

## Pyogenic vertebral osteomyelitis: a case report

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*A seventy-four year old man presented with a one-year history of low back pain and a long history of osteoarthritis of both hips. Four months prior to presentation, he developed septicemia following a biopsy for suspected prostatic carcinoma. He seemed to have recovered well from the septicemia, but radiographs of the lumbar spine strongly suggested vertebral osteomyelitis at the L4-5 level. Pyogenic vertebral osteomyelitis is an uncommon disease. It presents a diagnostic challenge due to the subtle clinical symptoms and a correct diagnosis is often delayed or missed. (JCCA 1989; 33(2): 67-70)*

**KEY WORDS:** Osteomyelitis, backache, chiropractic, manipulation.

*Un homme âgé de 74 ans présente depuis un an une dorsalgie dans la région lombaire de même que des antécédents très longs d'ostéoartrite des deux hanches. Quatre mois avant la consultation, il est tombé victime de septicémie à la suite d'une biopsie pratiquée en vue d'un cancer à la prostate. Il semble s'être bien rétabli de la septicémie, mais les radiographies de l'épine dorsale dans la région lombaire indiquent fortement une ostéomyélite vertébrale aux L4-5. L'ostéomyélite vertébrale pyogénique est une maladie fort peu commune. Elle présente un défi diagnostique de taille en raison des signes cliniques subtils de sorte qu'un diagnostic précis est souvent retardé on n'est simplement pas posé. (JCCA 1989; 33(2): 67-70)*

**MOTS CLEFS:** ostéomyélite, dorsalgie, chiropraxie, manipulation.

### Introduction

Osteomyelitis is defined as an infection of bacterial, fungal, or viral origin that invades and destroys bone.<sup>1</sup> It can occur at any age but most commonly occurs in children, and in adults in their sixth and seventh decades. In the young, the metaphysis of long bones is the most common location. In adults, it most often involves the spine. *Staphylococcus aureus* is the most common pathogenic organism. The pathogen reaches the bone via the circulatory system, directly from an adjacent infection, or secondary to trauma or surgical intervention.

Pyogenic vertebral osteomyelitis is an uncommon disease with an incidence between two to four percent of all patients with pyogenic osteomyelitis.<sup>2,3,4</sup> The disease is most often seen in adults over fifty years of age and has no sex preference. Diagnosis is often delayed or missed due to a clinical picture that lacks the common symptoms and signs of infection such as fever

and an elevated sedimentation rate.<sup>5</sup> In chronic pyogenic vertebral osteomyelitis, the only presenting complaint may be back pain with symptoms that appear to be mechanical in origin. The following case illustrates these points.

### Case presentation

A.H. is a seventy-four-year-old man with a long history of osteoarthritis in both hips. Approximately one year prior to presentation, he developed low-back pain after falling into a bathtub. Eight months later, he developed septicemia following a biopsy for suspected prostatic carcinoma. Bacteriological cultures isolated *Escherichia coli* which was found to be resistant to Keflex.

Physical examination revealed the patient to have significant difficulty in movement with a marked thoracolumbar kyphosis. Most of the pain was over the lumbosacral region on the right. There was no neurological deficit in the lower limbs. Examination of the hips revealed the characteristic picture of advanced osteoarthritis. There was a forty degree flexion contracture of both hips which were held in external rotation. There was virtually no rotation, abduction, or adduction bilaterally.

Radiographs taken of the lumbar spine demonstrated a lumbosacral transitional segment with advanced degenerative changes at all levels. The end-plates at the L4-5 level were

