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Case Report

Bone scan findings in calcific tendinitis at the gluteus maximus insertion: some illustrative cases

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ABSTRACT

We describe the bone scan and single-photon emission computed tomography/computed tomography findings in calcific tendinitis of the gluteus maximus and discuss its pathophysiology. Although this tendinopathy is mostly self-limiting, awareness of this disease is important for 2 reasons. First, it may explain acute hip symptoms in patients in the resorptive phase of the calcifications. Second, it should be considered as a differential diagnosis for bone scan hot spots in the vicinity of the gluteus maximus tendon and for cortical erosion seen in that region on X-rays or CT.

Case reports

Case 1

A 52-year-old man presented to the emergency department with a painful left hip. The pain had progressively increased over the past week, despite treatment with nonsteroidal anti-inflammatory drugs. Physical examination of the left hip revealed painful mobilization and body support but no signs of fractures. A bone scan with oxidronate (Fig. 1A) revealed a marked hot spot dorsally on the proximal left femoral diaphysis. Hybrid single-photon emission computed tomography/computed tomography (SPECT/CT) showed that this spot corresponded with hydroxyapatite deposition at the insertion of the gluteus maximus tendon (Figs. 1B–F). This led to the diagnosis of hydroxyapatite deposition disease of the gluteus maximus tendon. The patient received 3 injections of corticosteroids at the involved tendon and his complaints disappeared quickly.

Case 2

A 75-year-old female patient underwent a bone scan because of continued discomfort in the left iliac crest and left fossa iliaca, 1 year after osteosynthesis of an acetabular and iliac

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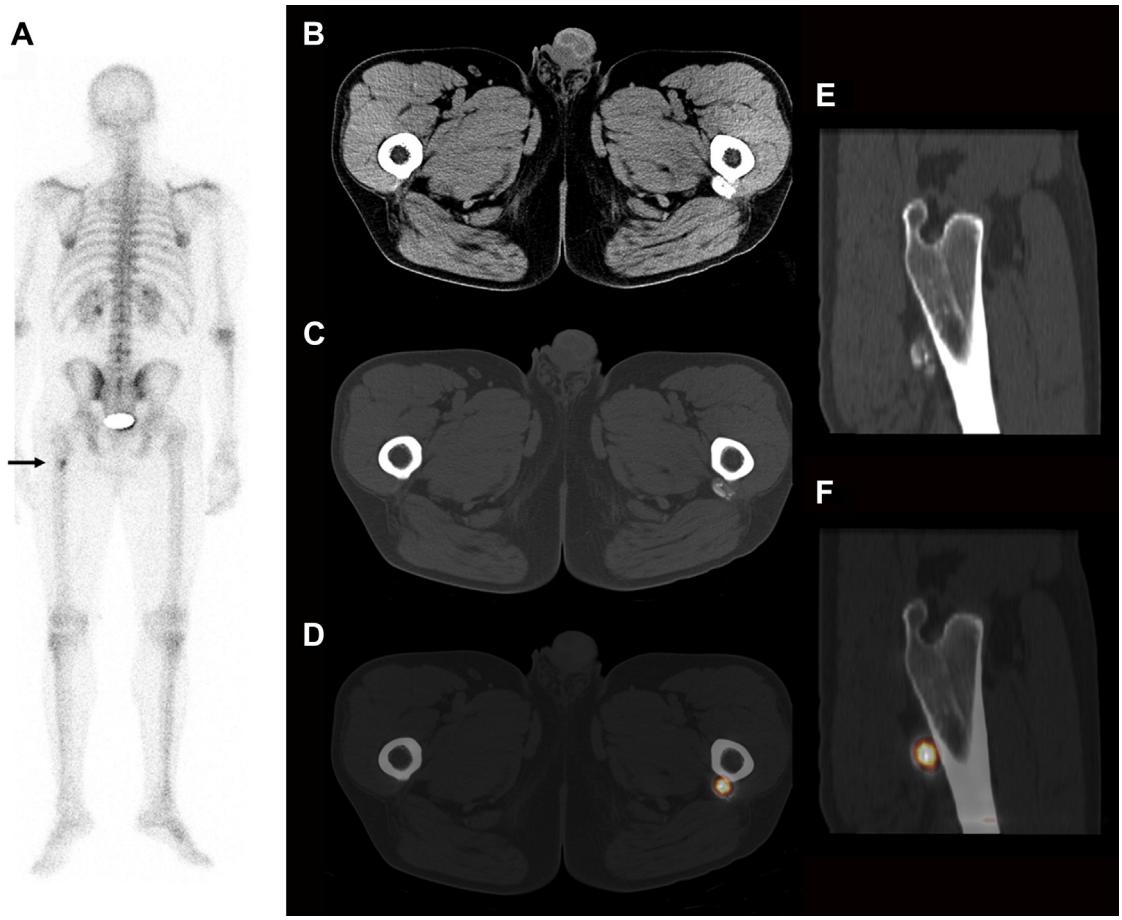

