

53-Year-Old Man With Fever and Back Pain

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A 53-year-old man with an unremarkable medical history presented to the emergency department (ED) with a 1-week history of fevers, chills, rigors, and back pain. Two weeks before the onset of these symptoms, the patient had undergone a dental procedure with placement of a temporary crown. He subsequently experienced pain and gingival swelling, and a 5-day course of clindamycin was prescribed. One week after antibiotic completion, he had acute onset of diarrhea, fevers, and back pain. The back pain began in the thoracic area and spread to the lower back and hips. He described it as a constant, severe sharp pain exacerbated by movement and affecting ambulation. He reported no radicular element, paresthesia, or bladder or bowel disturbance. His primary care physician diagnosed *Clostridium difficile* colitis following positive results on stool polymerase chain reaction testing, and oral metronidazole was prescribed. Although his diarrhea began to improve, he continued to feel unwell with ongoing fever, chills, and worsening back pain and presented to the ED for further evaluation.

In the ED, the patient appeared clinically well. Vital signs were temperature, 36.8°C; heart rate, 96 beats/min; blood pressure, 153/85 mm Hg; respiratory rate, 16 breaths/min; and oxygen saturation, 95% while breathing room air. Physical examination revealed no rashes, petechiae, or palpable lymphadenopathy. His lungs were clear on auscultation, and heart sounds were normal with no murmurs. Abdominal examination detected no abnormalities, including tenderness or organomegaly. Neurologic examination revealed normal tone, power, reflexes, coordination, and sensation. Anal tone was normal. Gait was remarkable for subjective discomfort with mobilization but otherwise normal. There was mild paraspinal tenderness but no overlying skin changes and no flank tenderness. The remainder of the physical examination findings were unremarkable.

Laboratory studies on admission revealed the following (reference ranges provided parenthetically): leukocytosis (white blood cell count [WBC], $11.8 \times 10^9/L$ [$3.5-10.5 \times 10^9/L$]) with neutrophilia (neutrophils, $7.56 \times 10^9/L$ [$1.7-7.0 \times 10^9/L$]); and an elevated erythrocyte sedimentation rate (ESR) (30 mm/h [0-22 mm/h]) and C-reactive protein (CRP) level (30.6 mg/L [≤ 8.0 mg/L]). An electrolyte panel revealed a sodium level of 137 mmol/L (135-145 mmol/L), potassium level of 4.4 mmol/L (3.6-5.2 mmol/L), random glucose concentration of 93 mg/dL (70-140 mg/dL), blood urea nitrogen level of 11 mg/dL (8-24 mg/dL), and a creatinine level of 1 mg/dL (0.8-1.3 mg/dL). The plasma lactate level was within normal limits at 0.66 mmol/L (0.6-2.3 mmol/L). Screening for human immunodeficiency virus was negative. Findings on urinalysis and Gram stain were unremarkable.

1. Which one of the following is the most likely cause of this patient's fevers, chills, and back pain?

- Pyelonephritis
- Mechanical musculoskeletal pain
- Vertebral osteomyelitis
- C difficile* infection
- Renal cell carcinoma

Pyelonephritis typically presents with fevers, chills, flank pain, nausea, and vomiting; cystitis and hematuria may or may not be present. In severe complicated cases, patients may present with sepsis, shock, or renal failure. However, the absence of pyuria would suggest an alternative diagnosis in this case. Mechanical musculoskeletal pain is unlikely given the presence of fevers and chills and the absence of documented trauma. The primary manifestation of vertebral osteomyelitis is back pain, and because vertebral osteomyelitis is an uncommon cause of a common complaint, physicians must always consider it in their differential diagnosis. Fever is an inconsistent finding, and focal spinal tenderness on palpation is a useful clinical

See end of article for correct answers to questions.

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sign although not highly specific. Most patients with vertebral osteomyelitis will have a mildly elevated leukocyte count, rarely exceeding $15 \times 10^9/L$, and an elevated CRP level. In this case, vertebral osteomyelitis was the most likely diagnosis. The most common feature of *C difficile* colitis is watery diarrhea, which was improving in our patient. Other signs include abdominal pain, leukocytosis, and fever. Back pain is not a typical presenting symptom of *C difficile* infection. Renal cell carcinoma can present with an array of symptoms, but unfortunately, many patients are asymptomatic until the disease is advanced. The most common presenting findings are hematuria, flank pain, an abdominal mass, and weight loss, the absence of which makes this a less likely diagnosis.

In the ED, the patient received one dose each of intravenous (IV) vancomycin and ceftriaxone before peripheral blood was obtained for cultures. Given concern for vertebral osteomyelitis, the patient underwent further imaging.

2. Given this patient's presentation, which one of the following is the *best* spinal imaging technique?

- a. Plain film radiography
- b. Contrast-enhanced computed tomography (CT)
- c. Magnetic resonance imaging (MRI)
- d. Radionucleotide scanning
- e. Ultrasonography

Findings on plain radiography are often normal when obtained in the early stages of an infection. Typical findings in vertebral osteomyelitis include destructive changes in 2 contiguous vertebral bodies with collapse of the intervening disk space. However, bone destruction may not be apparent for weeks after the onset of symptoms.¹ Computed tomography can identify changes of vertebral osteomyelitis before they are apparent on plain films and is also helpful in identifying potential bony sequestra, adjacent soft tissue abscesses, and an optimal site for biopsy. However, subtle changes on CT such as endplate irregularities are not specific for osteomyelitis, and early changes may be missed by this technique.² Magnetic resonance imaging is the most sensitive imaging technique for detection of vertebral osteomyelitis. Abnormalities suggestive of osteomyelitis are evident

on MRI before they become apparent on plain radiography. Typical MRI findings include decreased signal intensity in the vertebral bodies and disk on T1-weighted images, increased disk signal intensity on T2-weighted images, and contrast enhancement of the vertebral body and disk. Magnetic resonance imaging can also reveal paraspinal and epidural abscesses, identified by ring enhancement.³ Radioisotope studies may be used as an adjunct when plain films or CT yields either normal or equivocal results and the suspicion for osteomyelitis is high. These studies are relatively sensitive, but their specificity is low. Ultrasonography is most useful for the diagnosis of fluid collections, periosteal involvement, and surrounding soft tissue abnormalities and can provide guidance for diagnostic or therapeutic drainage or tissue biopsy.⁴

Thoracic and lumbar spine MRI revealed findings consistent with multilevel osteomyelitis at L2-3 and L5-S1 vertebral levels. The patient was admitted with a working diagnosis of vertebral osteomyelitis, and supportive care with analgesia was instituted. Because the patient was afebrile and hemodynamically stable, IV antibiotics were promptly discontinued until further work-up was completed. As expected, after administration of antibiotic therapy, the patient's peripheral blood cultures were sterile. Blood cultures are positive in only 50% of cases of osteomyelitis and, when possible, should be obtained before antibiotic administration. Empirical antibiotic therapy is not recommended if the patient is clinically stable without first obtaining a microbiological diagnosis.

3. At this point, which one of the following would be the *most appropriate* next step in establishing the diagnosis?

- a. Positron emission tomography (PET)—CT
- b. Open surgical bone biopsy for Gram stain, bacterial culture, and pathologic examination
- c. "Watch and wait" approach for 48 hours while antibiotic therapy is withheld
- d. CT-guided percutaneous needle biopsy for Gram stain, culture, and pathologic examination
- e. Indium 111-labeled WBC scintigraphy

Positron emission tomography combined with CT, although primarily used in neoplastic conditions, provides both functional and

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