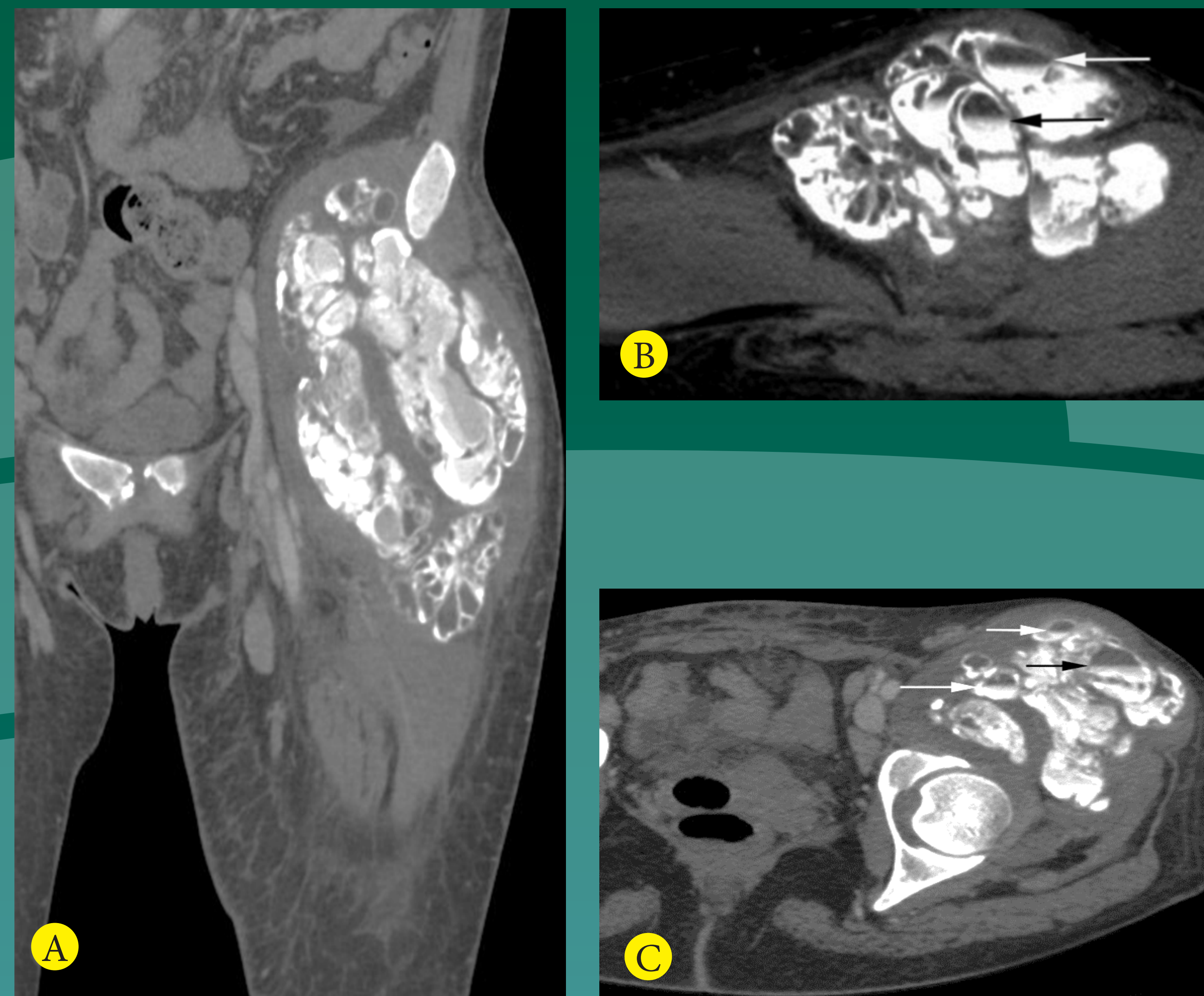


Figure 2: Computed Tomography of the left hip without contrast. (A) Coronal, (B) Axial and (C) Sagittal projections. Reveals an irregular calcified soft tissue mass with multicystic fluid levels (black and white arrows) located in the left thigh. These findings were consistent with TC secondary to end stage renal disease.

