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Case report

Bone Scanning in the Adductor Insertion Avulsion Syndrome

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Abstract

A thigh splint (adductor insertion avulsion syndrome) is a relatively uncommon diagnosis analogous to shin splints. This article reports a 19-year-old female patient NOT a regular athlete who presented with groin pain. Physical examination was non-specific; magnetic resonance imaging pelvis did not reveal any abnormality. Patient referred for whole body bone scan, especially to locate any abnormality in the spine. This study highlights the role of whole body bone scan in the evaluation of groin pain and importance of evaluation of whole lower extremity.

Keywords: Bone scan, groin pain, thigh splints

Introduction

Groin pain usually presents due to a condition of the genitals or reproductive organs. Pain can also radiate into the groin from a condition of the hip, lower spine, pelvis, kidney, bladder, or colon. Another cause of groin pain is a groin pull; a strain of the inner thigh muscles often occurs due to an activity that involves running, skating, jumping or swimming.

Acute sport injuries are often easily recognized as there is a sudden onset of symptoms following a traumatic event, such as a direct force applied to the bones or joints that often can be recognized clinically. However, acute soft-tissue injuries, tendon ruptures or ligamentous injury, are not so familiar and may therefore be more difficult to diagnose. In athletic individuals, the lower extremity is often the site of musculoskeletal trauma. Commonly seen conditions include enthesopathies, stress fractures, shin splints, plantar fasciitis and rarely thigh splints.[1] Physicians usually concentrate more on imaging of spine, pelvis or tibia region. Here, we are emphasizing the role of whole body bone scan in the evaluation of groin pain.

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Case Report

This is a case report of a 19-year-old, averagely built female presented with groin pain since last 15-20 days. On enquiry patient gave history of playing football for a week 1 month ago. Magnetic resonance imaging (MRI) of the pelvis was within normal limits. Roentgenograms of the tibia and femurs were normal. Local examination was negative for tenderness, redness and swelling. Patient referred for whole body bone scan, especially to locate any abnormality in the spine.

The whole body bone scan was performed using a large field-of-view gamma camera and a parallel hole, low energy high-resolution collimator, 3 h following iv injection of 20 mCi technetium-99m methylene diphosphonate. The scans routinely included whole body sweep along with anterior-posterior spot images of the pelvis and lower extremities. For each view 500 K counts were collected.

The scinitigraphic findings showed low to Moderate grade linear tracer uptake along anteromedial and to a lesser degree along lateral aspect of the proximal to mid shaft of both femurs [Figures 1 and 2], which correspond

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to the insertion of adductor muscle groups. In addition to that, foci of abnormal tracer uptake seen in the distal diaphysis of left ulna [Figure 1] and right tibia [Figure 3]. Single-photon emission computed tomography of spine and pelvis did not show any abnormality in the lumbar vertebrae, pelvic bones and hip joints. Thus overall scan findings were suggestive of bilateral thigh splints with stress fractures in the left ulna and right tibia, which were subsequently confirmed on radiological imaging [Figure 4].

Discussion

In general osseous fatigue-related injuries are relatively common and are thought to result from abnormal stresses to bone related to repetitive axial loading, abnormal biomechanics or excessive muscular forces. Initially, such injuries consist of areas of asymptomatic stress reaction, which may eventually become symptomatic; shins splints are a classic example. Stress fractures involving the posteromedial aspect of the femoral diaphysis are less common than tibial and proximal femoral stress fractures and are thought to be on the continuum of osseous fatigue-/stress-related injuries. Another specific, albeit much less common, type of osseous fatigue injury is the adductor insertion avulsion syndrome, also known as "thigh splints." The syndrome was felt to be related to an overly long marching step in a short-statured individual. It occurs when there are repetitive anteromedially directed vector pull upon the linea aspera. A lengthened stride would cause excessive adductor contraction and tend to strip the femoral periosteum in the vector plane.[2]

Thigh splints, is a rare cause of groin pain. Patients may also have a palpable mass due to periostitis, ossification of the injured muscle, or both, often confusing the clinical picture. The osseous changes from traction injury on the adductor magnus can be considerable, especially in children, in whom florid periostitis can occur, occasionally appearing as an aggressive growth and should not be mistaken for a neoplasm.[3] Occasionally serial imaging follow-up is needed to exclude other

Figure 1: Whole body Tc-99m-methylene diphosphanate bone scan images: Showing linear increased tracer uptake along the cortices of both femurs and focal increased tracer uptake in the distal shaft of left ulna and right tibia

