A case of popliteal artery entrapment syndrome: easy to miss in early angiographic phase of bone scan

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ABSTRACT

Background: Popliteal artery entrapment syndrome is a common vascular pathology in young athletes which is usually diagnosed based on magnetic resonance angiography findings. Although three-phase bone scan is a sensitive imaging modality in high turnover osteoblastic conditions, it does not have an established role in evaluating chronic pain syndromes and vascular pathologies.

Case Presentation: We report an atypical case of popliteal artery entrapment syndrome which was incidentally found in a patient who was evaluated for skeletal malignancy.

Conclusion: This case emphasizes the importance of attention to the first two phases of bone scan despite normal whole body images.

Keywords: Popliteal artery entrapment syndrome, PAES, chronic compartment syndrome, bone scan, magnetic resonance angiography

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Background

Chronic exertional leg pain covers a wide range of differential diagnosis including chronic exertional compartment syndrome, stress fractures, deep vein thrombosis, lumbosacral radiculopathy, and even malignancies [1,2]. Popliteal artery entrapment syndrome (PAES) is a rare cause of chronic leg pain reported in 3.5% of autopsy cases [3]. PAES is mostly seen in athletes and young adults. However, PEAS has also been reported in elderly or even children who didn't exercise professionally [4].

Case Presentation

A 47-year-old diabetic patient presented with left lower leg pain for 6 months. The pain was mostly localized over the midportion of the tibia. Leg pain worsened with daily physical activities and reduced by flexing the knee. Normal electromyography and degenerative changes in the spine in lumbosacral magnetic resonance imaging (MRI) were documented in her medical records. Knee MRI showed signal changes in patella along with signal intensity in the posterior part of the knee as well as muscular hypertrophy of the left leg. In order to rule out the possible malignancy and skeletal metastasis, a three-phase bone scan was done. After intravenous injection of 740 MBq of Tc-99m-MDP, scanning was performed in 2-seconds intervals for 2 minutes from both the legs. A static image was also performed at 2 minutes from the same region (Figure 1). The first phase of Tc-99m-MDP showed ab asymmetric early flow with decreased perfusion and reduced blood pool in the left leg. Delayed images showed faint asymmetry in the lower extremities uptake as well. The significant difference in the tracer activity of the lower limbs in the angiographic phase of bone scan implied a possible vascular problem.

Considering the possibility of the vascular problem by ^{99m}Tc-MDP Bone scan, magnetic resonance angiography (MRA) of the lower limbs was done and showed a normal signal and the diameter of common femoral, superficial, and deep femoral arteries and circumflex branches of the thigh. Popliteal, tibial, and anterior and posterior fibular arteries were normal. Perforating artery branches of the left leg were lower than the normal (Figure 2), in favor of vascular stenosis with popliteal artery origination. These findings were compatible with the diagnosis of PAES and the patient was referred to a vascular surgeon for further management. Considering the patient's preference for conservative treatment, supportive care including using compression bandage was done with some improvement in the patient's leg pain.

Discussion

PAES is a common vascular pathology in young athletes which is usually diagnosed based on MRA findings. Although the three-phase bone scan is a sensitive imaging