Fig. 1 – Acute pain. Posteroanterior whole body scan (A), axial CT slices (B, soft tissue window, C, bone window), and hybrid SPECT/CT slices (D), sagittal CT (E), and SPECT/CT (F) slices in a 52-year-old man with acute pain in the left hip. The whole body scan shows a hot spot (arrow) at the insertion of the gluteus maximum muscle on the gluteal line of the left femur. SPECT/CT shows this avid tracer uptake localizes in hydroxyapatite deposition at the insertion. SPECT/CT, single-photon emission computed tomography/computed tomography.

fracture. Apart from mild degenerative disease of the left hip, no relevant abnormalities were found. A faint hot spot was seen dorsally on the proximal part of the right femoral diaphysis (Fig. 2A). SPECT/CT revealed crumbly calcification at the insertion of the gluteus maximus (Figs. 2B–D), leading to a diagnosis of asymptomatic calcific tendinitis of the gluteus maximus.

Case 3

A bone scan was part of a metastatic survey in a 75-year-old female patient with a newly diagnosed mammary carcinoma. A hot spot was located proximally and posteriorly on the left femoral diaphysis (Fig. 3A). It corresponded to a bony outgrowth of the gluteal tuberosity, the structure onto which the gluteus maximus inserts (Figs. 3B–F). Such a projection is known as the third trochanter and is associated with short and robust femora [1]. In the patient presented here, inflammation of the tendinous insertion on the third trochanter was diagnosed.

Case 4

A 75-year-old female patient recently had received radiotherapy to a Merkel cell carcinoma in the left gluteal area. She presented with a painful right hip, with decreased body support and a tendency to sag through the knee. X-ray of the right hip showed a punched out lesion on the proximal femoral diaphysis, which was not seen on the whole body scan (Fig. 4A). A hybrid SPECT/CT was performed to elucidate the nature of that lesion (Figs. 4B–G). It turned out to be localized at an area of crumbly calcification and cortical erosion at the

