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1. Title: Looking beyond the indication: Bone scan for trauma providing unsuspected initial diagnosis of acute critical lower limb arterial compromise

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Looking beyond the indication: Bone scan for trauma providing unsuspected initial diagnosis of acute critical lower limb arterial compromise

Abstract

We report a case of rare incidental initial detection of unsuspected arterial supply compromise to the right lower extremity on a bone scan done to rule out fracture in a patient with right hip pain following a fall. Follow up CT angiogram confirmed near complete occlusion of right lower extremity arteries for which patient underwent above knee amputation.

Keywords: Three phase bone scan; ischemia; CT angiogram; amputation

Introduction

Three-phase bone scintigraphy is a useful tool to assess arterial flow, relative soft tissue perfusion and variations in bone turnover. Systematic evaluation of all three phases is crucial to detect skeletal and unsuspected extra-skeletal abnormalities.

Case Report

A 101 year old patient with history of atrial fibrillation presented to our hospital with right hip pain and difficulty walking following a fall. A plain CT scan of the bony pelvis and three phase 99mTc methylene diphosphonate bone scintigraphy done to rule out clinically suspected occult hip bone injury were negative for fracture. However, scintigraphy showed near absent radiotracer activity within right lower limb arteries on flow phase (Fig 1a), decreased soft tissue uptake around the right knee and lower leg on

blood pool phase (Fig 1b) and decreased radiotracer uptake in the right femur, especially distally and the lower leg bones on delayed skeletal phase (Fig 1c). Follow up urgent CT angiogram on same day demonstrated extensive thromboembolism of right lower limb arteries (Fig 2). The right leg turned extremely painful and cold after a day. On physical examination, there was no palpable or audible right femoral, popliteal and pedal flow. The patient had limited right knee flexion, limited sensation from knee downwards and could not move the right foot and underwent right transfemoral above-knee amputation.

Discussion

Major factors determining radiotracer uptake in three phase bone scintigraphy are local blood flow, extraction efficiency and osteoblastic activity. Impaired circulation, hydration level, renal function and age also influence uptake (*1,2)*. Bone scan is a useful adjunct to choose appropriate amputation level by aiding in distinguishing viable from nonviable tissue (*3)*.

Assessing symmetry of radiotracer distribution is very crucial. Venous/lymphatic obstruction and inflammation can cause asymmetrically increased tracer uptake. Unilateral paralysis can reduce ipsilateral uptake with increased contralateral activity from compensatory overuse. Decreased radiotracer activity can be seen in compromised arterial flow.

Functional status of the limbs could be improved with adequate collateral flow (*4)*. However, due to minimal time available for collateral development in cases of acute thromboembolism, chances for above knee amputation is doubled compared to chronic ischemia (*5)*.

Conclusion

While interpreting bone scans it is important not to confine our attention only to detect skeletal abnormalities. In our case, bone scan led to the initial diagnosis of critical ischemia of lower limb and apparent necrosis of thigh muscles, which led to further investigations, definitive diagnosis and treatment. Any asymmetry in radiotracer uptake pattern in all phases on a three-phase bone scan should not be overlooked.

Disclosure: None

References

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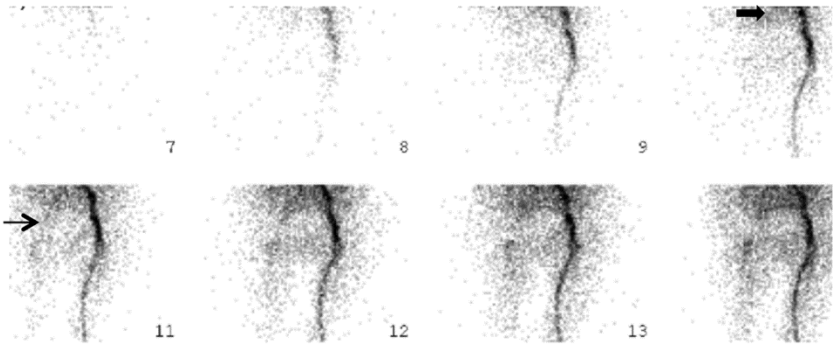
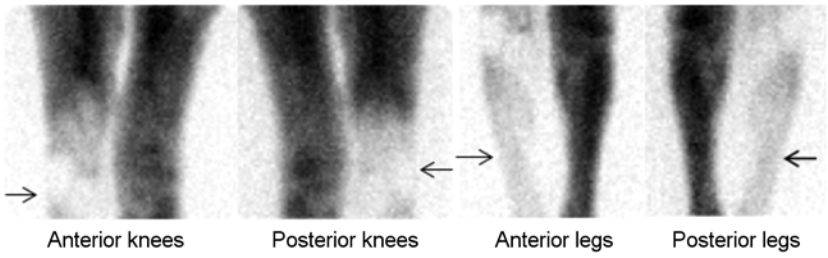
Figures

Figure 1a



Blood flow images of three phase bone scintigraphy of thighs in anterior projection shows near absent radioracer uptake within the right common iliac, external iliac (thick arrow) and proximal superficial femoral arteries (thin arrow).

Figure 1b

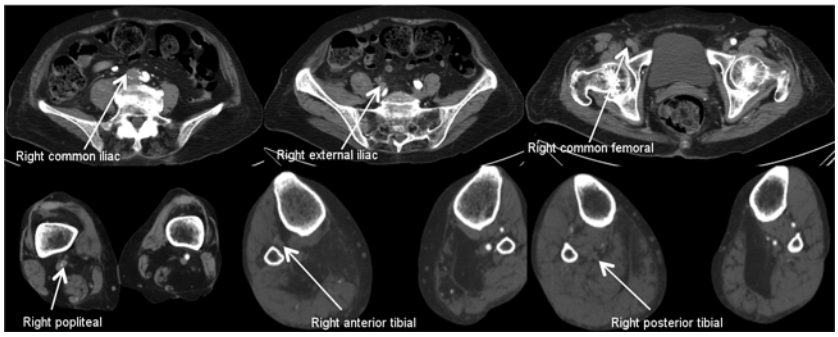


Blood pool images at knee/leg level in anterior and posterior projections show decreased soft tissue uptake in right knee and leg (arrows).

Figure 1c

Delayed whole body bone scan in anterior and posterior projections show decreased radiotracer uptake in the right femur especially distally and bones of right lower leg (thin transverse arrows). Increased linear uptake at medial right thigh (oblique arrows), possibly represent muscle injury. Note urinary activity in diaper (thick arrows).

Figure 2



CT angiogram of pelvis/lower limbs demonstrates extensive thromboembolism of right common iliac, external iliac, common femoral, popliteal, anterior and posterior tibial arteries (white arrows).