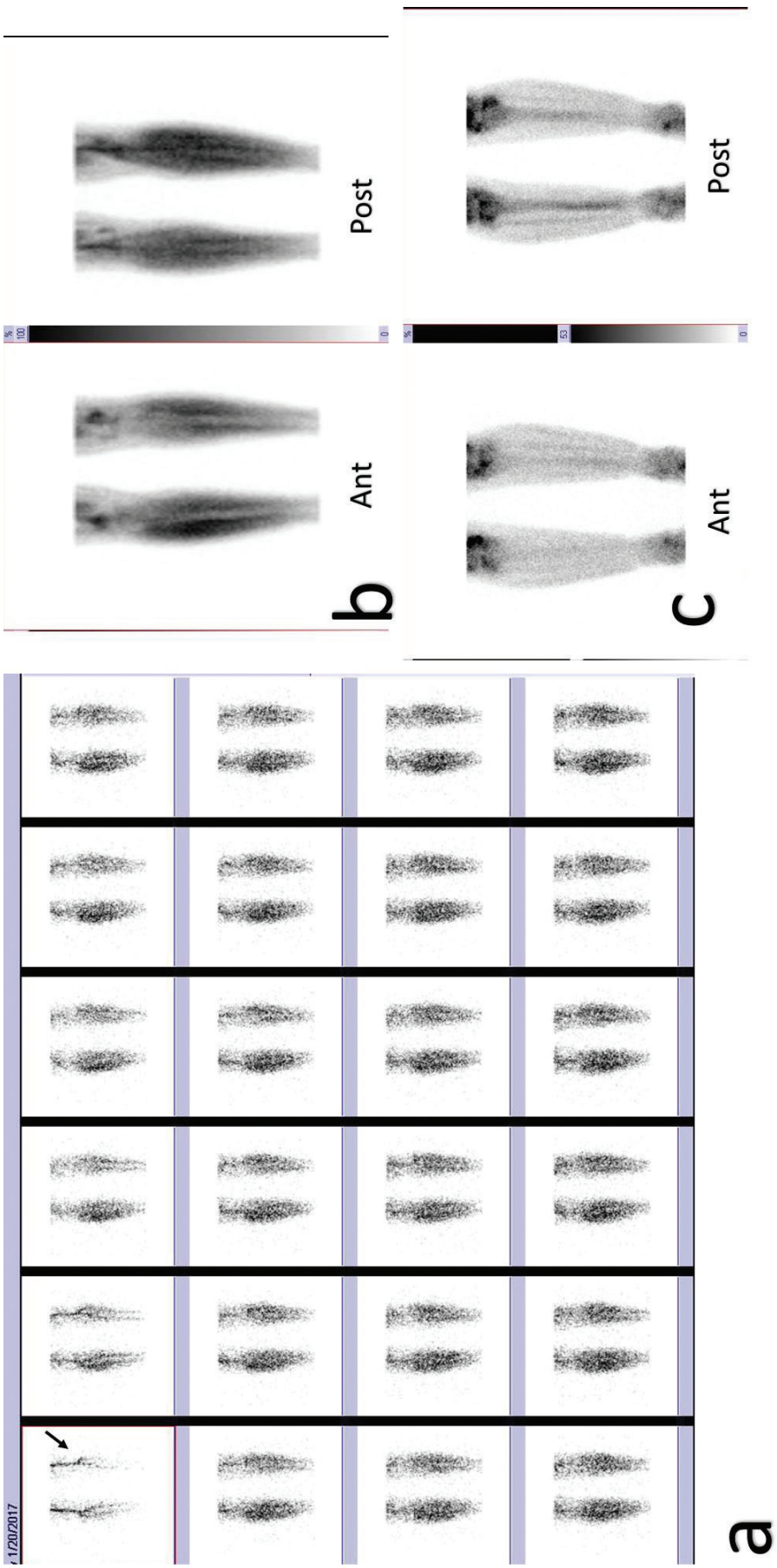

Figure 1. *Three phase ^{99m}Tc-MDP bone scan: (a) asymmetric early flow with decreased perfusion (arrow) and reduced blood pool (b) in the left leg are noted. Delayed static images and SPECT views showed a focal zone of increased tracer uptake in the facet joint of L5 vertebrae in favor of spondylolisthesis with no remarkable abnormality in the lower extremities uptake (c).*

Figure 2. *MRA of the lower limbs. Normal signal and diameter of common femoral, superficial and deep femoral arteries, and circumflex branches of the thigh are noted. Popliteal, tibial, and anterior and posterior fibular arteries are normal. Perforating artery branches of the left leg are lower than normal (arrow), in favor of vascular stenosis with popliteal artery origination.*

modality under high turnover osteoblastic conditions, it does not have an established role in evaluating chronic pain syndromes and vascular pathologies. While our patient didn't have risk factors for arterial thrombosis, anatomical etiologies were suspected. Imaging is the cornerstone of the diagnosis of PAES. The standard modality for diagnosis is conventional angiography; however, MRA and computed tomography angiography also provide useful details for confirming the diagnosis [5,6]. The three-phase bone scan is an imaging modality which is useful in evaluating chronic pain syndromes in sports medicine [7,8]. Decreased blood flow and increased pressure will reduce tracer uptake [1]. Although bone scan is not the gold standard in diagnosing PAES, in patients suffering from chronic exertional leg pain without classical risk factors of arterial thrombosis, this imaging modality provides useful information for ruling out the other possible causes and even help in providing a definite diagnosis along with MRA. Attention to the angiographic phase of bone scan may have an incremental value for the diagnosis of possible vascular problems.

Acknowledgement
None

Summary of the case

Patient (gender, age)	1	47-year-old female
Final Diagnosis	2	Popliteal artery entrapment syndrome
Symptoms	3	Chronic leg pain
Medications	4	None
Clinical Procedure	5	Bone scan, MRA
Specialty	6	Nuclear medicine

List of abbreviations:

MRI	magnetic resonance imaging
MBq	Mega Becquerel
MRA	magnetic resonance angiography
PAEP	Popliteal artery entrapment syndrome
SPECT	Single Photon Emission Computed Tomography

Consent for publication
Written informed consent was taken from the participant of the study.

Ethical approval
No need for ethical approval according to our center's policy.

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