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Detecting late infected hip prosthesis via ultrasonography: A case report

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Abstract

The case of a 64 year old female, who has had a septic prosthesis, is presented. She came to the Accident and Emergency Department complaining of a right hip pain after a minimal injury. She referred a right hip fracture ten years ago, treated with a hemi-arthroplasty having no problem ever since. The past medical history was clear. Roentgenograms were negative for fracture or gross loosening. She was sent home. After a couple of days the pain insisted and she has had a computed tomography scan which showed a hematoma. The symptoms worsened and then she underwent an ultrasound examination which revealed a large fluid collection and a snowstorm appearance around the prosthesis. The ultrasound findings and the elevated CRP set the diagnosis of a septic prosthesis. The operation confirmed these findings and a large amount of pus evacuated. The Orthopaedic hardware was removed as well.

Keywords: Fluid, hip replacement, septic prosthesis, ultrasound

1. Introduction

An infected joint prosthesis is difficult to diagnose. Ultrasound is one of the diagnostic imaging modalities and it can help to guide joint aspiration and the fluid can be used for further laboratory investigations. The European Society of Musculoskeletal Radiology recommends hip ultrasound for several clinical conditions involving the joint, soft tissues and nerves^[1]. A septic prosthesis case is presented, where ultrasound played a key role to diagnose it.

2. Case Description

A 64 years old lady presented to Accident and Emergency (A&E) Department complaining of right hip pain when she tried to sit up off a chair. From the Past Medical History, she was on anti-osteoporotic treatment and she had a non-cemented hip hemi-arthroplasty 10 years ago because of a Neck of Femur fracture. On clinical examination she was able to lift up her leg, but she complained of moderate groin pain. Neurologic examination was negative. Radiographs were negative for a periprosthetic fracture or signs of gross loosening (Figure 1). Since the symptoms had started 10 years after the operation, the diagnosis of septic arthritis was not included in the differential diagnosis. She visited her surgeon who sent her for a computed tomography (CT) scan, since a scintigraphy scan was not available and the presence of the stainless steel stem prohibited an accurate magnetic resonance imaging (MRI) diagnosis. The CT scan report was "Swelling around the iliopsoas and gluteus medius. There is a hyperintense lesion within the gluteus medius mass (possible haematoma). Artifacts around the prosthesis make proper evaluation difficult. Old united ischiopubic rami fracture. Possible hairline trochanteric fracture". When she visited the outpatient clinic, she was barely walking. Full Blood Count (FBC) was within the normal limits but she had an elevated c-reactive protein (CRP). Radiographs of the hip showed no changes in comparison to the initial ones (when she first presented to the A&E). She was examined by the orthopaedic doctor, who used an EsaoteMylab 70 X-vision ultrasound. The patient was slim and a linear probe 13 MHz was initially used. Then the hip evaluation completed using a convex probe 8 MHz. A large superficial fluid collection was found (Figure 2). Using the convex probe another fluid collection around the prosthesis was discovered (Figure 3).

This finding plus the elevated CRP led the surgeon to proceed to an open procedure. After the incision of the fascia latta, a large amount of pus gushed out of the surgical wound (Figure 4). All the hardware was removed and treatment with intravenous antibiotics was initiated according to the cultures' results.



Fig 1: Roentgenograms of the hip hemi-arthroplasty.



Fig 2: Large superficial fluid collection.



Fig 3: Fluid collection (snowstorm picture) around the neck of the prosthesis.



Fig 4: Massive pus collection evacuated from the wound.

3. Discussion

Periprosthetic infection carries a significant morbidity and cost and it accounts for 1% to 3% of hip prostheses [2]. From the non invasive diagnostic methods, radiography is cheap, widely available and its accuracy is quite good, it has a low sensitivity but higher specificity when it comes to implant associated infections, but it cannot demonstrate soft tissues disturbances [3].

Computed tomography (CT) is better than simple radiographs in assessing osteolysis or soft tissues changes [4], but the beam-hardening artifacts produced by the prosthesis obscure the picture quality and therefore the diagnosis [5, 6]. In the present case, CT failed to positively identify the infection of the prosthesis.

MRI is quite sensitive in the soft tissues assessment compared to the previous mentioned methods [7, 8], but again the artifacts from prosthesis obscure the vision of the soft tissues [6, 9]. In the present case the patient did not have an MRI, because the stem was made of stainless steel (old Smith and Nephew stem) and the metal artifacts would prohibit any reliable evaluation of the prosthesis and the surrounding soft tissues envelope.

Scintigraphy is not affected by the prosthesis hardware compared to CT and MRI scans and its accuracy it ranges from 50 to 90% [10]. The Combined leukocyte-marrow scintigraphy can tackle this problem, but that mean an increasing cost [10]. Although scintigraphy would have been a good option for further hip prostheses evaluation, it was not available within our region.

Ultrasonography is a good choice to assess prostheses infection. Its sensitivity in detection of joint effusion is far more superior to clinical and radiographic examination, exceeding up to 92% [4, 11]. The soft tissues and the prostheses can be assessed under dynamic conditions and compared with the opposite healthy side [4]. The disadvantage of ultrasonography is that for deeper structures like the hip joint, the diagnostic accuracy is diminished due to acoustic window attenuation [12], it is operator dependent and unable to evaluate bony involvement during infections. If the infection is limited to the bones it can give false negative results [13]. Distinction between noninfected and bacterial infected joint effusion is another weakness of ultrasonography [11, 13].

The combination of painful prosthesis and a large artificial joint effusion plus extra-articular fluid collection found with ultrasound is highly suggestive of a septic prosthesis [11] and this was the case in the present study. Definite diagnosis can be set by arthrocentesis and fluid aspiration either by ultrasound or CT scan [11]. However, the sensitivity of joint aspiration was significantly lower if antibiotics were previously used [14].

In the present study ultrasound immediately revealed large fluid collection areas around the prosthesis extending up to the more superficial soft tissues layers. Such a large fluid collection is not always the case of the low grade prosthesis infection making the ultrasound diagnosis more difficult.

4. Conclusions

Ultrasonography is a cheap useful bedside test in diagnosing hip effusion when present. Ultrasound-guided fluid aspiration is another advantage. However there are some limitations. It is operator - dependent, it cannot assess bony involvement and it gets more difficult to evaluate deeper structures due to beam attenuation.

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