

## Unsuspected early necrotizing fasciitis identified by $^{18}\text{F}$ -FDG PET imaging in a patient with acute myeloid leukemia

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### ABSTRACT

Necrotizing fasciitis is a part of a spectrum of necrotizing soft tissue infections that usually follow a surgical intervention or a chronic / acute medical illness. Diagnosis is often based on symptoms which classically start within hours after an injury. There are no reports on the use of PET/CT in this condition. Scarcely reports of its association in patients with malignancy (Ca of colon and rectum) are available. Here we present a young lady in remission from acute myeloid leukemia (AML) with sudden onset right knee pain and fever after a trivial foot injury. Clinically an osteomyelitis or acute septic arthritis was suspected, although the location is not appropriate for osteomyelitis.  $^{99\text{m}}\text{Tc}$ -MDP bone scan was performed followed by  $^{18}\text{F}$ -FDG PET.  $^{18}\text{F}$ -FDG PET scan was incremental in diagnosing subcutaneous infection around right knee even before appearance of an ulcer or skin erosion. Tissue culture confirmed necrotizing fasciitis. This is the first case report highlighting necrotizing fasciitis in a patient with AML.

**Key words:** MDP bone scan; FDG PET; Osteomyelitis; Necrotizing fasciitis; Acute myeloid leukemia

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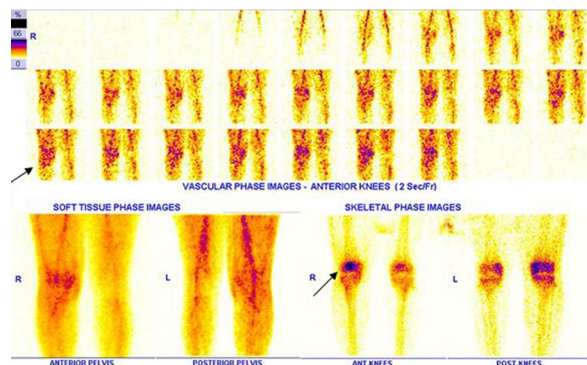
### CASE REPORT

Thirty two years old female, a known case of AML in complete remission presented to general medicine department with high grade fever, two episodes of vomiting and right knee pain of two days duration. Patient had a trivial glass shrapnel injury to the right sole a week ago. Fever was continuous in nature associated with chills and rigor. There was intermittent remission of fever on taking paracetamol. No relevant history of intake of non steroidal anti-inflammatory drugs was elicited.

On examination, patient was conscious and well oriented. Vitals were stable. Patient was febrile (102.5 degree Fahrenheit) and not ambulatory. Local examination of right lower limb revealed raised local temperature, redness and tenderness in right knee region with no signs of joint effusion. Two small blebs were present on the right knee and lateral aspect of thigh. Peripheral pulses were felt. Right inguinal lymph nodes were palpable but non-tender. Systemic examination was non contributory. Patient had anemia (Hb 10.9 gm/dl), with leucocytosis, raised CRP (5mg/dL), and ESR (62mm Hg/ hr). Xray of knee, venous doppler of right lower limb were non contributory. Ultrasound examination of right knee showed minimal free fluid/collection in the pre-patellar region. Orthopedic consultation was sought to rule out osteomyelitis or a knee joint involvement.

Three phase bone scan was done with 15 mCi of IV injection of  $^{99\text{m}}\text{Tc}$  MDP.

Immediate dynamic, soft tissue phase and 3 hours later whole body anterior and posterior images were acquired on a dual head variable angle Gamma camera (Figure 1).

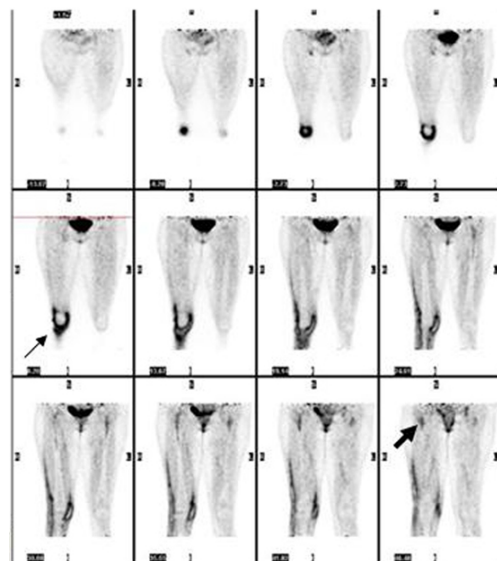


**Fig 1.** Skeletal scintigraphy was performed with 15 mCi (555 MBq) of  $^{99\text{m}}\text{Tc}$ -MDP given IV. Focal increased tracer uptake was noted in right patella femoral and tibial plateau (arrow). There was normal tracer uptake in lower third shafts of both femurs and tibiae ruling out any osteomyelitis. No evidence of any active infective / inflammatory pathology of right knee joint.

Focal increased tracer uptake was noted in right patella, right femoral and tibial plateau. Knee joint was uninvolved as confirmed by SPECT CT.

