# Whole-Body Bone Scintigraphy in Detecting Left Lower Limb Arterial Thrombus: A Case Report

Ruiqi Yang, Yanhai Yin and Chaoqun Wang

*Department of Nuclear Medicine, Hainan Affiliated Hospital of Hainan Medical University (Hainan General Hospital), Hainan, China*

## ABSTRACT

Acute lower limb ischaemia (ALLI) is a surgical emergency, commonly caused by arterial thrombosis or embolism (AE). Rapid diagnosis and treatment improve outcomes. Whole-body bone scintigraphy, a static imaging technique, in which the radiotracer Technetium 99m-labelled methylene diphosphonate (99mTc-MDP) is used to diagnose the cause of ALLI. Herein, we report a case of an 82-years-old female patient who presented with a long-standing bilateral knee pain. 99mTc-MDP was injected intravenously, and the distribution of the tracer was imaged using a gamma camera. This technique effectively visualises bone metabolism and indirectly reflects the regional blood supply. Unexpectedly, the scan revealed markedly reduced radiotracer uptake in the left lower limb, suggesting arterial occlusion. Subsequent imaging confirmed left lower-extremity arterial thrombus. This case highlights that whole-body static bone imaging can reveal early signs of limb ischaemia by detecting altered bone metabolism, which may reflect impaired regional blood flow.

**Key Words:** *Whole-body bone scintigraphy, Arterial embolism, Arterial thrombosis, Ischaemia*.

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## INTRODUCTION

Acute lower limb ischaemia (ALLI) is a true vascular emergency. Without prompt treatment, sudden arterial occlusion (embolism or thrombosis) can cause tissue necrosis and require amputation.[1,2] The classic 6Ps of acute limb ischaemia are pain, pallor, pulselessness, paraesthesia, poikilothermia (cold limb), and paralysis.[3] The femoral artery is often involved, and atrial fibrillation is a common embolic source.[1] Noninvasive Doppler ultrasonography is frequently used for initial evaluation due to its speed and availability; computed tomography angiography (CTA) or digital subtraction angiography (DSA) provides definitive arterial mapping.[3,4] However, in some cases, atypical presentations occur, and incidental findings on other studies may be crucial.[1,2,5]

In this case, a routine whole-body bone static imaging unexpectedly revealed findings suggesting left leg ischaemia. This prompted urgent vascular workup and led to the diagnosis of an arterial thrombus.

*Correspondence to: Dr. Chaoqun Wang, Department of Nuclear Medicine, Hainan Affiliated Hospital of Hainan Medical University (Hainan General Hospital), Xiuying District, Hainan Province, Hainan, China*
*E-mail: hyxwangcq@163.com*

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## CASE REPORT

An 82-year-old female patient presented with a long-standing bilateral knee pain (10 years) that had acutely worsened. On examination, there was no spinal tenderness. Bilateral knee joints showed tenderness (+), but no swelling. Left hip joint exhibited tenderness (+), but no swelling. Other joints were normal with no swelling, tenderness, deformity, or restricted motion. Both lower limbs were cool to the touch without oedema. Suspecting only osteoarthritic pain, a whole-body bone static imaging was performed to evaluate for occult pathology.

In the static imaging of the bone scan (Figure 1A), a focal cold defect in the distal left femur (red arrow), indicating markedly reduced tracer uptake was detected. This suggested severely impaired blood supply to that region. Based on this finding and the patient's symptoms, urgent vascular imaging was pursued. Doppler ultrasound of the left leg (Figure 1B) confirmed complete occlusion; no flow was seen in the left popliteal artery (blue arrow), and thrombosis was identified in the left iliac, femoral, popliteal, and foot arteries.

