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Subchondral insufficiency fracture of the femoral head

股骨頭軟骨下部的骨質不足性骨折

Subchondral insufficiency fracture of the femoral head is a recently recognised entity. There are a few cases reported in Japanese and Caucasian patients but none in the Hong Kong population. The condition typically occurs in elderly females with osteoporosis. Acute hip pain is the usual presentation. The patient may have concomitant insufficiency fractures elsewhere. Magnetic resonance imaging is usually required to make the diagnosis. The prognosis of the condition is unknown. Reported complications include rapid collapse of the femoral head and coxopathy. Joint replacement should be considered if conservative management fails.

股骨頭軟骨下部的骨質不足性骨折是近來才確立的病症，現時有數個日本籍和白種病人病例的報告，香港人口則未有發現此症。患有此症的大多是骨質疏鬆症的年老女性，表徵通常是急性臀部痛楚。病人可能同時出現其他部位的骨質不足性骨折。此症通常以磁力共振掃描來診斷，但預後情況則未能確定。現時發現的併發症包括急性股骨頭脱落和髖關節病。如護理治療無效，便須考慮進行關節移植手術。

Case report

In May 2004, a 65-year-old Chinese woman presented to the United Christian Hospital with acute pain in the right hip with no preceding history of trauma. An X-ray of the pelvis demonstrated a fracture of the right femoral neck. The differential diagnosis at that juncture included an osteoporotic insufficiency fracture of the femoral neck and a pathological fracture due to underlying malignancy. An isotope bone scan was performed in view of the possibility of a malignant fracture and showed an increase in radioisotope uptake at the fractured right femoral neck and a diffuse increase in radioisotope uptake at the left femoral head (Fig 1). Magnetic resonance imaging (MRI) revealed several incomplete fracture lines in the left femoral head, compatible with a subchondral insufficiency fracture of the left femoral head (Fig 2). Bone marrow oedema was seen around the insufficiency fracture lines. On further questioning, the patient complained of some left hip pain that had been over-shadowed by the right femoral neck fracture pain.

An Austin Moore arthroplasty was performed for the right femoral neck fracture, which was histologically proven to be a benign (osteoporotic) fracture. Conservative treatment with protected weight-bearing and analgesics were prescribed for the left femoral head insufficiency fracture. The patient became pain-free a few months later. Magnetic resonance imaging scanning at 6 months showed blurring of the fracture lines in the left femoral head signifying that healing was underway. The marrow oedema in the left femoral head was much resolved. An MRI scan at 1 year showed complete resolution of the fracture lines as well as disappearance of the bone marrow oedema over the left femoral head.

Discussion

Subchondral insufficiency fracture of the femoral head is a recently recognised entity.[1-3] Such cases have been reported in Japanese and Caucasian patients but not in the Hong Kong population. There is a recent report of a Taiwanese patient with Turner's syndrome and osteoporosis.[4] The true incidence and prevalence in the Chinese population are not known. The disease may be underdiagnosed

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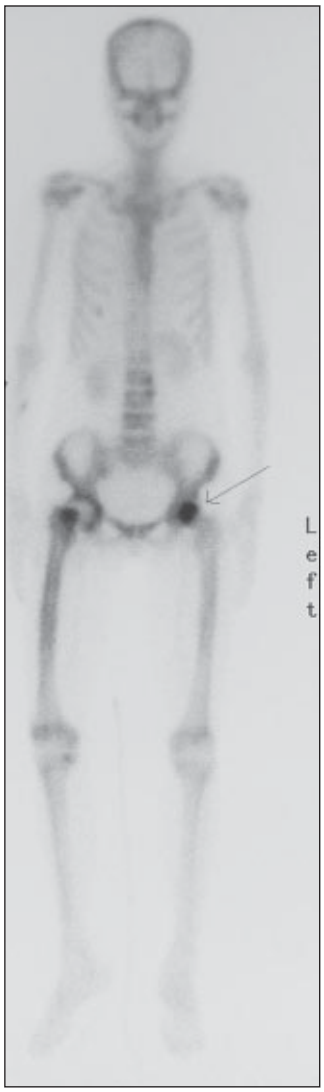

Fig 1. Isotope bone scan showing diffuse increase in uptake over the left femoral head (arrow) and increase in uptake over the right femoral neck corresponding to the fracture line