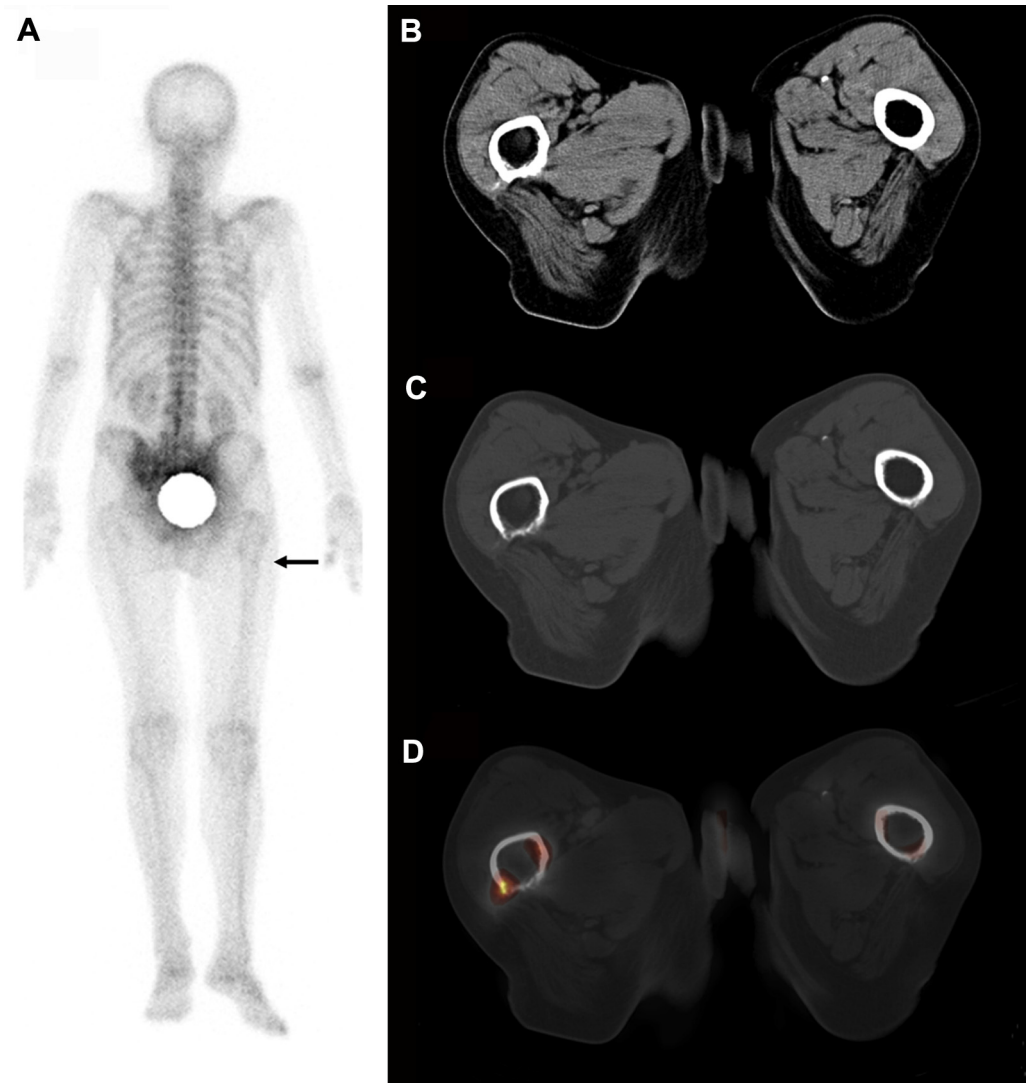

Fig. 2 – Asymptomatic case. Whole body scan (A), axial CT slices (B, soft tissue window, C, bone window), and hybrid SPECT/CT slices (D) in a 75-year-old female patient presenting with left iliac pain after osteosynthesis. An area of increased bone scan uptake, which can barely be seen on the whole body scan (arrow), corresponds to crumbly calcification at the insertion of the right gluteus maximus. SPECT/CT, single-photon emission computed tomography/computed tomography.

insertion of the gluteus maximus muscle, with uptake of oxidronate suggesting that the inflammation and calcification was ongoing.

Case 5

A bone scan for the assessment of metastasis from prostatic carcinoma in 73-year-old patient revealed invasion of the third rib at the right. A small hot spot was seen posteriorly on the right proximal femoral diaphysis (Fig. 5A). At follow-up one and a half year later, metastatic involvement had spread to adjacent vertebrae and ribs, but the spot on the femur had disappeared (Fig. 5B).

