

C A S E R E P O R T

The promising role of DECT in the diagnosis of Osteitis condensans ilii: a case report

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Abstract: Osteitis condensans ilii (OCI) is a noninflammatory condition of no clear etiology, cause of axial low back pain. It is characterized by sclerotic bone lesions at the iliac region of the sacroiliac joints. The diagnosis is based on radiological findings and the exclusion of other conditions associated with back pain. We present a case of bilateral OCI in a young woman with bone sclerosis at sacroiliac joints diagnosed with the use of Dual Energy CT. (www.actabiomedica.it)

Key words: Osteitis condensans ilii, sacroiliac joints, bone sclerosis, Dual Energy CT, MRI

Introduction

Osteitis condensans ilii (OCI) is one of the benign etiologies of chronic axial low back pain. It is a noninflammatory disorder characterized by the triangular bone sclerosis of the iliac region of the sacroiliac joints bilaterally (1).

Most of the time, OCI is an incidental finding on plain X-Ray without any associated musculoskeletal symptoms.

Sicard et al. first described the disorder in 1926 and 2 years later, Barsony and Polgar coined the term osteitis condensans ilii, based on the description of 15 patients characterized by lower back pain, SIJ tenderness on physical examination, and with the presence of bilateral or unilateral sclerotic iliac lesions on plain radiographs (2,3).

Although several papers have been published since the first description of OCI, the pathogenesis involved is not well understood (4).

OCI is more common in young women of child-bearing age in the prepartum or postpartum period. It can also present in nulliparous women and men (5).

It is commonly misdiagnosed as sacroiliitis (6). It may manifest with low back pain at a young age, like in this case.

The diagnosis of OCI is made on radiological findings (X-rays and CT) which allows to distinguish OCI from spondyloarthropathies and inflammatory arthritis thanks to the presence of the triangular shape of sclerosis at the iliac border with preserved joint space. It is typical the absence on bone marrow edema on MRI. (7)

This case also highlights the role of dual energy CT in the diagnosis of this pathology, that documented the absence of bone marrow edema at the iliac border. DECT role could replace that of MRI.

Case presentation

A 37-year-old woman came to our attention for chronic abdominal pain for several months, localized in the pelvic excavation and posteriorly in the sacral region.

Her pain is mostly in the lower lumbosacral area, sharp in character, intermittently. It gets aggravated by

lifting heavy weights or doing household chores and relieved by taking rest.

She denied any joint stiffness, swelling, deformity. Physical examination was normal.

Laboratory tests were unremarkable, with normal antibody titers and inflammatory markers. HLA-B27 antigen was absent.

She performed an abdominal ultrasound which detects a pyelectasis of the right renal pelvis upstream of a stenosis of the pyelo-uteretal passage, suspected findings for pyelo-ureteral joint syndrome.

For diagnostic confirmation, the patient underwent a CT examination, performed also with the Dual Energy technique.

CT scan with bone window showed a triangular-shaped area of bone sclerosis, mainly in the

anteroinferior region of the iliac side of the sacroiliac joint, characterized by the intact articular margins and the lack of sacroiliac joint space narrowing, ankylosis or erosions (Figure 1).

To understand the nature of the lesion, it was necessary to exclude the presence of edema at the sacroiliac joints. For this reason, a dual energy protocol evaluation was performed.

Dual-energy computed tomography (DECT) allows to evaluate virtual hydroxyapatite (HAP) images (the main component of bone mineral) subtracting water and virtual water images subtracting HAP (Figure 2). In particular, evaluation of color-coded overlay virtual water images obtained by subtracting HAP was negative in OCI, showing the absence of bone marrow edema at sacrum iliac joints.