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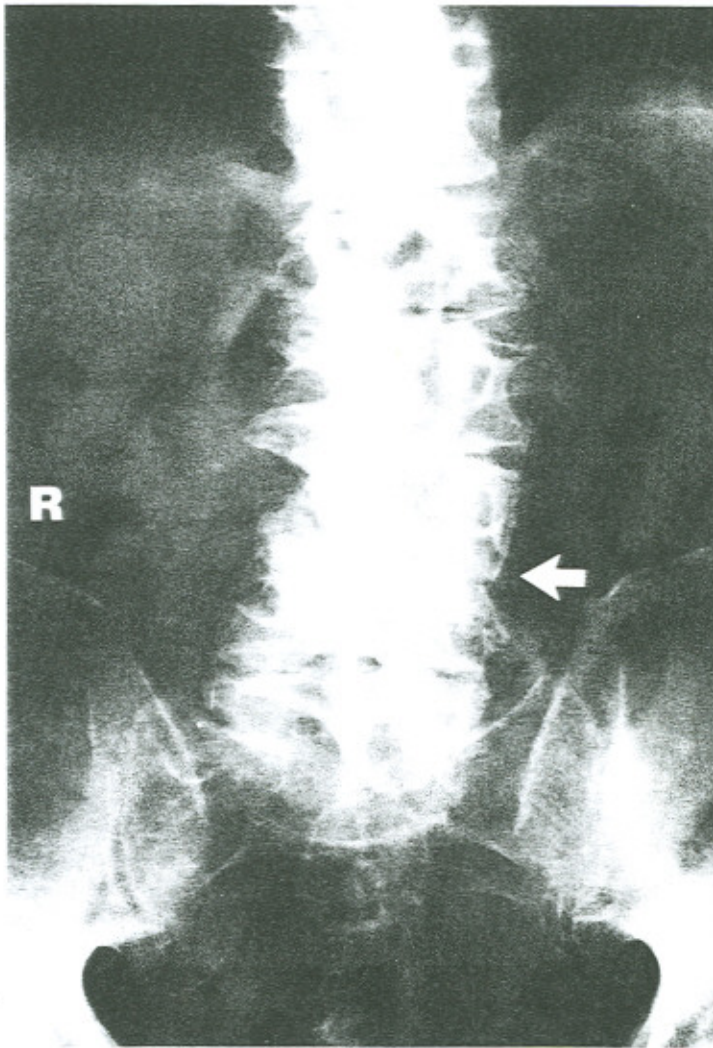
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