
Septic Arthritis of a Lumbar Facet Joint: Detection with Bone SPECT Imaging

Lawrence C. Swayne, Steven Dorsky, Vincent Caruana, and Isaac L. Kaplan

Departments of Radiology and Surgery, Morristown Memorial Hospital, Morristown, New Jersey

We present a rare case of septic arthritis of a lumbar facet joint with an associated epidural abscess resulting from *Staphylococcus aureus*. The infection was initially detected with planar bone scintigraphy and precisely localized with single photon emission computed tomography bone scintigraphy, despite an initially negative radiologic evaluation that included radiographs of the lumbar spine, lumbar myelography, and a postmyelography x-ray computed tomography scan. In the appropriate clinical setting, a bone scan demonstrating unilateral increased activity within the spine should raise the suspicion of inflammatory involvement of the posterior elements.

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Infectious spondylitis is an uncommon disease, accounting for only 2–4% of all cases of osteomyelitis (1). Common causative organisms include: *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Streptococcus* group B, *Salmonella*, *Escherichia coli*, and tuberculosis (1). The clinical course of the disease has recently become more indolent (2) and the characteristic radiographic finding of an irregularly narrowed disk space may be delayed for several weeks (3,4).

Septic arthritis of the posterior apophyseal joints is extremely rare. A literature search from 1966 to the present revealed only one previous case report (5). Heberling's extensive review of 201 patients with septic arthritis involving 221 joints failed to include a single case effecting a posterior apophyseal joint (6).

The value of planar bone scintigraphy in the early identification of pyogenic osteomyelitis and arthritis is well known; however, planar images of the spine cannot adequately distinguish in many instances between activity in the posterior elements and the overlying vertebral body. With the advent of single photon emission computed tomography (SPECT), this differentiation can easily be accomplished (7). We present a rare case of septic arthritis of a lumbar facet joint that was initially detected with SPECT bone scintigraphy.

CASE REPORT

A 65-yr-old white male was admitted to the hospital with a 6-mo history of chronic progressive right-sided paravertebral pain. Four days prior to admission, he developed a fever (38.7°C) and severe exacerbation of his pain with radiation into the right buttock and proximal thigh. He denied any history of radicular pain below the knees, numbness, paresthesias, or bowel or bladder dysfunction. The patient had been treated for 1 yr prior to admission with steroids for polymyalgia rheumatica. Physical examination revealed tenderness to palpation over the right paralumbar region. There was no evidence of positive nerve root tension signs in either the sciatic or femoral nerves and the sensory examination in the same distribution was normal to pinprick.

Initial diagnostic laboratory data, revealed an erythrocyte sedimentation rate of 46 mm/hr, hemoglobin of 13.8 g/dl, hematocrit of 40.9%, and white blood cell count of 7400/mm³ with nine bands. Blood and urine cultures were normal. A lumbar puncture was performed and revealed 52 red blood cells/mm³, 123 white blood cells/mm³, 75% polymorphonuclear cells, 21% lymphocytes, 4% monocytes, a normal glucose of 84 mg/dl, and an elevated protein of 123 mg/dl; however, a repeat spinal tap, performed 1 wk later was within normal limits.

Radiographs of the lumbar spine, a lumbar myelogram, and a postmyelography x-ray computed tomography (CT) scan of the lumbar spine were normal. Planar bone scintigraphy (20 mCi of technetium-99m hydroxydiphosphonate (HDP) on the third day after admission demonstrated increased activity on the right at the L₃ level (Fig. 1). A SPECT study of the lumbar spine (performed with a rotating gamma camera and dedicated computer) specifically localized the focus of increased activity to the posterior elements in the region of the right L2-3 apophyseal joint (Fig. 2). A repeat

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For reprints contact: Lawrence C. Swayne, MD, Dept. of Radiology, Morristown Memorial Hospital, 100 Madison Ave., Morristown, NJ 07960.