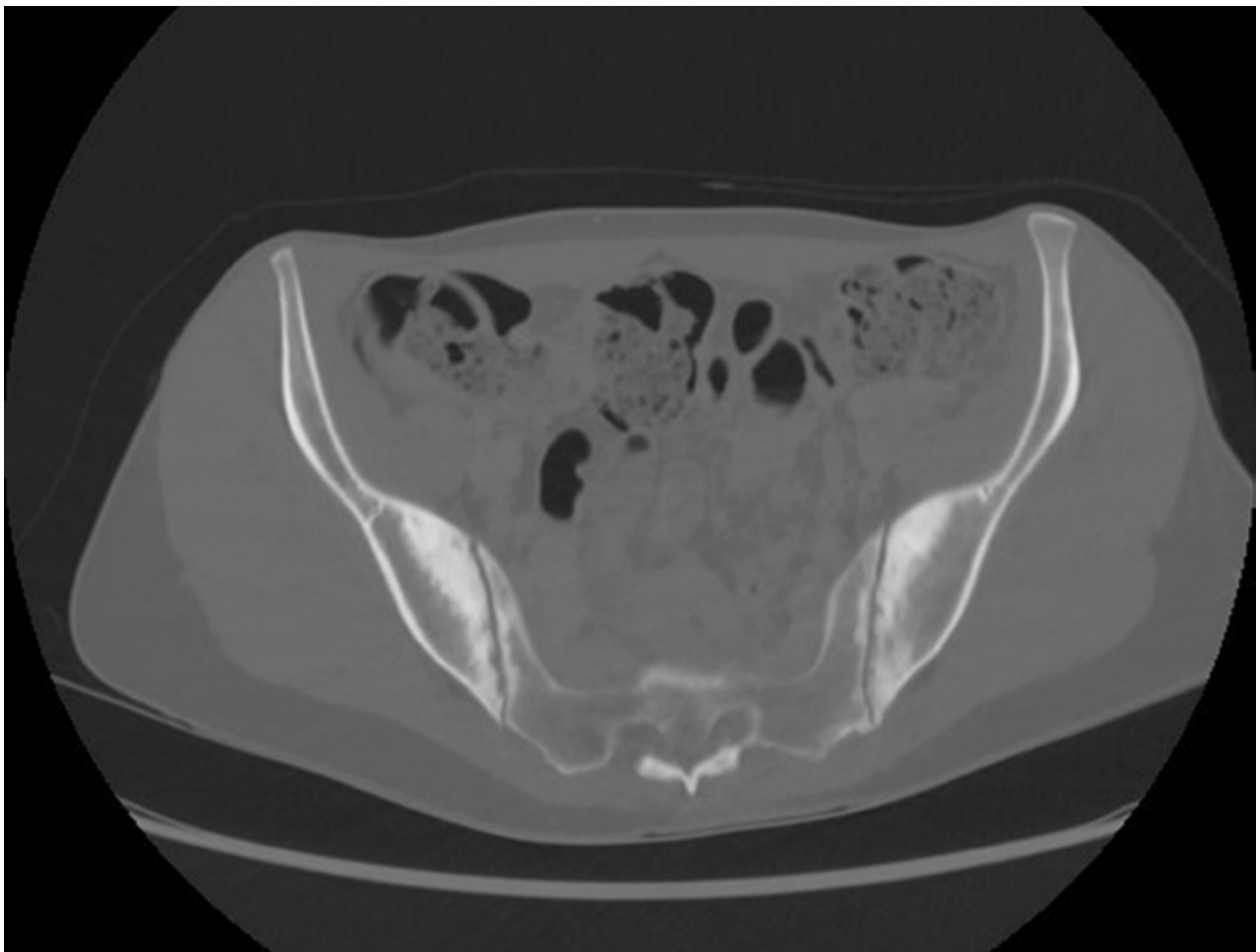


Figure 1. CT with bone windows confirm the triangular bone sclerosis bone of the iliac region of the sacroiliac joints bilaterally without joint space narrowing.

