

Adductor Insertion Avulsion Syndrome with Stress Fracture in Morbidly Obese Patient Diagnosed on ¹⁸F-Sodium Fluoride Positron Emission Tomography-Computed Tomography

Abstract

Adductor insertion avulsion syndrome, also known as “thigh splints,” is a painful condition affecting the proximal to mid-femur at the insertion of the adductor muscles of the thigh. ¹⁸F-Sodium fluoride (¹⁸F-NaF) is increasingly used in diagnosing skeletal pain which is not identified on radiographs. We report a case of a 56-year-old morbidly obese woman with left hip pain referred for ¹⁸F-NaF positron emission tomography-computed tomography (PET-CT) as magnetic resonance imaging cannot be performed due to obesity. ¹⁸F-NaF PET-CT shows an increase in tracer uptake at the posteromedial cortex of the upper shaft of left femur. Findings are likely due to adductor insertion avulsion syndrome. ¹⁸F-NaF provides important diagnostic information that might alter treatment options.

Keywords: ¹⁸F-sodium fluoride positron emission tomography-computed tomography, adductor insertion avulsion syndrome, stress fracture

A 56-year-old woman is morbidly obese with a body mass index of 51.5 kg/m². She is complaining of severe left hip pain. X-ray of the hip is normal. Magnetic resonance imaging (MRI) cannot be performed due to technical limitation of overweight. ¹⁸F-sodium fluoride (¹⁸F-NaF) positron emission tomography-computed tomography (PET-CT) is performed by injecting 6.3 mCi of ¹⁸F-NaF. Anterior ¹⁸F-NaF maximum intensity projection images show focal spindle-shaped area of increase tracer uptake at the upper shaft of left femur. Fused ¹⁸F-NaF PET-CT localized focal increase tracer uptake at the posteromedial cortex of the upper shaft of left femur; corresponding CT shows periosteal thickening with central linear lucency [Figure 1]. Findings are likely due to adductor insertion avulsion syndrome with stress fracture. Other differential diagnoses include Ewing’s sarcoma, osteoid osteoma, and osteomyelitis. Absence of bone destruction and soft-tissue components helps in excluding these conditions.

Adductor insertion avulsion syndrome, or thigh splints, is a clinical entity resulting from tension on the adductor muscles, which insert at the upper or mid-femoral shaft.^[1] There is

periosteal elevation along the anteromedial cortex. The traction periostitis may be an early finding, which may later develop into a frank stress fracture. Repetitive avulsive stresses in adductor insertion avulsion syndrome may result in a spectrum of findings, which include traction periostitis, osseous stress reaction, and stress fracture.^[2] Radiographs can be normal initially but later may show periosteal reaction along the proximal third of the medial femoral shaft near the insertions of the adductor brevis and longus muscles. MRI findings are thin rim of linear hyperintensity along the medial cortex of the proximal to mid-femoral shaft.^[3] Bone scan findings include abnormal, elongated, linear uptake along the medial and, to a lesser degree, lateral cortices of the proximal to mid-femur, with or without evidence of a focal stress fracture.^[4] Differentiating between thigh splint and stress fracture may be subtle. In thigh, splint uptake is more linear representing periosteal inflammation, while stress fracture is represented as focal uptake.

¹⁸F-NaF is an excellent bone-seeking agent owing to high bone uptake due to rapid single-pass extraction, minimal binding to serum proteins, and fast clearance from the soft tissues.^[5] It is a sensitive tool for

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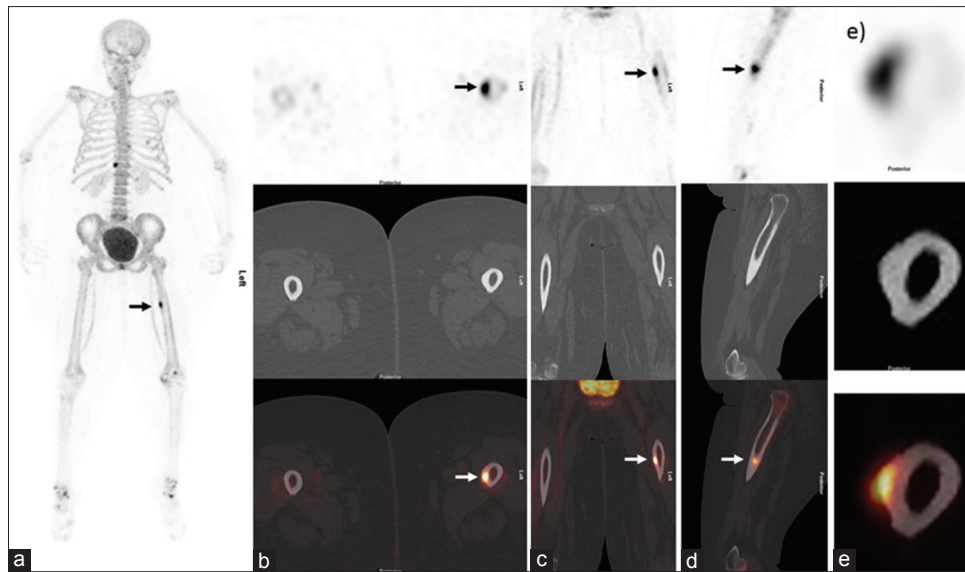


Figure 1: (a) Anterior maximum intensity projection images showing focal spindle-shaped area of increase tracer uptake at upper shaft of left femur (arrow). Increased sodium fluoride uptake also seen at degenerative/arthritis changes at osteophyte at D11, end plates of L4/L5 vertebrae, both knees, and ankle joints. (b-d) Cross-sectional ¹⁸F-sodium fluoride positron emission tomography-computed tomography (e) zoomed transaxial images showing focal area of increase tracer uptake at posteromedial cortex of upper shaft of left femur (arrow); corresponding computed tomography showing periosteal thickening with central linear lucency. Findings are likely due to adductor insertion avulsion syndrome with stress fracture

detecting skeletal metastases better than conventional bone scintigraphy.^[6,7] Encouraging results have also been reported for its use in characterizing benign bone diseases.^[8,9] Obese peoples are vulnerable to bone fractures, dislocations, sprains, and strains. Increased or sudden unaccustomed activities in obese patients cause abnormal stresses on the bone causing stress injuries. Our prior reported retrospective data^[10] suggest that ¹⁸F-NaF PET-CT is an excellent imaging technique in extremely obese patients. ¹⁸F-NaF will be increasingly used in diagnosing skeletal pain which is otherwise not identified on radiographs as in this case. It provides important diagnostic information that may alter the course of the disease, including treatment options. In our case, the patient was managed mainly conservative with pain killers and abstinence from the intense causative activity. Adductor insertion avulsion syndrome is an uncommon entity; it should be kept in mind in reporting patients with vague hip pain, especially if radiographically hip joints are normal.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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