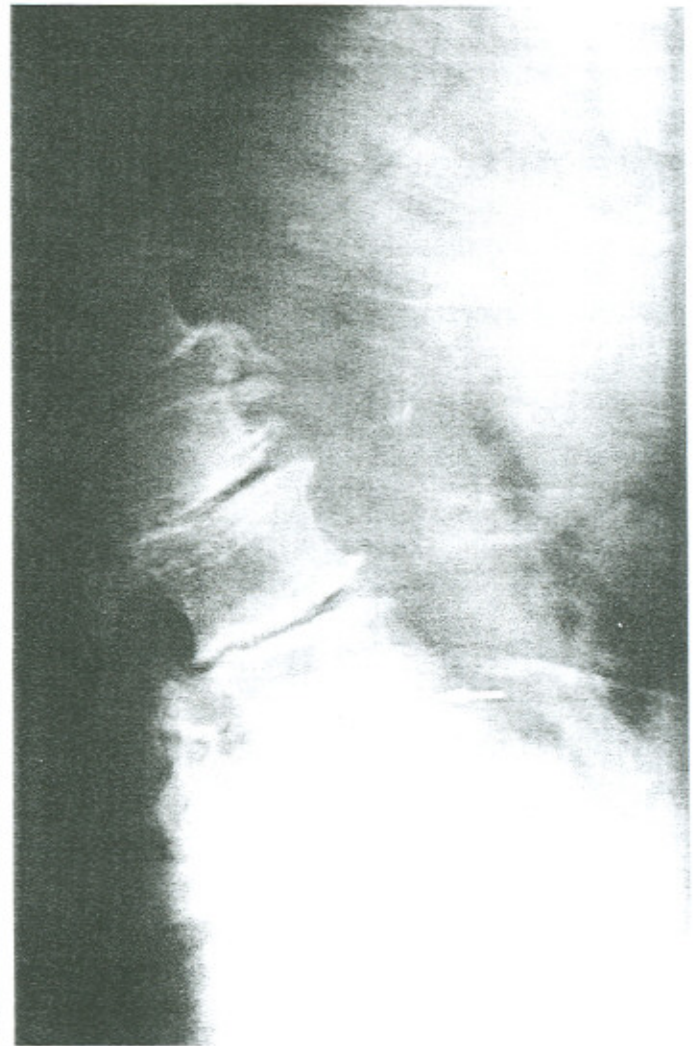
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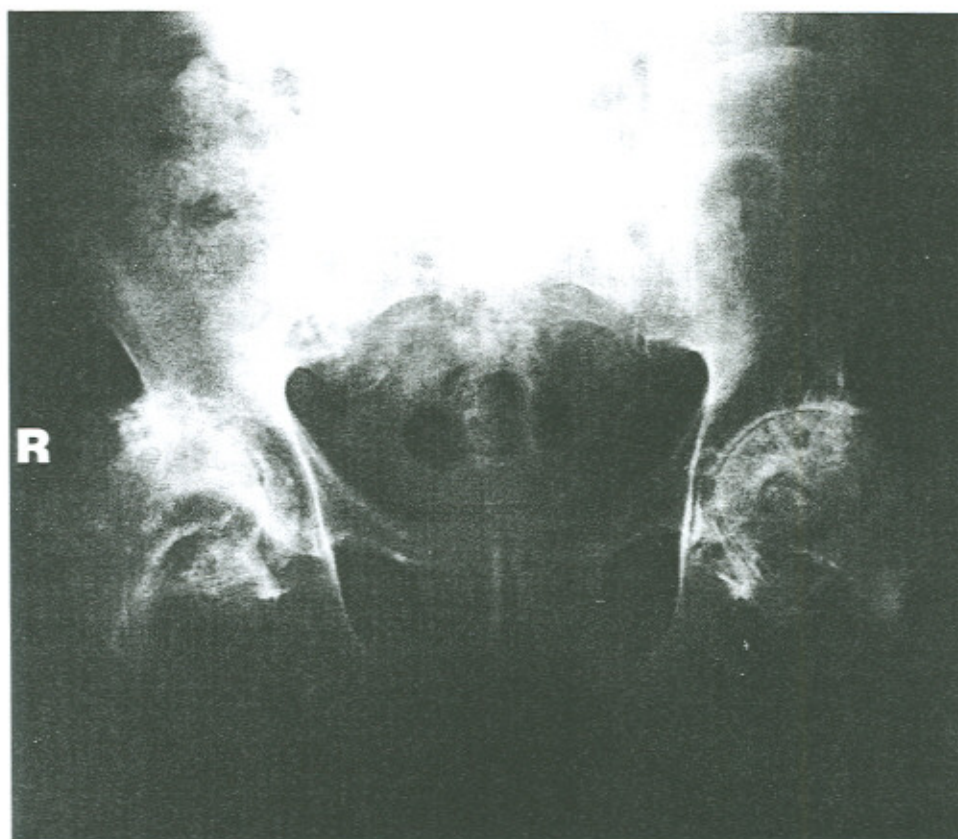