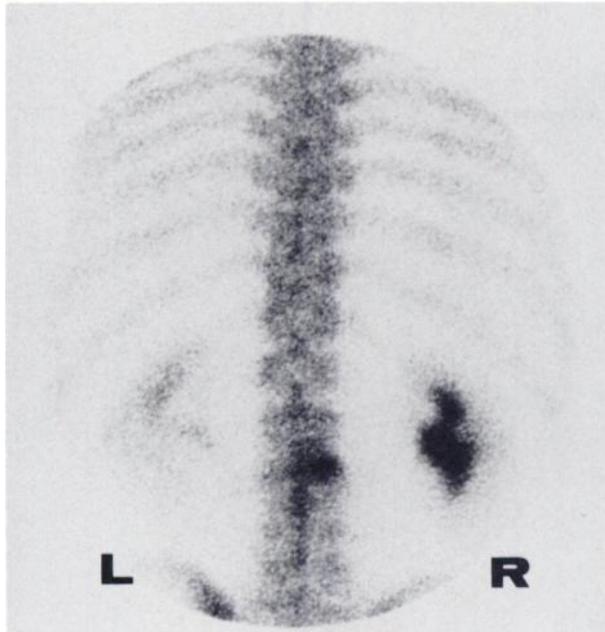


FIGURE 1
A posterior view from a [^{99m}Tc]HDP bone scan demonstrates a focus of increased activity on the right side of the lumbar spine at the L3 level.

thin-section CT scan was performed from the top of L2 to the bottom of L3 and demonstrated destructive osteocartilaginous changes at the right L2-L3 apophyseal joint with slight bulging of the adjacent ligamentum flavum (Fig. 3).

The patient's fever spontaneously defervesced without antibiotic treatment, and he became asymptomatic. Nevertheless, an open surgical biopsy and local debridement was performed because of concern regarding possible epidural abscess formation. At surgery there was edema of the paralumbar musculature and destruction of the cartilage and underlying subchondral bone. The infection had also extended medially into the epidural space and was adherent to the ligamentum flavum and underlying dura. Aspiration and culture of the purulent joint fluid subsequently yielded positive cultures of *Staphylococcus aureus*. The patient was placed on a regimen of bed rest and antibiotics and recovered uneventfully.

DISCUSSION

The majority of pyogenic infections of the spine occur through hematogenous seeding of the highly vascularized subchondral vertebral end plates, with frequent progression to involve the adjacent intervertebral disk space as well (1,3). Direct spread to the paravertebral soft tissues occurs in 20% of cases (1). The posterior elements may also become involved from either hematogenous spread (3) or by direct extension from an anterior osteomyelitis (1,2). Nevertheless, isolated pyogenic arthritis of a lumbar facet joint is an extremely rare phenomenon, with only one previous case reported in the literature (5). Since there are many

