

Complex Regional Pain Syndrome Diagnosed with Three-phase Bone Scan

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Abstract

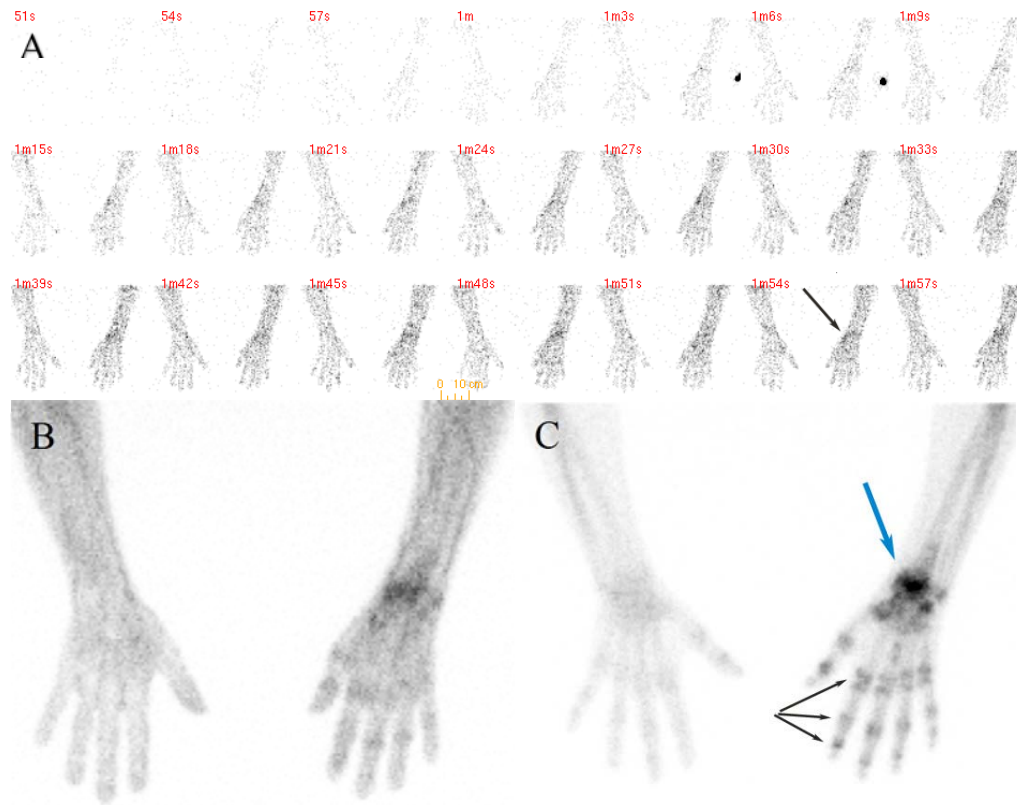
In this report, we present a case of complex regional pain syndrome in a 55-year-old female in whom the diagnosis was made based on the bone scan findings. We also discuss the typical and atypical scintigraphic presentations of this entity, including pathophysiology and management.

Case Report

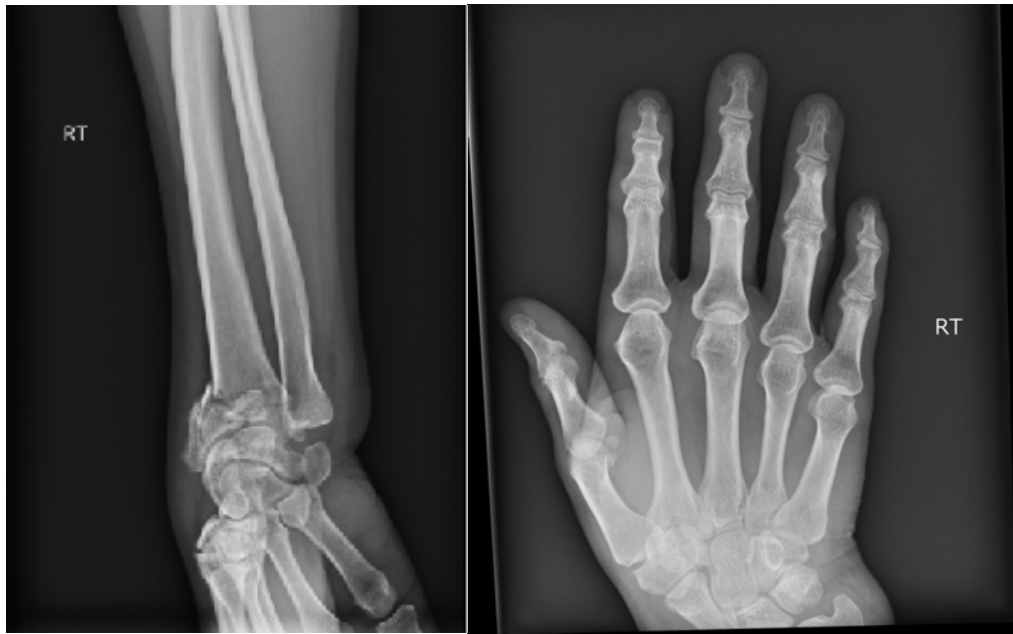
55-year-old female with right wrist fracture, status post open reduction and internal fixation 5 months previously, presented with pain and swelling of the right wrist. The patient was referred for a limited 3-phase bone scan for further evaluation. Immediately following injection of 851 MBq Tc-99m MDP, flow (radionuclide angiogram) and blood pool images (soft tissue phase) of the upper extremities were obtained, followed by delayed images at 3 hours (Fig 1A-C).