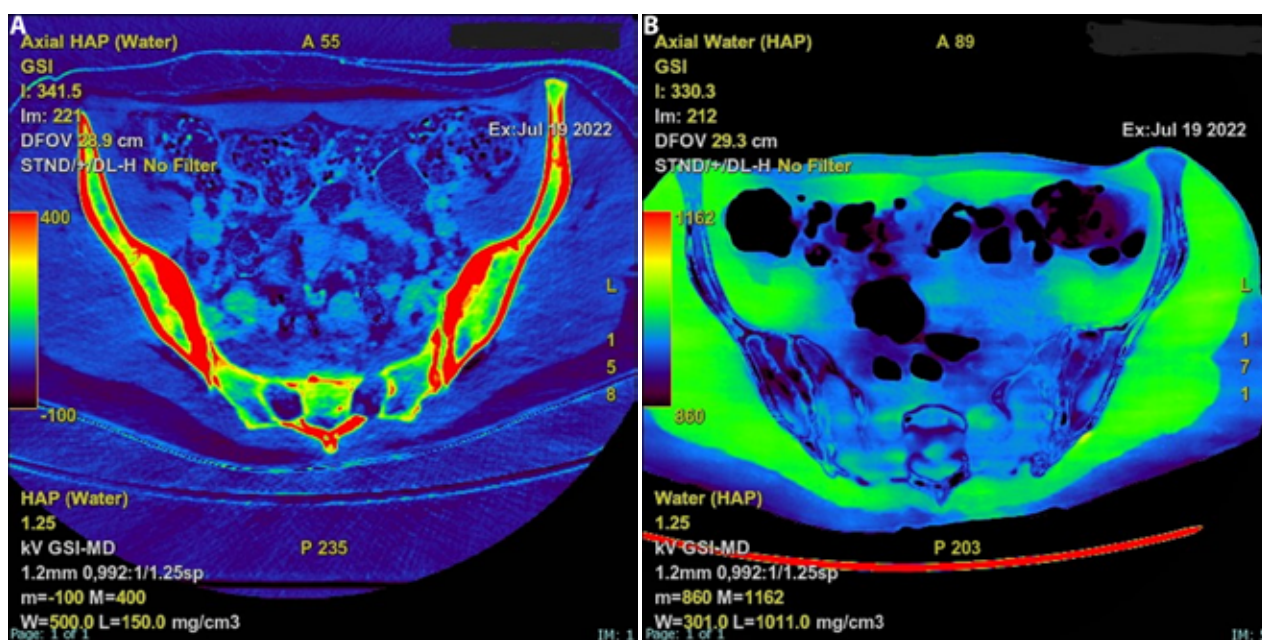


Figure 2. DECT analysis with virtual HAP images generated by subtracting water (A, on the left). This map shows only the HAP signal with suppression of the water signal. It is evident the high concentration of HAP in the sacroiliac joints (red color). DECT analysis with virtual water images generated by subtracting HAP (B, on the right). This map shows only the water signal with suppression of the HAP signal. It is evident the absence of bone marrow edema at sacroiliac joints.

X-ray of the hip showed significant sclerosis at the iliac border of sacroiliac joints (Figure 3).

MRI was performed a few days later that confirmed the absence of bone marrow edema and therefore the diagnosis of OCI (Figure 4).

The patient was treated with NSAIDs and physical therapy was recommended. She had a significant improvement in her symptoms in three months.

Discussion

OCI is a rare etiology of chronic low back pain which has an incidence rate of 0.9%–2.5% (8,9).

Despite some exceptional cases, OCI is generally not associated with elevated inflammatory markers (6).

The pathophysiology of OCI is not clearly understood. The mechanical stress in the sacroiliac joints has been proposed as a potential mechanism (8).

Histopathology of the sclerosed bone showed increased lamellar bone in biopsies of the affected region. (10)

Etiologies involving sacroiliac joints (SIJs) needs to be considered in differential diagnosis (10)

in particular in patients that present low back pain, excluding sacroiliitis in patients with axial spondylarthritis (ASA) (11).

Classic radiographic findings of OCI include sclerosis arising along the subcortical articular surface of the iliac bone extending into the adjacent medullary space, a pattern that classically appears as a triangular area of sclerosis with apex cephalad (11). The findings are most commonly symmetric (8).

Distinct radiological features of OCI include the absence of erosions, ankylosis, effusion, bone marrow edema, or surrounding soft tissue edema and joint space narrowing in the sacroiliac joints on plain radiographs. (6, 13)

CT scan demonstrates the same findings as radiographs but to greater advantage and detail (6).

Evaluation of OCI with the use of MRI was first introduced in 1994 (14). On MRI, regions of sclerosis in the iliac region of subchondral sclerosis are localized typically on the anterior part of the joint, mainly on the iliac side (14). They appear as low signal intensity on both T1 and T2 weighted imaging. Bone marrow edema has not typically been described in association with this process (11). On MRI, no periosteal reaction