An urgent serum D-dimer test revealed a significantly elevated level of 9.52 µg/ml (normal value $\leq$ 0.55 µg/ml). Upon re-examination, significant local tenderness was noted in the left knee, with discolouration below the knee and loss of sensation distally. The dorsalis pedis pulse was absent (Figure 2A). Emergency femoral angiography was performed with attempted thrombectomy (Figure 2B, C). The pre-thrombectomy angiogram (Figure 2B) showed abrupt cut-offs of the popliteal, anterior tibial, and peroneal arteries (red arrow). Post-thrombectomy angiography (Figure 2C) demonstrated re-establishment of flow in those arteries (blue arrow). Intraoperatively, no pulsatility was palpable in the left femoral arteries, and organised thrombus was removed.

Despite restoration of femoral and popliteal pulses after surgery, distal perfusion remained poor. The left foot stayed cold, and distal pulses (tibial and dorsalis pedis) remained absent. Over the next day, the foot's muscle activity diminished and gangrenous changes developed. Given the extensive ischaemic damage and in consultation with the patient, a left above-knee amputation was performed.

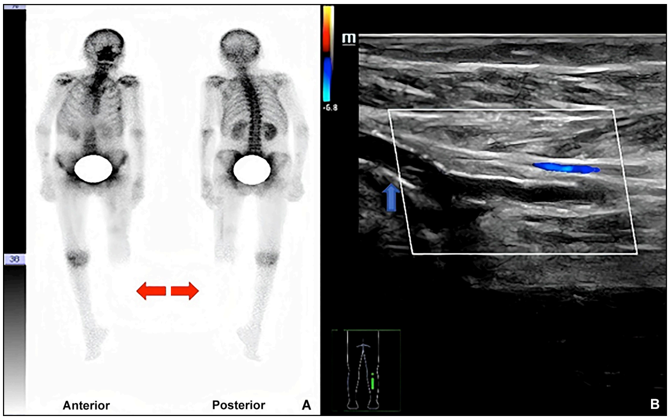


**Figure 1: (A) Whole-body bone static imaging showing a focal cold defect (red arrow) in the distal left femur, indicating absent radiotracer uptake due to impaired perfusion. (B) Doppler ultrasound at the left knee shows complete absence of flow in the popliteal artery (blue arrow), confirming occlusion of distal left leg vessels.**

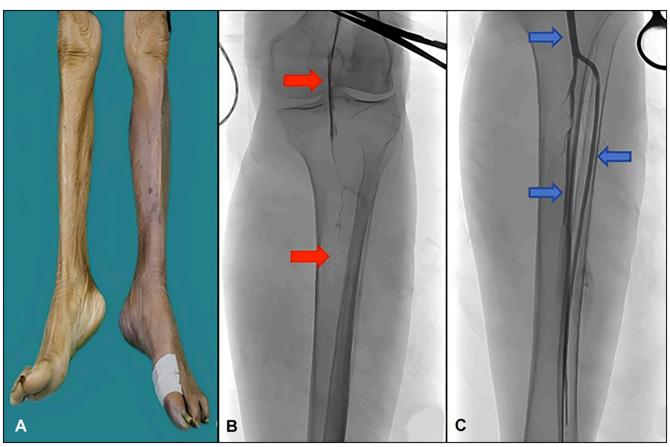


**Figure 2: (A) Photographic image of both lower legs: The left limb is markedly colder and dusky compared to the right, consistent with critical ischaemia. (B) Pre-thrombectomy angiogram of the left leg: Contrast fails to fill the popliteal and tibial vessels (red arrow), indicating complete arterial occlusion. (C) Post-thrombectomy angiogram: The popliteal, anterior tibial, and peroneal arteries are now opacified with contrast (blue arrow), confirming restoration of blood flow.**

## DISCUSSION

Acute arterial occlusion differs fundamentally from venous thrombosis due to rapid flow and platelet-rich clot formation.[6] Sudden arterial thromboembolism (often from cardiac sources or plaque rupture) causes abrupt tissue ischaemia distally.[7] The risk of limb loss is high. A study reported that 15-30% of acute limb ischaemia cases result in amputation.[2] Given this, prompt diagnosis is vital.

