CASE STUDIES IN DIAGNOSTIC IMAGING Series Editor: V N Cassar-Pullicino*

Sacroiliac joint sepsis

P G White, A M Cooper

University Hospital of
Wales, Cardiff, United
Kingdom

Department of
Radiology
P G White

Department of
Rheumatology
A M Cooper

Correspondence to:
Dr A M Cooper,
Department of
Rheumatology, Heath Park,
Cardiff CF4 4XW, United
Kingdom.

*Department of Diagnostic
Imaging, The Robert Jones
and Agnes Hunt Orthopaedic
Hospital, Oswestry,
Shropshire SY10 7AG,
United Kingdom.

Clinical history

A thirty eight year old woman was admitted with a two month history of right sciatica unresponsive to analgesia and bed rest. Examination revealed reduced straight leg raising on the right, reduced range of movement of the lumbar spine but no specific tenderness or neurological deficit. Plain radiographs of the lumbar spine and sacroiliac joints (SIJs) were normal, as was magnetic resonance imaging (MRI) of the lumbar spine. Her condition improved after a course of traction but two months later she was readmitted with intractable right sacroiliac pain, weight loss, night sweats and rigors. On examination she was pale and apyrexial with no lymphadenopathy.

There was loss of lumbar lordosis, paraspinal muscle spasm and generalised tenderness of the lumbosacral spine; there was no neurological deficit. Haematological investigations revealed a normochromic normocytic anaemia with a normal white cell count, but the erythrocyte sedimentation rate (ESR) was elevated to 95 mm/hour.

Radiological findings

Further imaging consisted of plain radiographs of the lumbosacral spine and SIJs, a technetium 99 m MDP bone scan and computed tomography (CT) of the SIJs. There was loss of disc height at the L5-S1 level with erosion of the anterior part of the inferior end plate of the L5 vertebra (fig 1). There was widening of the right SIJ with ill defined margins (fig 2). A delayed static image from the bone scan with a quantitative profile for the SIJs, revealed increased uptake at the right SIJ, normal activity on the left, and mildly increased activity at the L5-S1 level (fig 3). The CT scan (fig 4) showed widening of the right SIJ with erosion of the osseous margins and subchondral sclerosis, more marked on the sacral side. A normal left SIJ was demonstrated.

Differential diagnosis

The table lists the commonest causes of sacroiliitis. In Reiter's syndrome, gout, psoriasis and rheumatoid disease, bilateral symmetrical or asymmetrical change is more frequent than unilateral sacroiliac disease. Osseous erosion with variable subchondral sclerosis occurs in association with Reiter's syndrome and psoriatic arthritis; bony ankylosis occurs less frequently than in ankylosing spondylitis. In osteoarthritis the joint space is narrowed with adjacent sclerosis and osteophytosis, but no erosive change. In hemiplegic patients unilateral sacroiliac disease occurs on the paralysed side and can affect the contralateral SIJ in osteoarthritis of the hip. Sacroiliac involvement in chronic tophaceous

Figure 1 Lateral radiograph of the lumbosacral spine showing loss of disc height at the L5-S1 level and erosion of the anterior part of the inferior end plate of L5 (arrowed).

List of the common causes of unilateral and bilateral sacroiliac joint erosions. ++ = common; + = less frequent. (S) = symmetrical, (A) = asymmetrical

Common causes of sacroiliitis	Unilateral	Bilateral
Ankylosing spondylitis	—	++ (S)
Inflammatory bowel disease	—	++ (S)
Infection	++	—
Psoriasis	+	++ (A)
Reiter's syndrome	+	++ (A)
Gout	+	++ (A)
Rheumatoid arthritis	+	++ (A)
Osteoarthritis	+	++ (A)

Figure 2 Anteroposterior radiograph of the lumbosacral spine showing blurring of the margins of the right sacroiliac joint and widening of the joint (arrowed).

Figure 4 Axial CT image of the sacroiliac joints showing erosions of the osseous margins with subchondral sclerosis on the right (arrowed) and a normal left sacroiliac joint.

Figure 3 Posterior view bone scan of the pelvis with sacroiliac quantitative profile, showing increased uptake at the right sacroiliac joint, normal activity at the left, and mildly increased uptake at the L5-S1 level.

gout is not common, but large well defined erosions with surrounding sclerosis may be seen. Radiographic examination of the hands, feet and spine may reveal characteristic involvement of other joints.

The radiographic and CT findings, with unilateral loss of definition of the subchondral bone and widening of the joint space, are strongly suggestive of infective sacroiliitis in our patient. Aspiration of the right sacroiliac joint under fluoroscopic or CT guidance would be helpful to confirm infection and allow isolation of the organism.

Loss of disc height at L5-S1 and increased scintigraphic activity at this level may be due to degenerative disc disease, infective discitis or rheumatoid arthritis. End plate erosions are strongly suggestive of infection and further evaluation of the L5-S1 disc with MRI is indicated.

Follow up and final diagnosis

Soon after readmission the patient developed evidence of compression of the right S1 nerve root, with sciatica and a reduced ankle jerk. MRI with axial T1 weighted images showed a mass in the anterior epidural space at the L5 and S1 levels, consistent with an epidural abscess (fig 5). T1 weighted images also

Figure 5 Axial T1 weighted MRI of the sacrum showing anterior epidural abscess (arrowed), right sided sacroiliitis and inhomogenous signal from the vertebral marrow.