Discussion

Calcific tendinitis is a common disorder of the supraspinatus tendon, but less frequently, it may also involve the tendons of the gluteus maximus, rectus femoris, vastus lateralis, quadriceps, pectoralis major, deltoid, and adductor magnus [2–5]. Its peak prevalence is in the fourth through sixth decades of life [6]. Although calcific tendinitis of the hip has been described as unusual [7], it is our impression that it is seen fairly frequently on bone scans, at least when tomography is performed. Figures 1–4 illustrate the striking difference in the intensity of the hot spots on the gluteus maximus insertion on

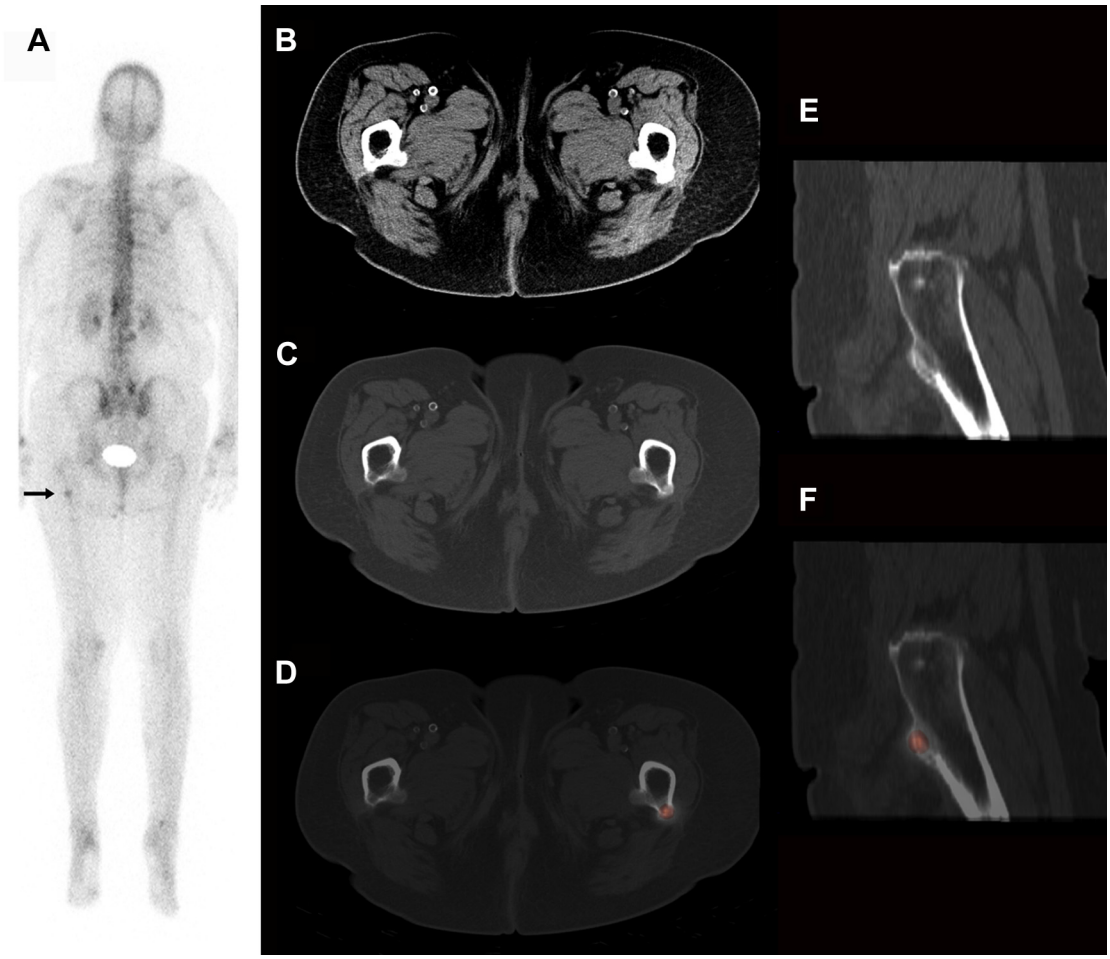

Fig. 3 – Metastatic survey. Whole body scan (A), axial CT slices (B, soft tissue window, C, bone window) and hybrid SPECT/CT slices (D), sagittal CT (E), and SPECT/CT (F) slices in a 75-year-old patient undergoing a metastatic survey for mammary carcinoma. Faintly increased oxidronate uptake (arrow) is present at a bone outgrowth of the left gluteal tuberosity, known as a third trochanter, presumably corresponding to some inflammation of the gluteus maximus enthesis. SPECT/CT, single-photon emission computed tomography/computed tomography.