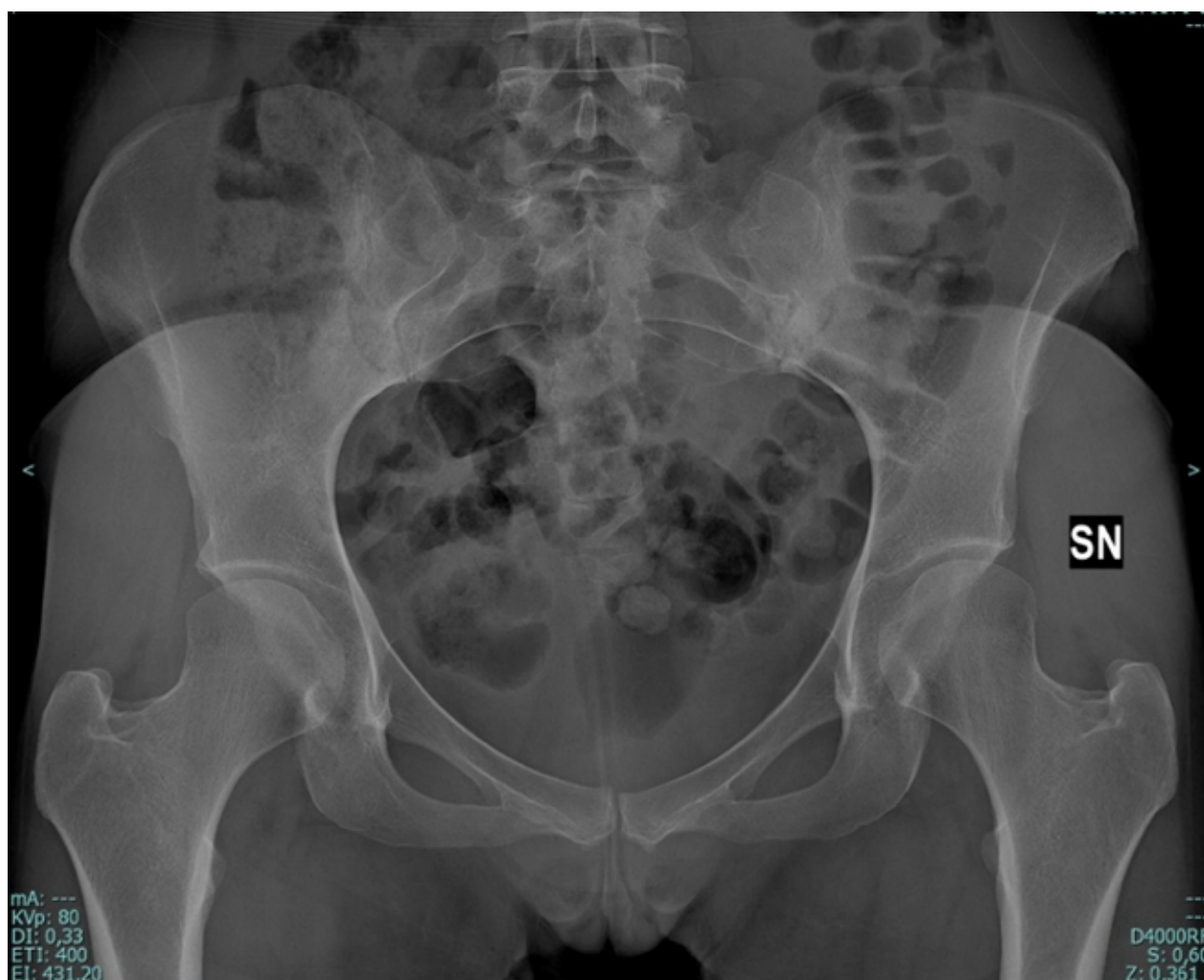


Figure 3. Pelvic X-rays shows bone sclerosis of bilateral subcortical articular surface of the iliac bone.

and no localized soft tissue abnormality are visible in OCI. (8)

Recently, the technological innovation of fast KV-switching dual-energy CT (DECT) has enabled the detection and characterization of bone marrow abnormalities (15). Depending on different photoelectric effect and Compton scattering of materials at two X-ray energy levels, DECT allows for material discrimination and attenuation measurement (16,17). DECT has the unique ability to differentiate a variety of material types based on differential X-ray attenuation at different photon energies.

Recent studies have reported that the use of DECT with the virtual non-calcium technique can

produce high sensitivity and specificity in the detection of bone marrow edema in virtual and quantitative analyses (16,18).