There was normal tracer uptake in lower third shafts of both femurs and tibiae ruling out an active osteomyelitis. 5 mCi (185 MBq) of  $^{18}\text{F}$  FDG was subsequently injected IV and regional PETCT of thigh and knees were acquired using an 8 slice GE PETCT system.

Abnormal increased FDG uptake was seen in subcutaneous fascia around lower third of right thigh and knee joint (depicted with an arrow) suggesting an active subcutaneous infection (Figure 2).



**Fig 2.**  $^{18}\text{F}$ -FDG PET images in coronal sections: 5 mCi (185 MBq) of FDG was injected IV in euglycemic status and an hour later regional PET-CT was acquired using a 8 slice GE PET-CT system. Abnormal increased  $^{18}\text{F}$ -FDG uptake was seen in subcutaneous fascia around lower third of right thigh and knee joint suggesting fasciitis (arrow).  $^{18}\text{F}$ -FDG avid right inguinal lymphadenopathy was also noted (bold arrow).

Right inguinal lymph nodes were enlarged and showed FDG uptake suggesting an underlying infection (bold arrow).

Coagulase-positive staphylococcus was the causative factor in our patient. Chest X ray was also done to rule out any respiratory tract infection. Aerobic and anaerobic blood culture showed no growth after 5 days of incubation.

Patient was given broad spectrum antibiotics, daily dressing and was advised high protein diet and mobilization of right knee and flexion exercises. Patient was on follow-up and shows good improvement after 6 weeks.

## DISCUSSION

Necrotizing fasciitis is a rapidly progressive inflammatory infection characterized by widespread necrosis of the subcutaneous tissue and the fascia, [1-2]. The speed of spread is directly proportional to the thickness of the subcutaneous layer. Necrotizing fasciitis moves along the fascial plane [3]. The causative bacteria may be aerobic, anaerobic, or mixed flora. Group A beta-hemolytic streptococci have historically been noted as a cause of necrotizing fasciitis, but *Haemophilus aphrophilus* and *Staphylococcus aureus* are also associated with the condition, and some patients have mixed infections involving multiple species of bacteria, including mycobacteria, as well as fungi [4]. Organisms spread from the subcutaneous tissue along the superficial and deep fascial planes, presumably facilitated by bacterial enzymes and toxins. This deep infection causes vascular occlusion, ischemia, and tissue necrosis [5]. Superficial nerves may be damaged, producing the characteristic localized anesthesia. Anatomical imaging has been used in few studies [6]. There are sparing reports of its association in patients with malignancy like Colorectal cancers and leukemia (albeit none in AML) [7, 8].

## CONCLUSION

Necrotizing fasciitis is a rare life threatening disease that requires immediate attention. Due to the vague presentation and rarity of the condition, it invariably goes undiagnosed in early stages. The differential diagnosis in such cases is cellulitis, osteomyelitis or any other local inflammatory pathology. <sup>99m</sup>Tc MDP bone scan is a highly sensitive investigation to identify cellulitis and osteomyelitis even in early stages. When the bone scan is negative for osteomyelitis, FDG PETCT imaging can be used to enhance the specificity and clinch the diagnosis of a superficial soft tissue inflammation / infection, as in our case.

## REFERENCES

1. Wilson B. Necrotizing fasciitis. *Am Surg.* 1952 Apr;18(4):416-31.
2. Namias N, Martin L, Matos L, Sleeman D, Snowden B. Symposium: Necrotizing fasciitis. *Contemp Surg.* 1996;49(3):167-178.
3. Lille ST, Sato TT, Engrav LH, Foy H, Jurkovich GJ. Necrotizing soft tissue infections: obstacles in diagnosis. *J Am Coll Surg.* 1996 Jan;182(1):7-11.
4. Kim HJ, Kim DH, Ko DH. Coagulase-positive staphylococcal necrotizing fasciitis subsequent to shoulder sprain in a healthy woman. *Clin Orthop Surg.* 2010 Dec;2(4):256-9.
5. Light TD, Choi KC, Thomsen TA, Skeete DA, Latenser BA, Born JM, Lewis RW 2nd, Wibbenmeyer LA, Shyamalkumar ND, Lynch CF, Kealey GP. Long-term outcomes of patients with necrotizing fasciitis. *J Burn Care Res.* 2010 Jan-Feb;31(1):93-9.
6. Sharif HS, Clark DC, Aabed MY, Aideyan OA, Haddad MC, Mattsson TA. MR imaging of thoracic and abdominal wall infections: comparison with other imaging procedures. *AJR Am J Roentgenol.* 1990 May;154(5):989-95.
7. Duncan BW, Adzick NS, deLorimier AA, Longaker MT, Ferrell LD, Zoger S, Harrison MR. Necrotizing fasciitis in two children with acute lymphoblastic leukemia. *J Pediatr Surg.* 1992 May;27(5):668-71.
8. Lou J, Low CH. Necrotising fasciitis in leukaemic children. *Ann Acad Med Singapore.* 1990 Mar;19(2):290-4.