Bone scan revealed the typical 3-phase positivity (increased blood flow, blood pool and intense periarticular delayed uptake) in the small joints of the affected hand. The scintigraphic pattern of “periarticular accentuation” in the osseous phase is characteristic of complex regional pain syndrome (CRPS). The right wrist uptake was consistent with the recent fracture.

Figure 1.



Blood flow (A) and blood pool (B) images demonstrate increased activity in right hand diffusely and more focally in the right wrist. Delayed images (C) demonstrate “periarticular accentuation” in the multiple interphalangeal and metacarpophalangeal joints of the involved hand which is characteristic of CRPS (thin arrows). The right wrist uptake (blue arrow) is consistent with the recent fracture.



A

B

Figure 2.

Radiographs of the wrist demonstrating fracture of the distal radius with Colles' angulation (A) and of the hand (B) without any abnormality.

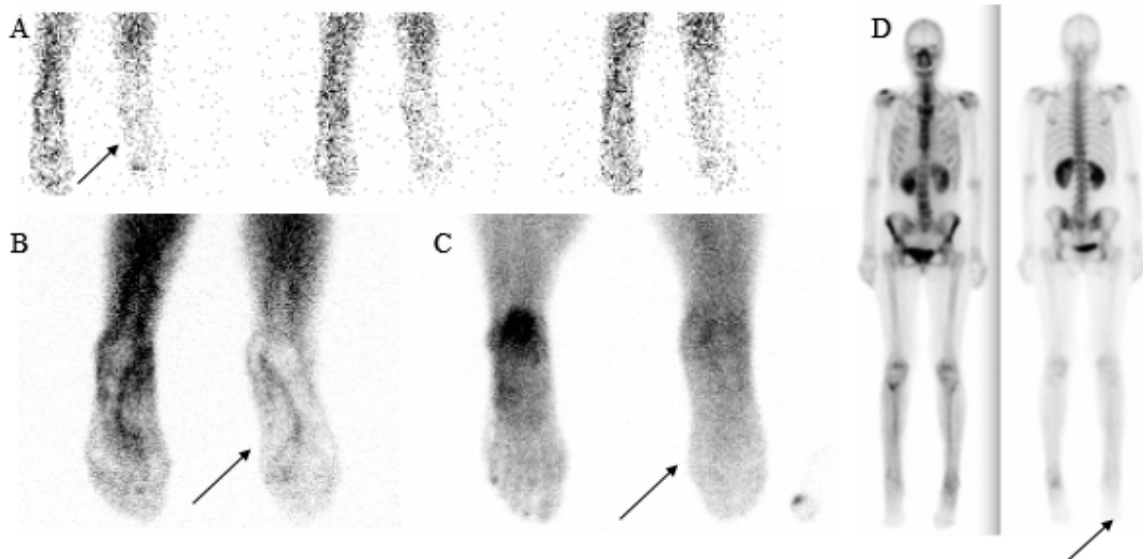


Figure 3.

This is an example of a 45-year-old female presenting with right lower extremity pain for over a month. Bone scan ordered for evaluation of complex regional pain syndrome demonstrated diminished radiotracer uptake in the right foot and distal leg in all 3 phases: blood flow (A), blood pool (B) and delayed spot (C) and whole body images (D). This is an example of atypical presentation of CRPS.

Discussion

In our case report we discussed the typical scintigraphic pattern of complex regional pain syndrome. However, an atypical scintigraphic presentation may be encountered, with decreased blood flow, blood pool activity and decreased radiotracer uptake in the bones and joints of the affected limb (Fig 3). This presentation is usually seen in the late stages of the disease and in the pediatric population, in whom even the growth plates in the affected limb demonstrate decreased radiotracer accumulation.

The pathophysiology of CRPS remains unknown, but it is believed that inflammation plays a crucial role in its development. It is called neurogenic inflammation. CRPS is associated with increased levels of pro-inflammatory cytokines (TNF α , IL-6) and decreased levels of anti-inflammatory cytokines (IL-1, IL-10, TGF β 1) (1).

Another possible mechanism is a vasomotor dysfunction accompanied by structural changes in the brain, which lead to sensitization (2).

Management of CRPS includes:

- Physical therapy and occupational therapy.
- Following agents are suggested for the early CRPS (2):
 - Nonsteroidal anti-inflammatory drugs (NSAID),
 - Anticonvulsants, (e.g., gabapentin or pregabalin),
 - Tricyclic or other antidepressant drugs (amitriptyline or nortriptyline),
 - Bisphosphonates,
 - Topical lidocaine cream or topical capsaicin cream.
- Refractory cases may require: Interventional procedures (nerve blocks, sympathectomy, neurostimulators).

Conclusion

CRPS is a challenging clinical entity and requires a multidisciplinary approach. There is no single study or lab test that can confirm or exclude CRPS. Triple phase bone scan is one of the useful studies in this clinical situation with a sensitivity of 87% according to a meta-analysis (3). Furthermore, it enables exclusion of other diagnoses such as arthritis, pseudoarthropathy, benign or malignant bony lesions, or even metabolic bone diseases such as Paget's disease, particularly if integrated SPECT/CT is added (4). The typical scintigraphic findings in CRPS are increased blood flow and blood pool activity due to hyperemia. Delayed images usually display the characteristic pattern of increased periarticular uptake in the small joints, as well as the major joints of the affected limb, although other, less typical patterns (decreased perfusion and delayed activity) are possible, especially in children and in the later stages of the disease.

References

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