**Figure 1** An anteroposterior radiograph of the lumbar spine. There is a left lumbar scoliosis with the apex at L3 and partial lumbarization of the first sacral segment. Marked degenerative changes are present throughout the lumbar spine. The intervertebral end-plates at the L4-5 level are very irregular (arrow).



**Figure 2** A lateral radiograph of the lumbar spine. There is complete loss of lordosis in the lumbar spine. Osteophytic formation is present at the anterior aspect of the lumbar vertebral bodies. Intervertebral disc height is diminished at all levels. There is obliteration of the vertebral end-plate at the L4-5 level (arrow).





**Figure 3** An anteroposterior radiograph of the pelvis. There is uneven joint space narrowing of the hips bilaterally. Subchondral cysts are present in the left femoral head and there is superolateral migration of the right femoral head.

partially obliterated and irregular (figures 1 and 2). A radiograph of the pelvis showed advanced osteoarthrotic changes of both hips (figure 3).

A.H.'s clinical picture and radiographs strongly suggested vertebral osteomyelitis. He was referred to an orthopaedic surgeon and a plan of management was outlined to him. This consisted of a needle biopsy to identify the organism, followed by at least three weeks of intravenous antibiotics and a further minimum of twelve weeks on oral antibiotics. A.H. refused this form of management and opted for a blood culture for identification of the organism and a course of oral antibiotics. The blood culture grew *Escherichia coli* that was sensitive to Ampicillin. He was placed on Ampicillin, 250 m.g. four times a day for three months.

He did not return for his follow-up appointment three months after the initial visit.

## Discussion

Pyogenic vertebral osteomyelitis in adults is usually the result of hematogenous spread of a pathogen from a primary focus of infection elsewhere in the body. Any disease that involves bacteremia, especially genito-urinary tract infections, prostatitis, and respiratory tract infections can lead to hematogenous

pyogenic vertebral osteomyelitis.<sup>1</sup> Prolonged intravenous therapy, catheterization, instrumentation, surgery involving the genito-urinary tract, immunosuppression, and diabetes mellitus are known risk factors.<sup>6,7</sup> *Salmonella* is often the responsible pathogen in patients with associated sickle-cell anemia.<sup>1,4,8</sup> *Pseudomonas aeruginosa* is found to be associated with heroin addicts.<sup>1,8</sup>

The lumbar and lower thoracic spine are the most commonly affected areas.<sup>2,4</sup> The spread of the pathogen is thought to be through the Batson's plexus of veins which drain the vertebral bodies and the pelvis.<sup>9</sup> A retrograde hematogenous spread of organisms from the pelvis via Batson's plexus to the spine accounts for the frequent association of genito-urinary tract infections and vertebral osteomyelitis.<sup>4</sup> Wiley and Trueta disagree with this theory and suggest an arterial spread through the vertebral branches of the posterior spinal arteries.<sup>10</sup>

Regardless of the mechanism of spread, the pathogen tends to lodge in the capillary beds adjacent to the subchondral plate of the vertebral body.<sup>9</sup> The infection usually starts in the antero-superior corner of the vertebral body close to the anterior longitudinal ligament.<sup>11</sup> The infective process extends through the vertebral end-plate and up to the inferior end-plate of the vertebra above through vascular anastomoses. This results in



the activation of the host's defense mechanism causing an inflammatory response with local concentration of leukocytes and osteoclasts.<sup>1</sup> The osteoclastic activity causes a focal osteolysis and weakening of the vertebral end-plate resulting in disintegration. Radiographically, this is seen as an irregularity of the vertebral end-plates. Intense new bone formation occurs as a reparative process and may result in a spontaneous fusion of adjacent vertebrae, marking the end of the disease process. Bony fusion occurs in more than eighty percent of cases.<sup>4</sup>

Back pain is the most consistent symptom. Radiation of pain into the extremities, fever, and weight loss may be present. Pediatric patients usually present with all of the above symptoms, making the diagnosis relatively easy. In adults, the clinical picture is less clear. Less than fifty percent of adults with vertebral osteomyelitis present acutely.<sup>2,4,12</sup> The intensity of back pain varies from mild to severe. The onset is usually gradual and the course is slow. There is pain at rest which is aggravated by movement. Analgesics and bed-rest give little relief. Physical examination shows a loss of spinal range of motion with paravertebral muscle spasm. Usually there is tenderness overlying the spine at the level of infection. A low grade fever may be detected. Lesions in the cervical spine may cause radiation of pain to the occiput, shoulders, or arms; thoracic lesions to the chest, abdomen, or inguinal area, and lumbar lesions to the hips and legs.<sup>13</sup>

Laboratory examination usually shows an elevated erythrocyte sedimentation rate and a normal or slightly elevated leukocyte count.<sup>4</sup> Blood cultures in acute cases are usually positive, while they tend to be negative in subacute and chronic cases. Percutaneous needle biopsy of the infected vertebral body is the best diagnostic tool. The specimen harvested is gram-stained, cultured and identified for appropriate antibiotic therapy to be administered. Biochemical tests for calcium, phosphate and alkaline phosphatase should be ordered to rule out metabolic and neoplastic bone diseases according to Waldvogel.<sup>8</sup>

The earliest radiographic changes, occurring between two to twelve weeks after onset of symptoms, are narrowing of the disc space, paravertebral soft tissue swelling, and superficial destruction of the end-plates of adjacent vertebral bodies.<sup>5,14</sup> A bone scan is useful to localize the infection and to rule out metastatic disease.