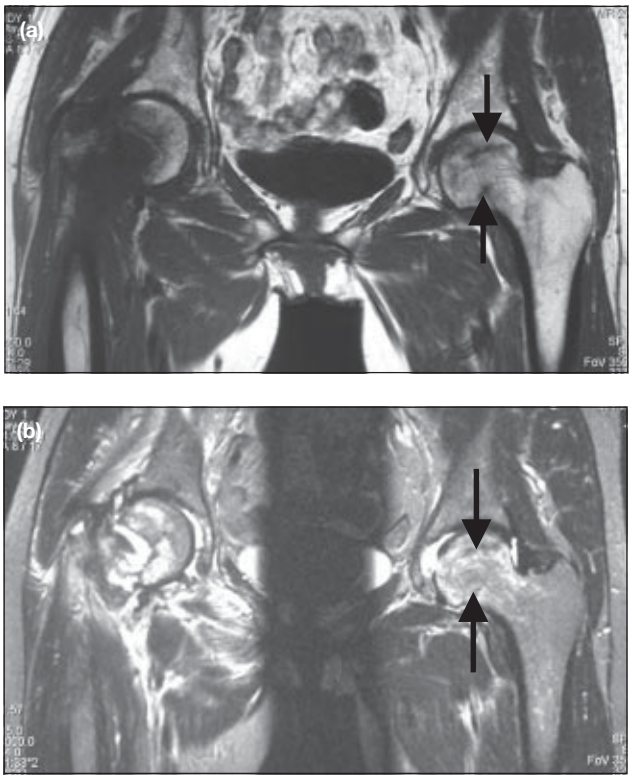

Fig 2. (a) Coronal spin-echo T1- and (b) short TI inversion recovery T2-weighted images of both hips showing presence of incomplete fracture lines (arrows) in left femoral head. Bone marrow oedema (hypointense in T1- and hyperintense in T2-weighted images) is seen in the left femoral head and neck. Also note the presence of right femoral neck fracture

because of difficulty making the diagnosis and easy confusion with osteonecrosis of the femoral head. An MRI is usually required for confirmation of the diagnosis.

Insufficiency fractures occur when normal or physiological stress is applied to abnormal bone with decreased mineralisation and elastic resistance. The most common cause of bone weakening is osteoporosis. Hence, this type of fracture is most prevalent in postmenopausal osteoporotic women.

Patients usually present with an acute onset of severe hip pain. The hip X-ray is usually normal in early stages of the disease. The MRI shows extensive bone marrow oedema in the femoral head and neck region. The bone marrow oedema appears as low signal intensity in T1-weighted images and high signal intensity in T2-weighted images. Low signal intensity lines (in both T1- and T2-weighted images) representing the fracture lines are typically seen in the femoral head.

A subchondral insufficiency fracture is easily misdiagnosed as osteonecrosis due to its very similar clinical presentation and imaging appearance. Circumscribed lesions are commonly seen on an MRI in osteonecrosis but not in subchondral insufficiency fractures. Moreover, there is no enhancement within the circumscribed area (representing the necrotic segment) in osteonecrosis. Enhancement is typically seen on both sides of the fracture line in subchondral insufficiency fractures.

Our patient had an insufficiency fracture in the contralateral femoral neck as well. It should be noted that additional insufficiency fractures may occur at other sites apart from the femoral head, including the acetabulum or femoral neck.[2] The presence of additional similar lesions at other sites is a finding that supports the diagnosis of insufficiency fracture[2] and is an important factor in determining the treatment plan.

Sometimes the histopathological differentiation between these two lesions is confusing because all fractures ultimately lead to some bone and marrow necrosis.[5] The preparation of the pathological specimen has to be done very carefully, otherwise iatrogenic pseudo-fracture may be generated.[6]

In some patients, spontaneous healing and resolution of

the fracture lines may occur after conservative management consisting of analgesics and protected weight-bearing. Others with hip destruction may progress to subchondral collapse with a subsequent need for prosthetic hip replacement. The progression can be very fast. There are reported cases with hip destruction occurring within 1 month.[7,8] It is proposed that subchondral insufficiency fractures may be an important factor in the pathogenesis of rapidly destructive arthrosis of the hip joint.[7]

The natural history, prognostic indicators, and treatment options for subchondral insufficiency fractures of the femoral head have not been fully established. At present, hip joint replacement is commonly adopted if conservative treatment fails especially in the presence of rapid joint destruction. However, the optimal time that should be allowed for conservative therapy before the application of surgical treatment is still unclear.[9] We need to gather more experience, both locally and overseas, to enable us to develop the best treatment regimen.

This is the first case of subchondral insufficiency fracture of the femoral head diagnosed in the Hong Kong population. It typically occurs in elderly women with osteoporosis. The disease may be underdiagnosed as an MRI is usually required for its diagnosis and it is easily confused with osteonecrosis of the femoral head. Conservative management is recommended but a prosthetic hip replacement may be required as the fracture can progress to hip destruction in some patients.

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