planar images. While all these patients showed increased uptake of the gluteus maximus insertion on SPECT in patients 1 and 3, a strong and a moderate hot spot were seen, respectively, whereas in patients 2 and 4, planar imaging barely showed a hot spot. In a database consisting of 9748 bone scan reports performed in our department, a hot spot at the insertion of the gluteus maximus tendon has been described in 39 patients or about 0.4%.

The exact pathogenesis of calcific tendinitis is unknown, but 3 stages have been recognized histopathologically [8,9]. In the precalcific stage, fibrocartilaginous transformation of the tendon is seen, probably as a result of hypoxic or mechanical stress. This is followed by deposition of calcium in the formative phase of the calcific stage. The calcium subsequently is removed by phagocytosis during the resorptive phase of the calcific stage. During that phase, calcification may migrate into the surrounding soft tissues and even subcortically in the bone [9]. Formative and resorptive phases may be concurrent at different locations in the tendon. In the postcalcific stage, granulation tissue develops and matures into a scar. Acute symptoms may arise during the resorptive phase, probably owing to increased pressure—at surgery, a toothpaste-like substance may be extruding from the incised tendon [10]. Symptoms often are so severe as to incapacitate the use of the affected muscle. In the postcalcific stage, chronic pain may still be present for months, but anyhow, this is a self-limiting disease [11]. The self-limiting character of the disorder is illustrated here by the fifth patient, in whom hot spots at the gluteus maximus insertion disappeared spontaneously.

Although the disease is self-limiting, recognition of the diagnosis is important in patients seeking medical attention for acute pain, such as in the first patient described here, where it only to avoid unnecessary investigation or surgery.