Case 3

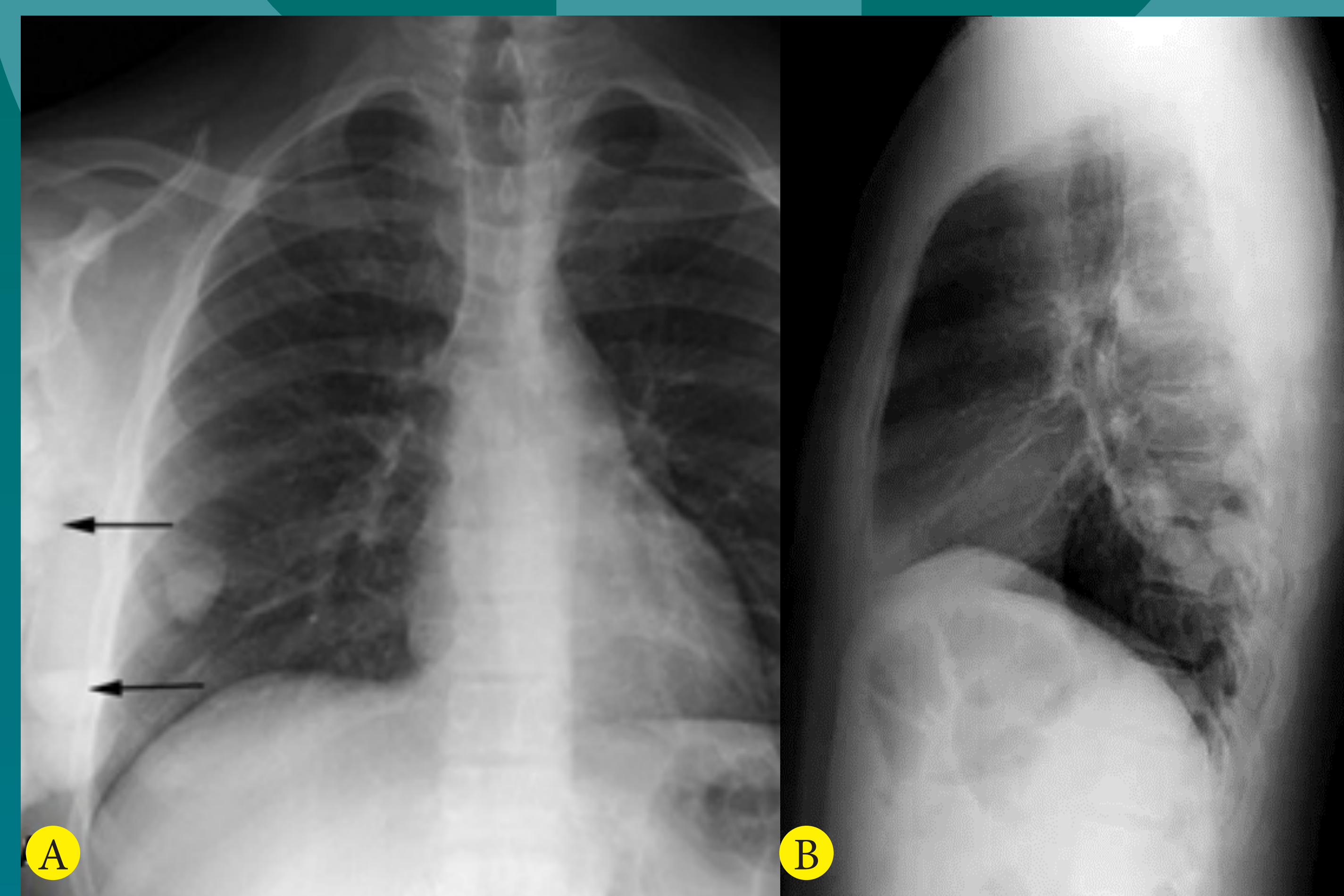


Figure 3: Chest radiographs. (A) Postero-anterior and (B) Lateral views. Demonstrate a lobulated calcific nodular mass with small fluid levels (black arrows), projected over the right upper chest wall. This was considered to be consistent with TC in the setting of long-standing renal disease.

