

CLINICAL CASE - TEST YOURSELF Musculoskeletal Imaging

Progressive hip pain in a middle-aged man

Pavlos Drakontaeidis, Antonia Bintoudi, Christos Tsantiridis
Radiology Department, Papageorgiou General Hospital of Thessaloniki, Greece

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PART A

A 54-year-old male was admitted to our hospital with progressive onset of pain and swelling in his left hip and proximal thigh. On physical examination, he had muscle weakness, positive Lasègue sign and positive FABER/FADIR test on his left lower limb. Laboratory tests showed leukocytosis and elevated C-reactive pro-

tein. The patient was on treatment with methylprednisolone for at least one month due to sudden hearing loss in his left ear. He also had a positive history of chronic alcohol abuse. There was no history of recent trauma or surgery. Pelvic radiograph, CT and MRI were performed (**Figs. 1-5**).



CORRESPONDING
AUTHOR,
GUARANTOR

Pavlos Drakontaeidis, Papageorgiou General Hospital of Thessaloniki, 4 Artakis Str, Thessaloniki 55133, Greece, Email: drakonpaul@outlook.com



Fig. 1. Anteroposterior pelvic radiograph.



Fig. 2. Coronal STIR MR image.

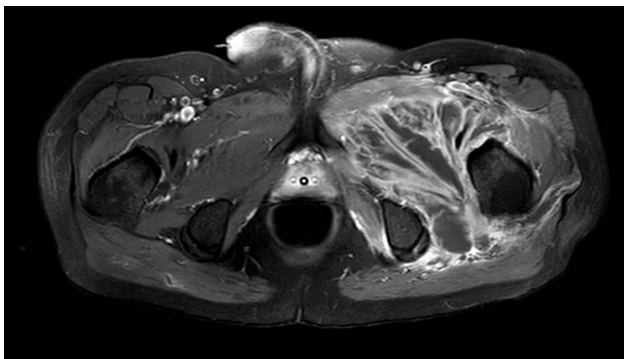


Fig. 3. Axial fat suppressed contrast enhanced T1-w MR image of the lower pelvis.



Fig. 4. Axial CT image of the hips with soft tissue window.

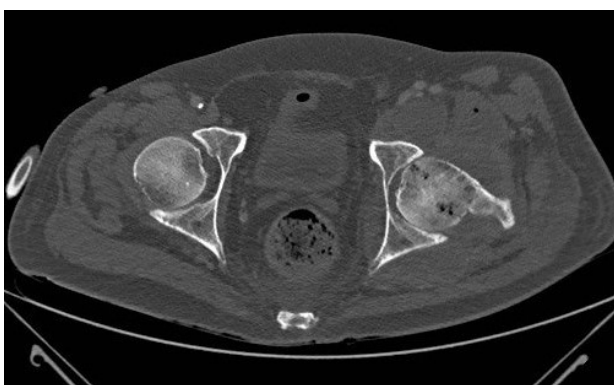


Fig. 5. Axial CT image of the pelvis with bone window.

PART B

Diagnosis: Emphysematous osteomyelitis

Emphysematous osteomyelitis is a rare, life-threatening condition, characterised by haematogenous dissemination of bacterial infection and development of intraosseous gas. It is associated with immune-suppressing comorbidities such as diabetes mellitus, malignancy, Crohn's disease and chronic alcohol abuse [1].

The presence of intraosseous gas in the extra-axial skeleton is highly indicative of emphysematous osteomyelitis, particularly in the absence of open fracture, recent surgery or other procedures of bone/outer environment communication. The development of gas bubbles within the infected bone is usually caused by the enterobacteriaceae family, *Mycobacterium tuberculosis* and in rare cases aerobic bacteria such as *Staphylococcus aureus* and *Streptococcus*. Infection can be either monomicrobial or multimicrobial. The first case of emphysematous osteomyelitis was described in 1981, by Ram et al. [2] and up to date, around 30 cases have been published, with the most common affected bone being the pelvis, followed by the femur, tibia, fibula and spine [3].

Patients with emphysematous osteomyelitis typically present with pain, swelling and erythema on the affected part. General symptoms like fever, fatigue and lethargy might also be present.

Plain radiography has low sensitivity and atypical findings in cases of acute osteomyelitis (Fig. 1). In cases where there is high clinical suspicion of bone infection, CT and MRI imaging are necessary to assess extent of the infection, involvement of surrounding soft tissues and presence of intraosseous gas (Figs. 2-5).