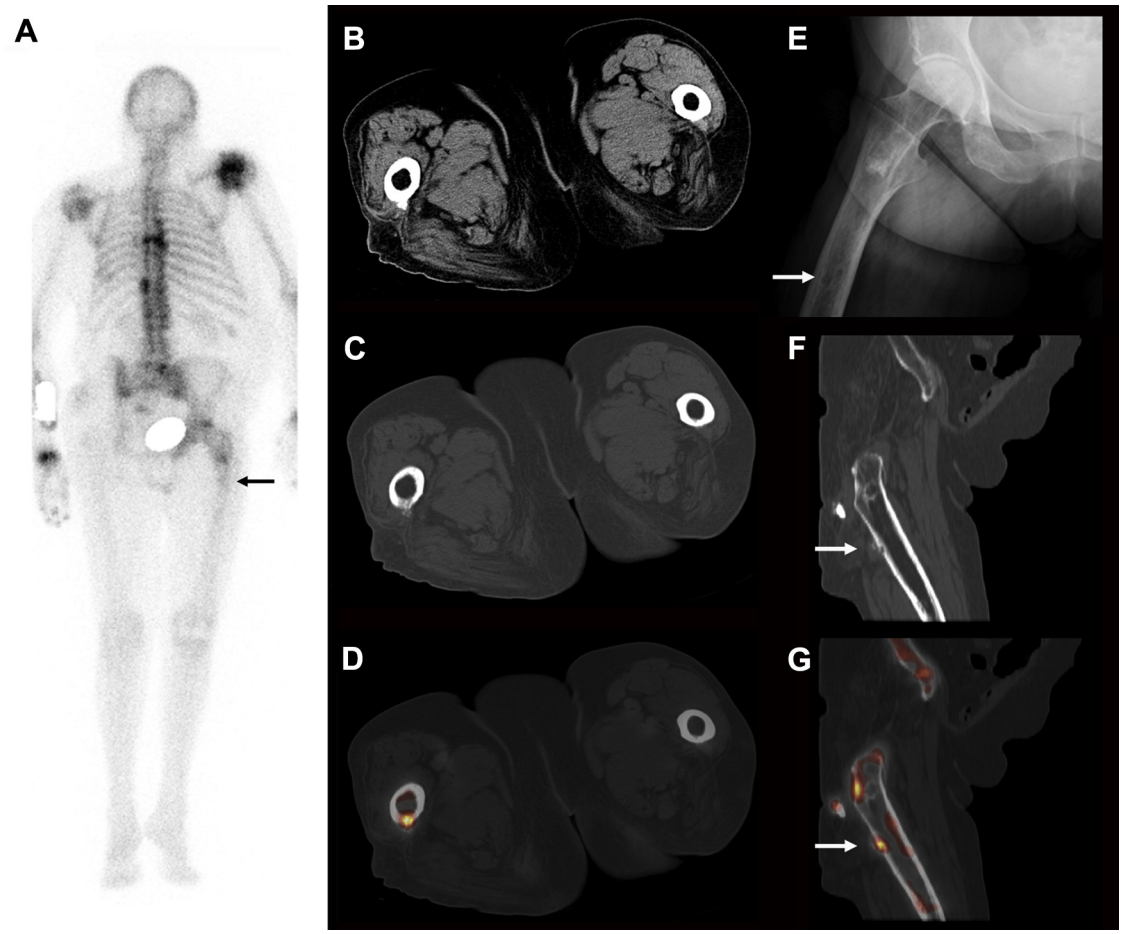

Fig. 4 – Work-up of a punched out lesion. Whole body scan (A), axial CT slices (B, soft tissue window, C, bone window) and hybrid SPECT/CT slices (D), sagittal CT (F), and SPECT/CT (G) slices in a 75-year-old patient in whom an X-ray of her painful right hip (E) showed a punched out lesion (white arrows). That lesion was shown to be a cortical erosion at the gluteus maximus insertion, in an area with crumbly calcification on CT and uptake of oxidronate on bone scan. On the whole body scan, this area is not clearly visible (black arrow). Note that the hot spot visible in the right trochanteric region does not correspond to the gluteus maximus insertion on SPECT. SPECT/CT, single-photon emission computed tomography/computed tomography.

X-rays may reveal a homogeneous, well-defined deposit during the formative phase, or an ill-defined, amorphous deposit during the resorptive phase [8,9]. On CT, the soft tissue calcification conforms to the shape of the tendon and has been likened to a flame [12] or a comet tail [13]. Magnetic resonance imaging in the acute phase shows soft tissue and marrow edema, which can be regarded as a correlate to the pain [9]. It is suboptimal, however, in evaluating soft tissue calcifications and subtle cortical erosion when compared with CT [11].

When imaging performed for other reasons reveals abnormalities in the vicinity of the gluteus maximus tendon, such as was the case in patients 2–4 in this report, one should be aware of the possibility of calcific tendinitis, which frequently is asymptomatic. This holds in particular when one is screening for metastases. This differential diagnosis becomes all the more pertinent since radiographic findings of calcific tendinitis may include bone erosions and subperiostal bone formation [7,9,11,13–15], especially in the hip and in the pectoralis tendon. These may reflect the strength of the muscles involved and may be reactive to inflammation in the enthesis. However, they also could suggest malignancy or osteitis. Of course, bone scan findings are nonspecific as well, but when a hot spot is present proximally and dorsally in the femoral cortex, SPECT-guided CT [16] is useful to precise its anatomic localization and to assess calcification of the gluteus maximus tendon, as is illustrated by patients 1–4 in the present report.

Treatment of acutely painful calcific tendinitis usually includes pain management with nonsteroidal anti-inflammatory drugs, but sometimes needs to be supplemented with narcotic-based analgesics. Local anesthetic or steroid injections may be of some benefit. Needling and lavage of the deposits may be an alternative to extracorporeal shock wave therapy or surgical removal of the deposits [11].