Figure 6 Coronal proton density MRI of the sacrum showing right sided sacroiliitis with marrow oedema in the sacrum (arrow).

showed reduced signal intensity of the vertebral marrow, indicating sclerosis or oedema, and swelling of the prevertebral soft tissues. Coronal proton density images clearly demonstrated the extent of sacroiliac infection (fig 6). Sagittal T1 weighted images showed the appearances of discitis at the L5-S1 level with destruction of the margins between the disc and the adjacent end plates; T2 weighted images showed increased signal intensity from the same areas. Following neurosurgical referral laminectomy and L5-S1 discectomy was performed. Infected granulation tissue was removed from the epidural space and staphylococcus aureus was subsequently isolated from this material. After a six week

Figure 7 Lateral radiograph of the lumbosacral spine showing complete loss of disc height at the L5-S1 level and end plate destruction (arrowed).

course of intravenous antibiotics the patient made a full recovery. Radiographs of the lumbosacral spine and pelvis taken six months later showed destruction of the L5-S1 vertebral end plates with complete loss of disc height (fig 7) and sclerosis of the right SIJ (fig 8). The final diagnosis was infective right sacroiliitis and chronic epidural abscess with discitis.

Discussion

Spinal and sacroiliac infections most commonly result from haematogenous spread, usually by the arterial route. Batson's vertebral venous plexus is less important in the spread of infection than was previously thought.² In this patient infection may have been started either at the sacroiliac joint or the L5-S1 disc. The arrangement of the microcirculation in both the subchondral bone of the ilium¹ and the vertebral end plates³ predisposes to slow blood flow, making these areas prone to haematogeneous infection.

The clinical presentation of both spinal infection and infective sacroiliitis is non-specific. In vertebral osteomyelitis neurological examination is usually normal at the time of presentation, and the delay in diagnosis average three months for pyogenic infections and two years for tuberculosis.⁴ Epidural abscess may present acutely or, as in this case, as a chronic infection secondary to discitis. In both types of presentation laminectomy is indicated,³ but in chronic infection granulation tissue is usually found rather than frank pus.² The ESR is elevated in 73% of cases³ but only 35% of patients have a raised white cell count.

Radiological evaluation

This has an important role in the diagnosis of both spinal and sacroiliac infections. A range of imaging modalities is available.

A) PLAIN RADIOGRAPHS

In discitis plain film changes may be seen after one to three weeks,¹ with loss of definition of the end plates and reduction in disc height, followed by areas of destruction in the adjacent vertebral body. In infective sacroiliitis the first plain film changes develop after two to three weeks. Erosions usually start on the iliac side of the joint, probably due to the greater thickness of the cartilage over the sacral joint surface.⁵ Soft tissue swelling with or without abscess formation is more easily discernible in the spine than in the SIJ. In this patient the erosive changes were more marked on the sacral side, suggesting that infection may have involved the joint by direct extension from a focus in the sacrum.

B) RADIOISOTOPE BONE SCANNING

This is a more sensitive indicator of both spinal and sacroiliac infections than plain radiography with increased uptake early in the course of the disease;¹ specificity of this technique is improved by three-phase scanning.⁶ Sensi-

Figure 8 Anteroposterior radiograph of the pelvis showing sclerosis of right sacroiliac joint and lumbosacral junction (both arrowed).

tivities of 92% with specificity of 100% have been obtained in the detection of vertebral osteomyelitis using combined gallium and bone scan studies.⁷

C) COMPUTED TOMOGRAPHY

CT is well suited for imaging the SIJs,⁸ but an understanding of the anatomy is important (fig 9) as the appearance of the postero-superior ligamentous part of the joint can mimic the changes of inflammatory sacroiliitis. CT is also useful in spinal infection, giving a good assessment of the extent of bony involvement and showing extension into the spinal canal³ and para-vertebral tissues especially along the psoas outlines.

D) MAGNETIC RESONANCE IMAGING

MRI is now the technique of choice in spinal infection. Modic *et al*⁷ found a sensitivity of

Figure 9 The normal anatomy of the sacroiliac joint.

96% and specificity of 92% for the detection of vertebral osteomyelitis. MRI allows direct visualisation of the epidural space, theca, nerve roots and spinal cord. Epidural infection is more readily detected on T1 than T2 weighted images as on T2 the signal intensity of an epidural abscess is similar to that of CSF. On contrast enhanced T1 weighted images homogenous enhancement suggests the presence of infected granulomatous tissue whereas peripheral enhancement indicates a liquefied necrotic abscess.⁹ Overall, MRI is also superior to CT in the evaluation of sacroiliitis,¹⁰ particularly for the assessment of sacroiliac cartilage and erosive change. Osteophyte formation, bony ankylosis and subchondral sclerosis are best imaged by CT.

E) INTERVENTIONAL TECHNIQUES

In both discitis and infective sacroiliitis aspiration or needle biopsy under fluoroscopic or CT guidance may facilitate identification of the infecting organism. One study revealed that a positive culture result was obtained in 50% of infective vertebral lesions following needle biopsy,¹¹ previous antibiotic therapy being a frequent cause of negative results. The most frequent pyogenic organism isolated in spinal and sacroiliac infections is *Staphylococcus aureus*, but gram-negative organisms are becoming more frequent in drug abusers^{3 12} and tuberculosis remains an important cause of infection at both sites.

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