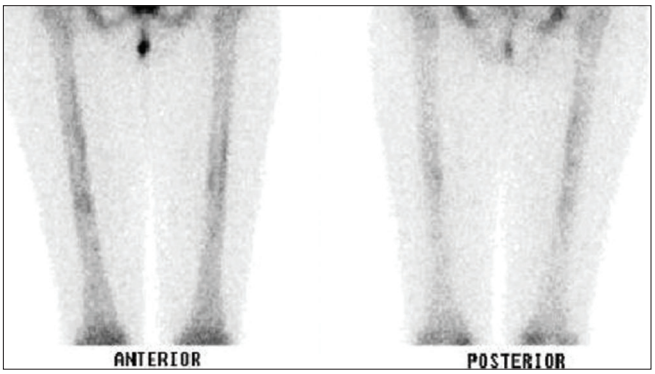

Figure 2: Static images of the femur showing linear increased tracer uptake along the cortices of both femurs consistent with thigh splints

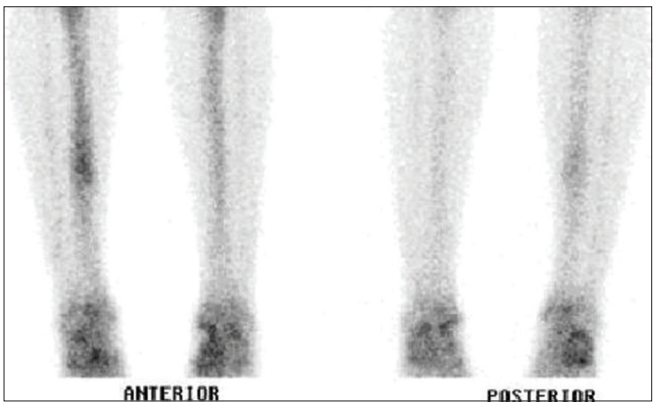

Figure 3: Static images of the femur showing increased tracer uptake in the distal shaft of right tibia consistent with stress fracture

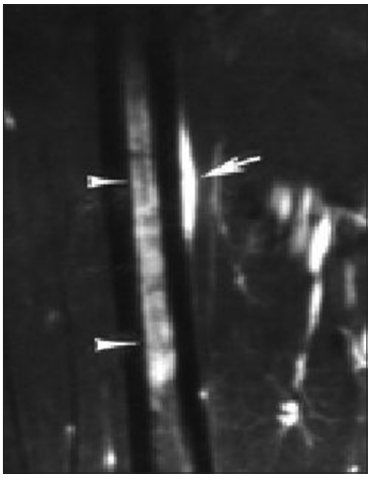

Figure 4: Coronal turbo spin-echo inversion recovery image reveals high signal intensity along periosteum of proximal to mid femur

diagnoses such as infection,[4] femoral stress fracture or articular hip disease.

Early in the course of the adductor insertion avulsion syndrome, radiographs may appear normal or may show subtle periosteal reaction in the characteristic location on the medial margin of the proximal-to-mid portion of the femoral diaphysis.

Bone scintigraphy may show corresponding areas of linear abnormal radiotracer uptake and no evidence of stress fracture. A study published in 1981, Ozburn and Nichols[5] found that bone scans to be the most sensitive and effective diagnostic aids in differentiating the adductor syndrome from stress fracture, but no scans were published. Hyperperfusion and increased blood pooling are generally present in acute stress fracture whereas angiograms and blood pool images are usually normal in periostitis (thigh and shin splints). The differentiation of stress fracture from periostitis is important because their treatments are very different.

At early stage of thigh splints, MR may show periosteal fluid/edema as the only abnormality. In other more severe and/or more advanced cases, additional MR signal abnormalities in the underlying medullary cavity and cortex may be seen, indicating the presence of a more severe stress reaction and a frank stress fracture, respectively. In contradiction to the stress fractures that occur in other locations, these femoral shaft stress fractures are often oblique and may therefore appear subtle or even occult radiologically.

Treatment of adductor insertion avulsion syndrome is one of planned and gradually increased physical therapy and anti-inflammatory medication, with surgery (tenotomy) reserved only for failures of conservative therapy.[6,7] If the patient's clinical symptoms persist, short-term imaging follow-up is advised to assess for the interval development of a radiologically evident fracture line. If conservative measures fail and the abnormal imaging findings persist, other entities on the short list of differential diagnostic possibilities could be entertained and assessed for via biopsy.

Conclusion

Doctors should carefully evaluate the patients of groin pain before advising any imaging modality. Whole body bone scan is relatively low-cost imaging modality that can be used not only to evaluate the presence of thigh splints but also to visualize the stress fractures elsewhere in the skeleton and to see any active osseous pathology of hip joints. Thus its exquisite sensitivity makes it a useful screening procedure. Moreover, some conditions that are not evident on anatomic images can be diagnosed with radionuclide bone imaging. The adductor insertion avulsion syndrome is thought to represent the early stage of an evolving osseous stress reaction on the continuum to frank stress fracture; therefore, the importance of early detection is emphasized.

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