Histopathology

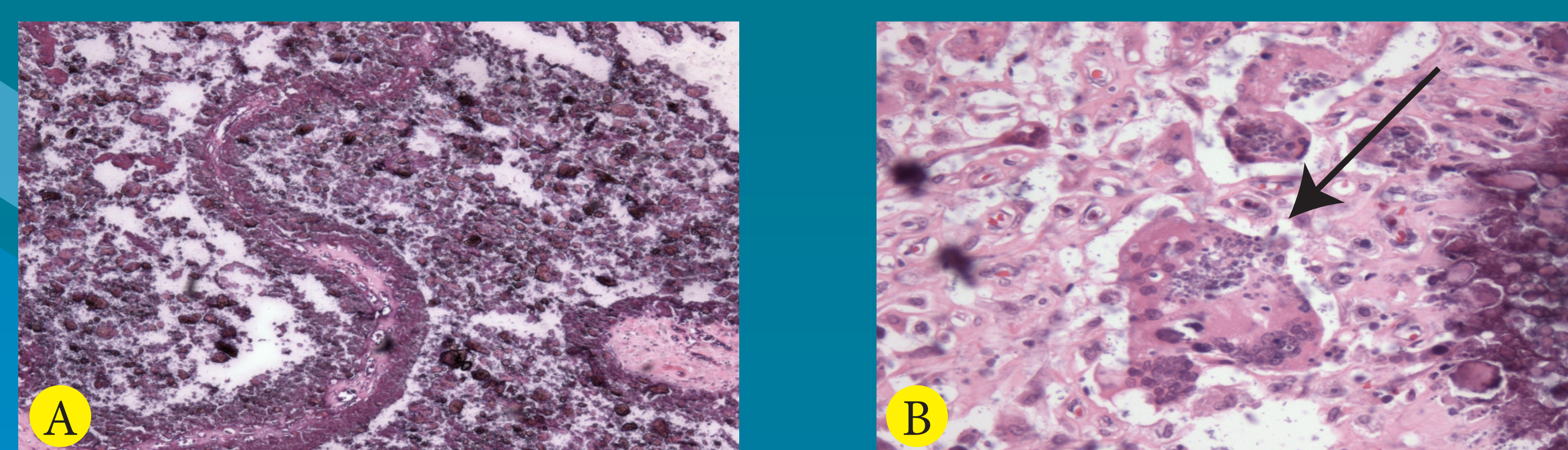


Figure 4: Low (A) and high (B) power photomicrographs show a calcified mass with fibrous septation and giant cells (black arrow) with intracytoplasmic punctate calcifications.

Discussion

Tumoral Calcinosis is secondary to a mutation in FGF23 (Fibroblast Growth Factor 23), KL (Klotho) gene and the N acetylgalactosaminyltransferase 3 (GALNT3) gene.^{1,2} The physical morbidity is based on repetitive trauma generating reparative impairment and initiation of osteoclastic activity¹. Smack et al classified this entity into three types:

1. Primary normophosphatemic TC; in this type, patients have normal serum calcium and phosphate levels.
2. Primary hyperphosphatemic TC characterized by a defect in phosphate resorption.
3. Secondary TC: these patients have a concurrent disease that causes soft tissue calcification, such as chronic renal failure with a secondary hypervitaminosis D, hyperparathyroidism and bone destruction.³

Imaging and biopsy may confirm the diagnosis revealing yellow material containing calcium hydroxyapatite. The cystic lesions reveal fluid–fluid levels caused by calcium layering or sedimentation corresponding to multinucleated giant cells surrounded by calcium granules.¹ (Figure 4 A and B).

Other entities that may have similar imaging findings and that should be considered in the differential diagnosis of TC are described in table 1.

Tumoral Calcinosis treatment is based on its underlying cause, and is a combination between surgical excision and phosphate reduction secondary to acetazolamide administration.^{1,2} Acetazolamide increases calcium-phosphate solubility by lowering the systemic pH, resulting in an increase of phosphate excretion.¹ Surgical excision is dependent on the patient's symptoms due to compromise of the adjacent structures and further surgery for recurrence is recommended.¹

Table 1

| DIFFERENTIAL DIAGNOSIS OF TUMORAL CALCINOSIS ¹ | |
|---|---------------------|
| Calcinosis Universalis | Synovial sarcoma |
| Calcinosis Circumscripta | Osteosarcoma |
| Calcific Tendonitis | Myositis Ossificans |
| Synovial Osteochondromatosis | Trophaceous Gout |

References

1. Finer G, Price HE, Shore RM, et al. Hyperphosphatemic familial tumoral calcinosis: Response to acetazolamide and postulated mechanisms. Am J Med Genet. Part A 2014; 164A:1545–1549.
2. Olsen KM, Chew FS. Tumoral Calcinosis: Pearls, Polemics, and Alternative Possibilities, Radiographics 2006; 26:871-885.
3. Smack D, Norton SA, Fitzpatrick JE. Proposal for a pathogenesis-based classification of tumoral calcinosis. Int J Dermatol 1996; 35:265–71.