Current guidelines recommend clinical assessment followed by urgent imaging.[4] Duplex ultrasound is often used first because it is fast and non-invasive.[3] It can quickly localise occlusions in femoral and popliteal arteries. For definitive arterial mapping, CTA or magnetic resonance angiography (MRA) are employed.[8] Among these, vascular ultrasound is favoured due to its non-invasive nature, high sensitivity, and specificity.[5] The 2020 European Society for Vascular Surgery (ESVS) guidelines specifically recommend CTA as the first-line anatomical imaging for acute limb ischaemia.[4] CTA provides a comprehensive view of the entire arterial tree, except in patients with renal failure or contrast allergy. For those patients, contrast-enhanced MRA is a good alternative to delineate vessel anatomy.[9] Finally, DSA remains the gold standard and is usually performed in the operating room or interventional suite, both for diagnosis and treatment.[1,2] In line with these recommendations, this patient underwent Doppler ultrasound (confirming no flow in the left popliteal artery) followed by immediate angiography for thrombectomy. Additionally, elevated D-dimer levels can indicate a hypercoagulable state and the presence of intravascular thrombi,[10] serving as a crucial laboratory marker for thrombosis.

Although bone scintigraphy is not routinely used to detect vascular occlusions, it can reveal perfusion abnormalities when carefully evaluated. In the present case, the whole body bone static imaging showed a clear cold defect in the left distal femur (Figure 1A). Such marked asymmetry can signal arterial compromise. For example, Palot Manzil *et al*. described a bone scan that showed near-absent perfusion in a limb with acute arterial occlusion.[6] Similarly, our incidental finding of absent tracer uptake prompted vascular workup. Others have reported comparable cases. Pruthi *et al*. presented an incidental bone scan finding in a cancer patient, where a thrombo-embolic occlusion of the leg arteries caused complete absence of tracer in the foot.[11] Likewise, Bae and Chun reported that an unusual soft-tissue uptake pattern on a bone scan led to early diagnosis of peripheral arterial disease.[12] These reports, together with the present case, emphasise that any unexpected asymmetry or cold region on whole-body bone static imaging should raise suspicion for ischaemia and should not be dismissed.

Beyond diagnosis, bone scintigraphy can help assess tissue viability. In chronic limb disease, triple-phase scans have been used to predict amputation level. Masaoka showed that decreased tracer in the capillary phase of a three-phase bone scan correlated with zones that would necrose, guiding surgeons in amputation level selection.[13] Although our patient's scan was incidental, it foreshadowed the poor outcome. The lack of perfusion indicated insufficient collateral flow, and indeed, the patient required high-level amputation. Palot Manzil *et al*. noted that acute embolic ischaemia often leads to above-knee amputation (with rates nearly double those in chronic ischaemia) because collaterals have not developed.[6]

In summary, this case reinforces that whole-body bone static imaging can provide early indirect evidence of critical limb ischaemia and may carry prognostic information about tissue viability. Additionally, in this patient, the bone scan finding converted an initially presumed orthopaedic case into an acute vascular emergency. Despite prompt surgical intervention and anticoagulation, the limb could not be salvaged due to extensive occlusion and late presentation. This outcome aligns with literature emphasising the gravity of acute limb ischaemia.

Our case adds to emerging evidence that any focal perfusion defect on a bone scan should not be ignored. In acute limb ischaemia, such findings can offer an early clue to arterial thrombus. The authors suggest that clinicians interpret bone scans with caution: abnormalities in tracer uptake patterns may warrant further vascular workup. Future research and guidelines may further define the role of nuclear scans in evaluating limb perfusion, but for now, they can complement standard imaging in the selected cases.

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**ETHICAL APPROVAL:**
The study involving human subjects was reviewed and approved by the Medical Research Ethics Committee of the Hainan General Hospital, Hainan, China, in accordance with the Helsinki Declaration.