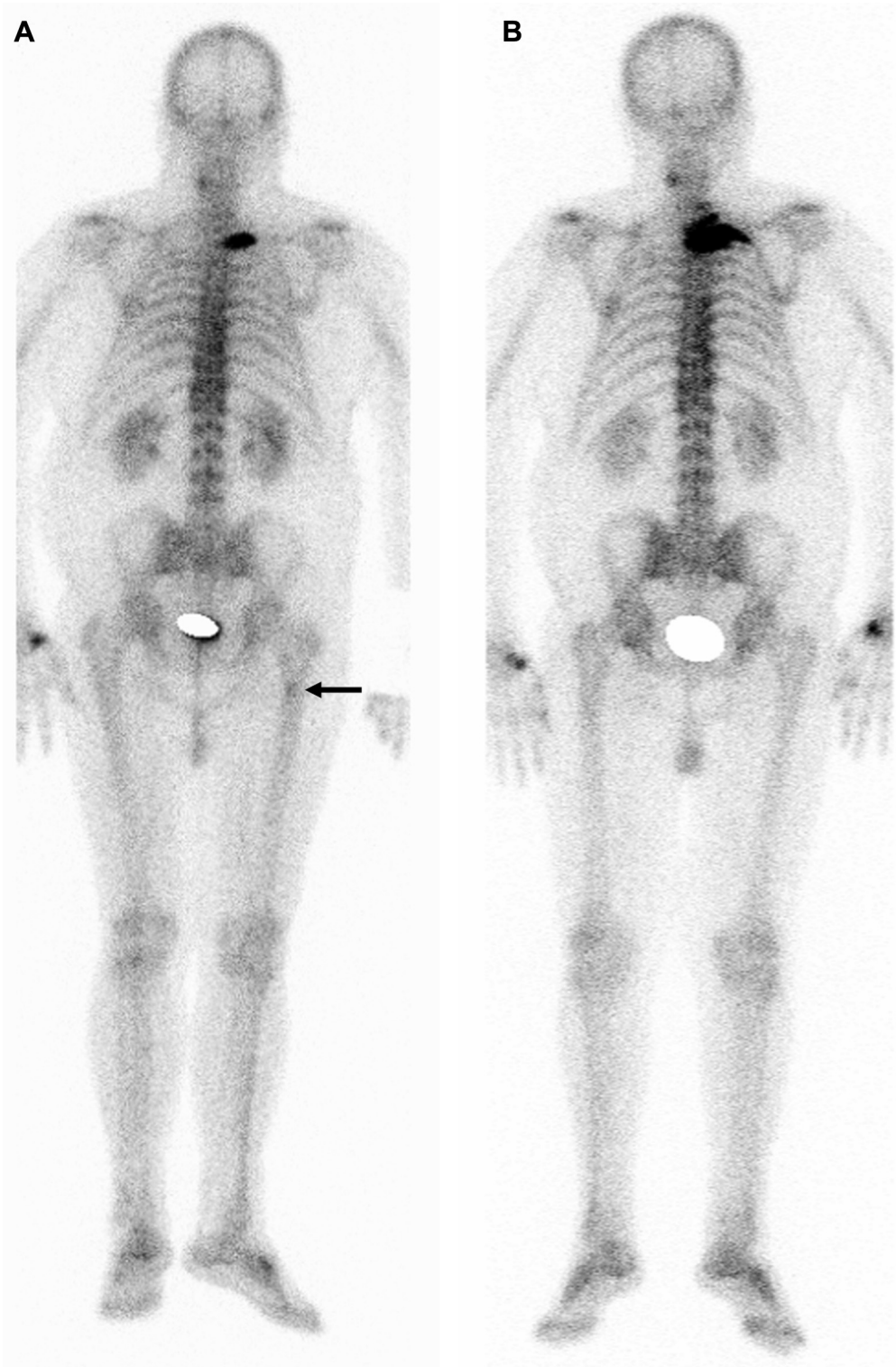

Fig. 5 – A self-limiting condition. Whole body bone scans for metastatic survey in a 73-year-old patient with prostatic carcinoma. Whereas a hot spot at the right gluteus maximus tendon (arrow) is present on the first bone scan (A), it has disappeared on a scan one and a half year later (B).