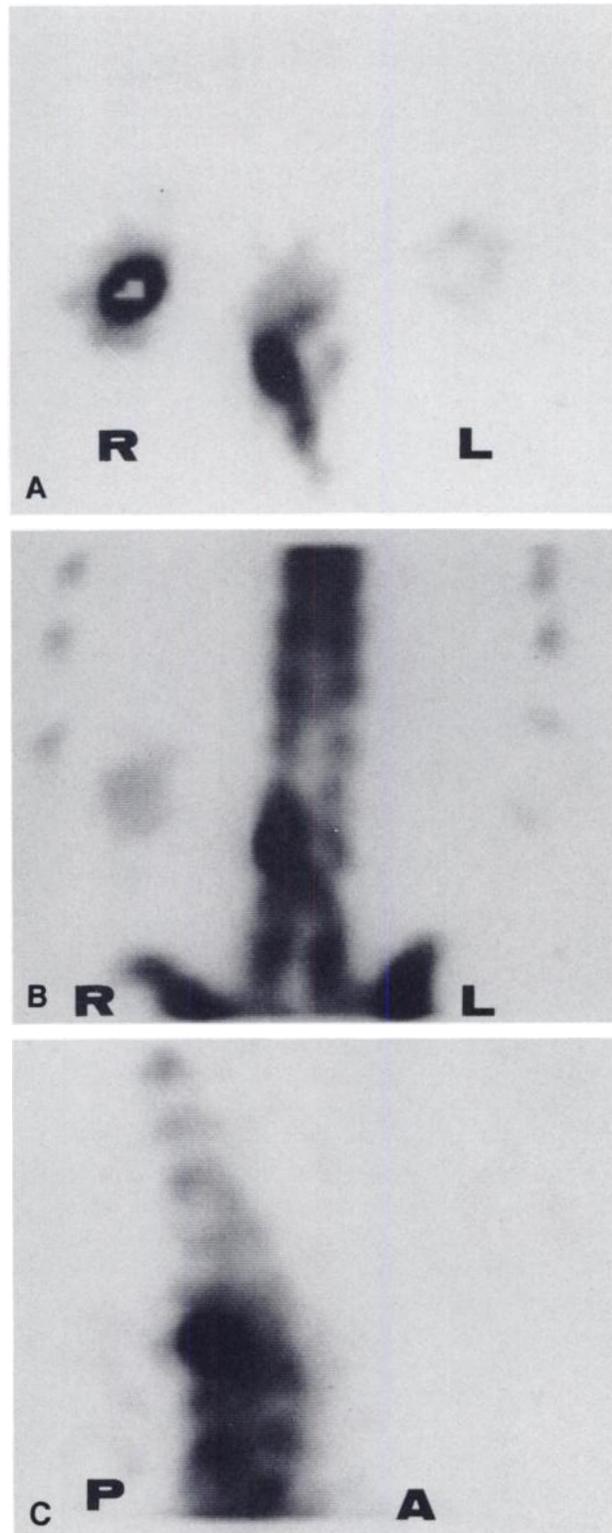


FIGURE 2
Transverse (A), coronal (B), and right parasagittal (C), images from a bone SPECT study localizes the increased activity to the right L2-3 facet joint. Pixel overflow is incidentally identified in the dilated right renal collecting system.

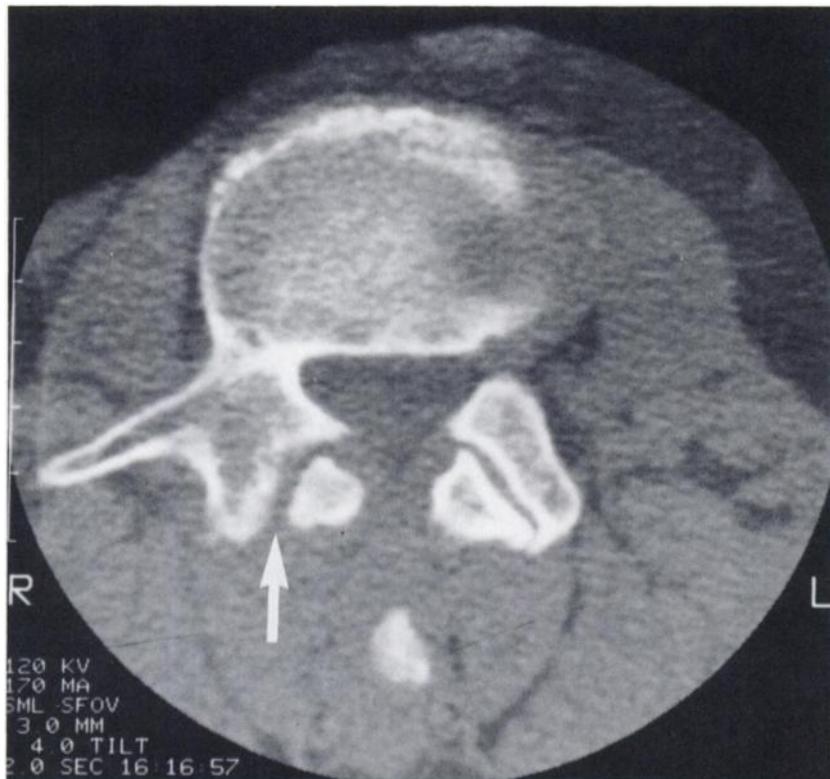


FIGURE 3

Thin-section CT scan at the level of the right L2-3 facet joint (arrow) demonstrates irregularity of the subchondral bone with bulging of the ligamentum flavum, indicating extension beyond the joint space.