**PATIENT'S CONSENT:**
Informed consent was obtained from the patient for publication of this case report.

**COMPETING INTEREST:**
The authors declared no conflict of interest.

**AUTHORS' CONTRIBUTION:**
RY: Conceptualisation, writing of the original draft, reviewing, and editing.
YY: Data collection, guidance, and constructive criticism.
CW: Conceptualisation, writing, reviewing, and editing.
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## REFERENCES

1. Yang M, Chen L, Zhang M, Huang X, Zhao W, Wang H. Evidence-based nursing model in interventional thrombolysis for acute lower extremity arterial embolism. *Contrast Media Mol Imaging* 2022; **2022(9)**:1-9. doi: 10.1155/2022/4488797.
2. Meng XH, Xie XP, Liu YC, Huang CP, Wang LJ, Liu HY, *et al*. Observation of the effect of angiojet to treat acute lower extremity arterial embolization. *World J Clin Cases* 2023; **11(15)**:3491-501. doi: 10.12998/wjcc.v11.i15.3491.
3. Olinic DM, Stanek A, Tataru DA, Homorodean C, Olinic M. Acute limb ischaemia: An update on diagnosis and management. *J Clin Med* 2019; **8(8)**:1215. doi: 10.3390/jcm8081215.
4. Bjorck M, Earnshaw JJ, Acosta S, Bastos Goncalves F, Cochennec F, Debus ES, *et al*. Editor's choice - European Society for Vascular Surgery (ESVS) 2020 clinical practice guidelines on the management of acute limb ischaemia. *Eur J Vasc Endovasc Surg* 2020; **59(2)**:173-218. doi: 10.1016/j.ejvs.2019.09.006.
5. Van Leuven SM, Mertzel ML, Ferdosian S, Samuel RJ, Landry GJ, Liem TK, *et al*. Improving follow-up of incomplete lower extremity venous duplex ultrasound examinations performed for deep and superficial vein thromboses. *J Vasc Surg Venous Lymphat Disord* 2021; **9(6)**:1460-6. doi: 10.1016/j.jvsv.2021.01.014.
6. Palot Manzil FF, Almodovar SE, Bhambhvani P. Looking beyond the indication: Bone scan for trauma providing unsuspected initial diagnosis of acute critical lower limb arterial compromise. *J Nucl Med Technol* 2017; **10**: jnmt.117.200618. doi: 10.2967/jnmt.117.200618.
7. Poredos P. Interrelationship between venous and arterial thrombosis. *Int Angiol* 2017; **36(4)**:295-8. doi: 10.23736/S0392-9590.17.03820-2.
8. Gu J, Xu K, Teng G. Consensus among Chinese experts on standard interventional therapy for deep venous thrombosis of lower extremity (second edition). *J Interv Med* 2019; **1(3)**:125-36. doi: 10.19779/j.cnki.2096-3602.2018.03.01.
9. Guggenberger K, Krafft AJ, Ludwig U, Vogel P, Elsheik S, Raithel E, *et al*. High-resolution compressed-sensing T1 black-blood MRI: A new multipurpose sequence in vascular neuroimaging?. *Clin Neuroradiol* 2021, **31(1)**:207-16. doi: 10.1007/s00062-019-00867-0.
10. Wieczor R, Wieczor AM, Rosc D. Tissue-type plasminogen activator and plasminogen activator inhibitor type 1 in patients with symptomatic lower extremity artery disease. *Minerva Cardiol Angiol* 2021; **69(2)**:161-71. doi: 10.23736/S2724-5683.20.05114-2.
11. Pruthi A, Chauhan VV, Rao SA, Choudhury PS. Incidentally detected arterial thrombosis in (99m)Tc-methylene diphosphonate skeletal scintigraphy: An atypical observation. *Clin Nucl Med* 2014, **39(2)**:190-2. doi: 10.1097/RLU.0b013e318292eef9.
12. Bae SJ, Chun IK. Incidentally found soft tissue (99m)Tc-DPD uptake on bone scintigraphy was useful in an early diagnosis of peripheral arterial disease. *Nucl Med Mol Imaging* 2022; **56(4)**:202-7. doi: 10.1007/s13139-022-00750-w.
13. Masaoka S. Evaluation of arterial obstructive leg and foot disease by three-phase bone scintigraphy. *Ann Nucl Med* 2001; **15(3)**:281-7. doi: 10.1007/BF02987847.

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