Imaging findings in CT scan typically involve intraosseous gas, extensive inflammation and fluid-pyogenic collections in the surrounding soft tissues. MRI findings depend upon the applied sequences. More specifically, T1-w images are useful for assessing bone marrow oedema, cortical disruption, cortical sinus tracts and periosteal elevation. Fluid sensitive sequences, such as STIR and fat suppressed PD/T2-w, show to better advantage bone marrow oedema, cortical sinus tracts, parosteal oedema, and soft tissue inflammation. Fat suppressed contrast enhanced T1-w images are able to show enhancement of the wall of abscesses, which is useful for treatment planning [4].

In cases where clinical and radiological findings are non-pathognomonic, emphysematous osteomyelitis should be differentiated from other causes of intraosseous gas, such as penetrating wounds, open fractures, osteonecrosis or recent biopsy [5].

In conclusion, emphysematous osteomyelitis is a rare but severe bone infection that must be identified whenever intraosseous gas is seen, particularly when the extra-axial bones are involved. Imaging is necessary to assess the location and the extent of the infection. Surgical intervention, in addition to potent antibiotics, is crucial to prevent the fatal complications of the disease. **R**

Conflict of interest

The authors declared no conflicts of interest.

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Fig. 1. Pelvic radiograph showing joint space narrowing of the left hip joint (black arrow), asymmetry of the ischio-femoral spaces (black arrowheads) and soft tissue oedema in the left proximal thigh (white arrow).



Fig. 2. Coronal STIR MR image showing high signal within muscles in the ischio-femoral space (white arrowheads). Areas of abnormal high signal can also be seen in the left femoral neck and head, indicating inflammation (white arrow).

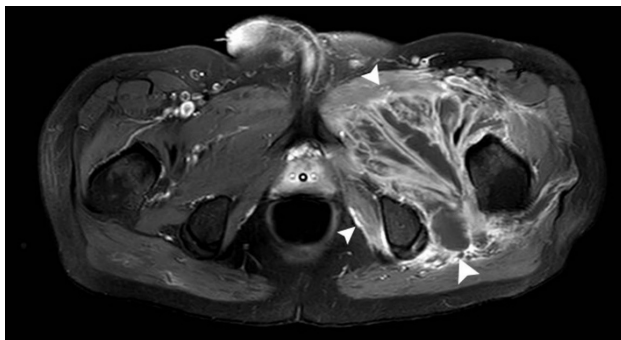


Fig. 3. Axial fat suppressed contrast enhanced T1-w MR image reveals multiple fluid collections (arrowheads) within the muscles in the left inguinal and ischio-femoral space, including internus and externus obturator, iliopsoas, pectineus, abductor brevis and quadratus femoris muscles. Appearance of the collections was more likely to correspond to pyogenic collections.

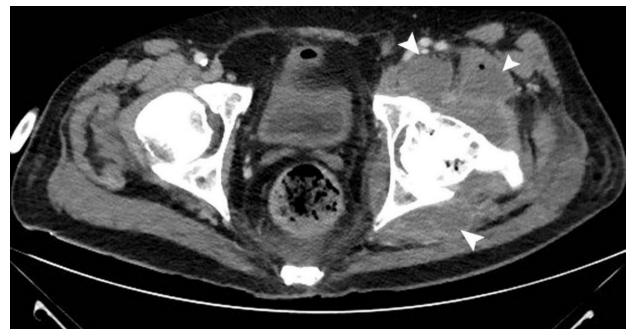


Fig. 4. Axial CT soft window image demonstrates extensive inflammation around the left femoral head and multiple fluid (pyogenic) collections in the surrounding muscles (white arrowheads).

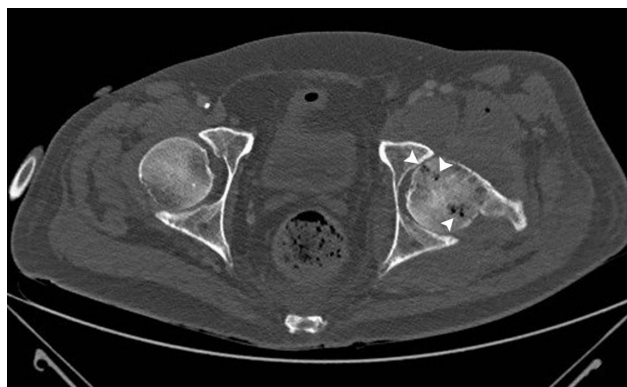


Fig. 5. Axial bone window in the same CT demonstrates multiple hypodense foci within the left femoral head, measuring up to -400 in HU, in keeping with air bubbles (white arrowheads). It is important to note that no biopsy or aspiration procedure was performed prior to the CT and the MRI.