facet joints within the spine, perhaps septic arthritis at this site is a self-limiting process, and thus other cases may have gone unrecognized. Early decompression of the joint may occur into either the adjacent soft tissues (5) or the extradural space. In this regard, it is interesting that both our patient and the previously reported patient followed a rather benign clinical course.

When infectious spondylitis is clinically suspected, conventional radiographs are frequently obtained; however, the characteristic erosive bone changes may not become evident for several weeks (3,4). Thin-section CT may detect subtle bone and cartilagenous changes earlier than conventional radiography, and has the additional advantage of demonstrating paravertebral, transdural, and disk space extension (3,4). Unfortunately, however, the characteristic inflammatory structural changes may not always be initially present following the septicemic phase (5). An additional potential disadvantage of CT is the requirement for exact clinical localization prior to the study, in order to ensure that the appropriate levels of the spine are imaged.

In our patient, SPECT bone scintigraphy localized the abnormality in a posterior lumbar facet joint. Bone SPECT may be the most sensitive imaging modality for the early detection of spondylitis (8). The technique is more sensitive than planar scintigraphy (7,10,11), and has the additional advantages of increased contrast resolution and three-dimensional localization (7). SPECT bone scintigraphy has previously been used to

investigate other spinal diseases, including, pyogenic discitis (9), ankylosing spondylitis (10), painful spondylolysis (7), and painful pseudoarthrosis following lumbar fusion (10). Our case illustrates the additional application of SPECT for precisely defining the osseous extent of involvement in patients with suspected inflammatory disease of the spine.

REFERENCES

1. Hermann G, Mendelson DS, Cohen BA, Train JS. Role of computed tomography in the diagnosis of infectious spondylitis. *J Comput Assist Tomogr* 1983; 7:961-968.
2. Pollack N, Spinner M, Richman R. Hematogenous pyogenic spondylitis. *NY State J Med* 1964; 64:2870-2875.
3. Larde D, Mathieu D, Frijia J, Gaston A, Vasile N. Vertebral osteomyelitis: disk hypodensity on CT. *AJNR* 1982; 3:657-661.
4. Golimbu C, Firooznia H, Rafii M. CT of osteomyelitis of the spine. *Am J Roentgenol* 1984; 142:159-163.
5. Halpin DS, Gibson RD. Septic arthritis of a lumbar facet joint. *J Bone Joint Surg* 1987; 69-B:457-459.
6. Heberling JA. A review of two hundred and one cases of suppurative arthritis. *J Bone Joint Surg* 1941; 23:917-921.
7. Collier BD, Johnson RP, Carrera GF, et al. Painful spondylolysis or spondylolisthesis studied by radiography and single-photon emission computed tomography. *Radiology* 1985; 154:207-211.
8. Jacobsson H, Larsson SA, Vesterskold L, Lindvall N.

The application of single photon emission computed tomography to the diagnosis of ankylosing spondylitis of the spine. *Br J Radiol* 1984; 57:133-140.

9. Swanson D, Blecker I, Gahbauer H, Caride VJ. Diagnosis of discitis by SPECT technetium-99m MDP scintigram: a case report. *Clin Nucl Med* 1987; 12:210-211.
10. Slizofski WJ, Collier BD, Flatley TJ, Carrera GF, Hellman RS, Isitman AT. Painful pseudarthrosis following lumbar spinal fusion: detection by combined SPECT and planar bone scintigraphy. *Skeletal Radiol* 1987; 16:136-141.
11. Gates GF. SPECT imaging of the lumbosacral spine and pelvis. *Clin Nucl Med* 1988; 13:907-914.