Dual-energy computed tomography (DECT) allows to evaluate virtual hydroxyapatite (HAP) images (the main component of bone mineral) subtracting water and virtual water images subtracting HAP (15). Detected abnormal edema on virtual water images was revealed by subtracting HAP signal from trabecular bone. In our case, no bone edema was detected at sacrum iliac joints

At the moment, there are no papers in literature about the use of DECT in OCI diagnosis. However, its use has a promising role in replacing MRI evaluation,

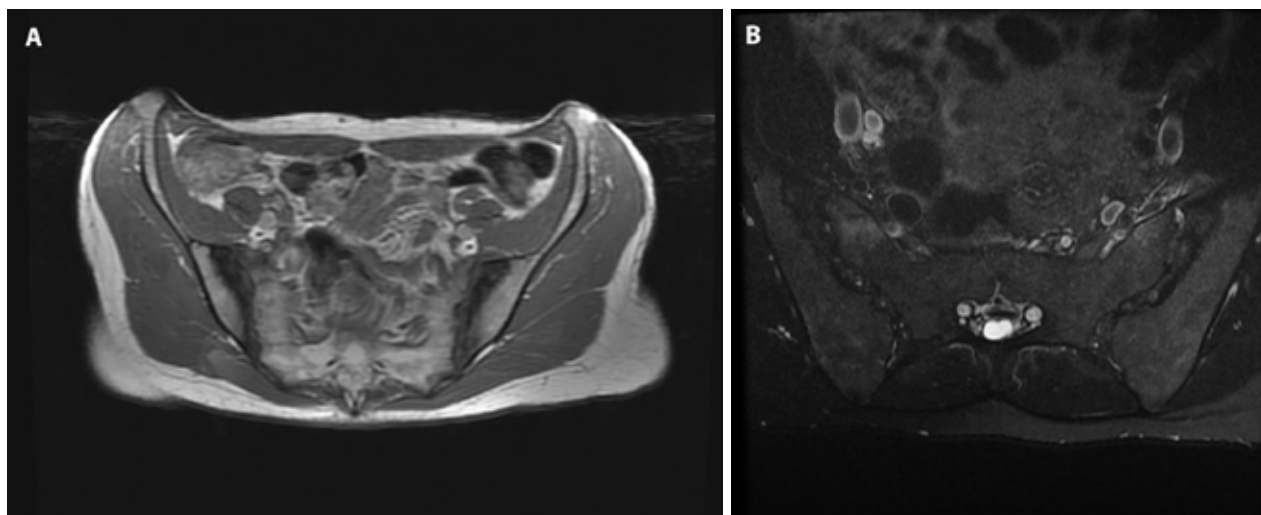


Figure 4. MR T1w imaging of the pelvis (A, on the left) shows low signal intensity of the iliac bone in the region of the sacroiliac joint, typical of bone sclerosis. MR STIR imaging of the pelvis (B, on the right) show the absence of area of hyperintensity at the iliac bones, that indicates the absence of bone marrow edema.

especially in subjects with pacemakers and in subjects who have absolute contraindications to perform MRI. In addition, waiting times and public health costs may be significantly reduced.

Finally, the diagnosis of OCI is based on the careful recognition of the distinctive radiographic findings, and it is considered a diagnosis of exclusion due to the absence of any specific signs, symptoms, or laboratory findings. (12)

In general, laboratory tests are often unremarkable, with normal antibody titers or inflammatory markers, such as sedimentation rate, C-reactive protein (6). HLA-B27 antigen is absent in the majority of patients (19).

A previous study compared the radiographic features of patients with ankylosing spondylitis and OCI and reported that in OCI patients, the sacroiliac joint space width is normal with unchanged articular surfaces (20).

Although OCI has been associated with chronic lower back pain and sclerotic lesions on radiographs, it is characterized by a favorable prognosis and regression of the symptoms in the majority of patients (21).

Management involves physical therapy and the use of non-steroidal anti-inflammatory drugs and muscle relaxants as needed. (22).

Conclusion

OCI is a benign radiological condition characterized by iliac sclerosis of the sacroiliac joints.

The radiological diagnosis is fundamental in the differential diagnosis with other pathologies, such as sacroiliitis and spondyloarthritis, in order to carry out a targeted therapy.

The use of DECT in the diagnosis of this pathology is promising, as it could replace MRI in the diagnosis, reducing the time and costs for public health.

Ethics Approval and Consent to Participate: Written consent was obtained from the patient to publish the case report.

Consent to Participate and for Publication: Written informed consent for publication was obtained from the patient.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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