Once the clinical, radiographical, and bacteriological diagnosis of pyogenic vertebral osteomyelitis is established, specific antibiotic therapy combined with rest and immobilization are prescribed as treatment.<sup>4</sup> Surgical debridement may be necessary, especially in cases with adjacent soft tissue abscesses.<sup>4</sup> The prognosis is good with treatment. However, in untreated cases, the course is lengthened and the recurrence rate is high.<sup>4</sup> In some patients, paraplegia and soft tissue abscesses occur as complications.<sup>6,14,15</sup> The paraplegia is temporary if the patient is managed surgically with anterior decompression and stabilization or laminectomy.<sup>7</sup> Drainage is the treatment of choice for soft tissue abscesses.<sup>16</sup>

## Conclusion

In an elderly patient that presents with back pain and a history of surgical intervention, pyogenic vertebral osteomyelitis must be considered as an important diagnostic consideration. More than one disease process can be responsible for an individual's pain, thus making differential diagnoses very important. Plain-film radiographs are an important diagnostic aid and should be obtained in all elderly patients. Prompt referral for medical treatment is indicated and the majority of patients recover well from this disease.

## Acknowledgements

The authors would like to acknowledge the assistance of the Department of Medical Photography at the University Hospital. Financial assistance for this publication was provided by CMCC and the Chiropractors' Association of Saskatchewan.

## References

- Wynngaarden JB, Smith. Cecil textbook of medicine. 18th ed. Philadelphia: W.B. Saunders, 1988; 1622-1624.
- Bonfiglio M, Lange TA, Kim YM. Pyogenic vertebral osteomyelitis. Clin Orthop 1973; 96: 234-247.
- Kulowski J. Pyogenic osteomyelitis of the spine. J Bone Joint Surg 1936; 18-B(2): 343-364.
- Stauffer RN. Pyogenic vertebral osteomyelitis. Orthop Clin North Am 1975; 6(4): 1015-1027.
- Wedge JH, Oryschak AF, Robertson DE, Kirkaldy-Willis WH. Atypical manifestations of spinal infections. Clin Orthop 1977; 123: 155-163.
- Collert S. Osteomyelitis of the spine. Acta Orthop Scand 1977; 48: 283-290.
- Eismont FJ, Bohlman MD, Soni PL, Goldberg VM, Freehafer AA. Pyogenic and fungal vertebral osteomyelitis with paralysis. J Bone Joint Surg 1983; 65-A(1): 19-29.
- Waldvogel FA. Osteomyelitis: recognizing an elusive infection. Diagnosis 1984; 6: 68-72.
- Batson OV. The function of the vertebral veins and their role in the spread of metastases. Ann Surg 1940; 112(1): 138-149.
- Wiley AM, Trueta J. The vascular anatomy of the spine and its relationship to pyogenic vertebral osteomyelitis. J Bone Joint Surg 1959; 41-B(4): 796-809.
- Yochum TR, Rowe LJ. Essentials of skeletal radiology. 1st ed. Baltimore: Williams and Wilkins, 1987; 921-926.
- Stone DB, Bonfiglio M. Pyogenic vertebral osteomyelitis. Arch Intern Med 1963; 112: 491-500.
- Ross PM, Fleming JL. Vertebral body osteomyelitis. Clin Orthop 1976; 118: 190-198.
- McHenry MC, Duchesneau PM, Keys TF, Rehm SJ, Boumphey FRS. Vertebral osteomyelitis presenting as spinal compression fracture. Arch Intern Med 1988; 148: 417-423.
- Griffiths HED, Jones DM. Pyogenic infection of the spine. J Bone Joint Surg 1971; 53-B(3): 383-391.
- Kirkaldy-Willis WH, Thomas TG. Anterior approaches in the diagnosis and treatment of infections of the vertebral bodies. J Bone Joint Surg 1965; 47-A(1): 87-110.