

IMAGING GAMUT

Diagnosis of the Cause of Knee Pain in a Patient with a Normal MRI

Anthony D'Sa*, Ben Corocan and Mazin Al-Janabi

Department of Nuclear Medicine, King's College Hospital, London

Keywords: Reflex sympathetic dystrophy, Knee pain, Bone scan, CT

Background A 27-year-old man presented to the Orthopaedic Clinic complaining of longstanding right knee pain. The patient took regular exercise, but there was no specific incident of trauma. Examination showed patellofemoral dysfunction and quadriceps atrophy. An MRI was unremarkable. The patient was referred for a bone scan of the knee along with SPECT-CT to assess whether there was a small osteochondral defect with loose bone fragment causing the symptoms.

Procedure The patient was injected intravenously with ^{99m}Tc -HDP. A 2-phase planar bone scan was performed with early blood pool imaging at 5-10 minutes and delayed acquisition was performed at 3-hour postinjection followed by SPECT-CT imaging of the knees.

Findings Early blood pool images on the bone scan were unremarkable (Fig. 1). The delayed planar bone scan images showed increased uptake in the patella, the distal femur and the proximal tibia on the right (Figure 2). The SPECT-CT helped accurate localisation of the abnormal areas of uptake and the CT component additionally showed multiple patchy areas of trabecular bone loss and subperiosteal resorption (Figure 3).

*Correspondence

Dr Anthony D'Sa
Department of Nuclear Medicine
King's College Hospital
London SE5 9RS
Email: antdsa@hotmail.com



Figure 1 Anterior (A) and posterior (B) projection blood pool scan images ^{99m}Tc -HDP show normal and symmetrical activity

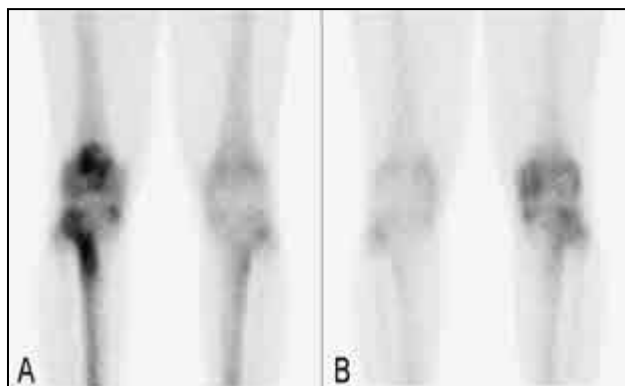


Figure 2 Delayed planar bone scan images in anterior (A) and posterior (B) projections

The left knee was unremarkable both on planar and SPECT bone scans.

Conclusion The dual modality scan findings were consistent with reflex sympathetic dystrophy (RSD) of the right knee.

Comments The clinical characteristics of RSD vary and the diagnostic criteria for RSD on multi-phase bone scanning are affected by several factors that include the duration of



Figure 3 The SPECT scan image shows peri-articular distribution of tracer in the right knee

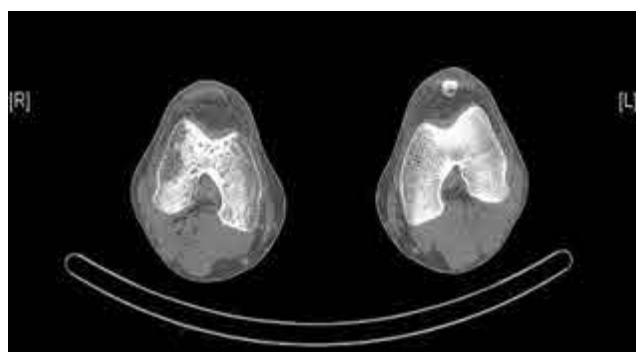


Figure 4 CT scan axial section through the distal femora showing multiple patchy areas of trabecular bone loss and subperiosteal resorption consistent with severe osteoporosis of the right knee

symptoms, the anatomical site involved, the age of the patient, etc. [1].

Typically, RSD goes through three phases. In Phase 1 (hypertrophic stage), the affected area is painful, oedematous and warm. The diagnostic sensitivity of 3-phase bone scanning is high in this stage with increased tracer uptake noted in all 3 phases. Phase 2 (atrophic stage), is again characterised by pain but this time manifesting with reduced range of movement at the joint as well as atrophy and coldness of the affected area. The pain starts to subside in Phase 3 but with residual atrophy and stiffness that can

become permanent. Phases 2 and 3 overlap clinically and on imaging [2,3] with the 3-phase bone scan characterised by normalisation of the vascular and early blood pool phases but with increased uptake on the delayed phase [4].

This case highlights the fact that the bone scan is an important but not the only tool for evaluating chronic pain syndromes and is best used as a part of the algorithm for evaluating reflex sympathetic dystrophy.

References

1. Fournier, RS, Holder, LE. Reflex sympathetic dystrophy: diagnostic controversies. *Semin Nucl Med* 1998;28(1):116-123.
2. Shehab D, Elgazzar A, Collier BD. Impact of three-phase bone scintigraphy on the diagnosis and treatment of complex regional pain syndrome type I or reflex sympathetic dystrophy. *Med Princ Pract* 2006;15(1):46-51.
3. Okudan B, Celik C, Serttas S, Ozgirgin N. The predictive value of additional late blood pool imaging to the three-phase bone scan in the diagnosis of reflex sympathetic dystrophy in hemiplegic patients. *Rheum Int* 2005;26(2):126-31.
4. Lee G, Weeks P. The role of bone scintigraphy in diagnosing reflex sympathetic dystrophy. *J Hand Surg* 1995;20(3):458-463.