In conclusion, the case studies presented in this article illustrate that, although calcific tendinitis is mostly self-limiting, awareness of this disease is important for 2 reasons. First, it may explain acute hip symptoms in patients in the resorptive phase of the calcifications. Second, it is a differential diagnosis for bone scan hot spots in the vicinity of the gluteus maximus tendon and for cortical erosion seen in that region on X-rays or CT.

REFERENCES

[1] Bolanowski W, Smiszkiewicz-Skwarska A, Polguj M, Jedrzejewski KS. The occurrence of the third trochanter and its correlation to certain anthropometric parameters of the human femur. Folia Morphol (Warsz) 2005;64:168–75.

[2] Flemming DJ, Murphey MD, Shekitka KM, Temple HT, Jelinek JJ, Kransdorf MJ. Osseous involvement in calcific tendinitis: a retrospective review of 50 cases. AJR Am J Roentgenol 2003;181:965–72.

[3] Kachewar SG, Kulkarni DS. Calcific tendinitis of the rotator cuff: a review. J Clin Diagn Res 2013;7:1482–5.

[4] Gong Y, Yang C, Jingyu W, Liu J, Qi X. Calcific tendinitis of the gluteus maximus tendon with sciatic pain. Eur J Radiol Extra 2010;76:e59–60.

[5] Hottat N, Fumière E, Delcour C. Calcific tendinitis of the gluteus maximus tendon: CT findings. Eur Radiol 1999;9:1104–6.

[6] Uhthoff HK. Calcifying tendinitis. Ann Chir Gynaecol 1996;85:111–5.

[7] Thornton MJ, Harries SR, Hughes PM, Whitehouse R, Carradine S. Calcific tendinitis of the gluteus maximus tendon with abnormalities of cortical bone. Clin Radiol 1998;53:296–301.

[8] Uhthoff HK, Sarkar K. Calcifying tendinitis. Baillieres Clin Rheumatol 1989;3:567–81.

[9] Malghem J, Omoumi P, Lecouvet F, Vande Berg B. Intraosseous migration of tendinous calcifications: cortical erosions, subcortical migration and extensive intramedullary diffusion, a SIMS series. Skeletal Radiol 2015;44:1403–12.

[10] Berney JW. Calcifying peritendinitis of the gluteus maximus tendon. Radiology 1972;102:517–8.

[11] Kraemer EJ, El-Khoury GY. Atypical calcific tendinitis with cortical erosions. Skeletal Radiol 2000;29:690–6.

[12] Mizutani H, Ohba S, Mizutani M, Otake S, Otsuka T, Nakamura T. Calcific tendinitis of the gluteus maximus tendon with cortical bone erosion: CT findings. J Comput Assist Tomogr 1994;18:310–2.

[13] Hayes CW, Rosenthal DI, Plata MJ, Hudson TM. Calcific tendinitis in unusual sites associated with cortical bone erosion. AJR Am J Roentgenol 1987;149:967–70.

[14] Holt PD, Keats TE. Calcific tendinitis: a review of the usual and unusual. Skeletal Radiol 1993;22:1–9.

[15] Fritz P, Bardin T, Laredo JD, Ziza JM, D'Anglejan G, Lansaman J, et al. Paradiaphyseal calcific tendinitis with cortical bone erosion. Arthritis Rheum 1994;37:718–23.

[16] Römer W, Nömayr A, Uder M, Bautz W, Kuwert T. SPECT-guided CT for evaluating foci of increased bone metabolism classified as indeterminate on SPECT in cancer patients. J Nucl Med 2006;47:1102–6. Erratum in: J Nucl Med 2006;47:1586.