

CLINICAL VIGNETTE

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## Spinal Epidural Abscess: A Diagnostic Dilemma

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### Case Report

A 71-year-old male, with type-2 diabetes of 10 years duration, developed progressive urinary frequency and dysuria over a period of three days. He presented to the hospital with a fever of 102°F associated with some delirium. The patient was admitted with the presumptive diagnosis of urosepsis.

Past medical history was significant for progressive weakness and numbness with occasional aching pain in the legs 6 months prior to admission. He eventually consulted an orthopedist who performed an MRI of the lumbar spine 3 months prior to admission. The scan showed a spondylolisthesis of 7 mm at L4-L5 with central and bilateral foraminal stenosis as well as disk bulges at L1-L2, L2-L3 and L3-L4. As a result, he received three lumbar epidural steroid injections; the last injection was performed approximately a month and a half prior to admission. Weakness diminished slightly with the injections but 3 weeks prior to admission, he began to have increased weakness in the lower extremities and was undergoing hydrotherapy and physical therapy.

At the time of admission, he was using a walker for ambulation. His medications included glyburide, metformin, digoxin, ASA, atorvastatin, midodrine hydrochloride, isosorbide mononitrate, propranolol hydrochloride sustained-release and fluoxetine hydrochloride.

On examination, his temperature was 96.8°F, pulse was 100 and regular, respiration was 16 and BP was 144/58. He did not have localized back pain or CVA pain. Neurological examination revealed the cranial nerves to be intact. Physical exams revealed mild atrophy in the right leg, especially the quadriceps. In the lower extremities, the muscle strength was 3+/5 in the right and 4/5 in the left. Lower extremity reflexes were absent. Sensory exam revealed decreased sensitivity to pin pricks and light touch throughout the lower extremities without dermatomal distribution.

Laboratory studies on admission were notable for

white count 15300, with differential count 88% neutrophils, 4% lymphocytes and 8% monocytes. Electrolytes, glucose and creatinine were normal. Urinalysis showed: color amber, pH 5.0, SG 1.037, WBC 3-5 per hpf, no bacteria, trace protein, glucose negative and ketones 2+.

Urine and blood cultures were taken. The patient was started on IV levofloxacin and one dose of IV tobramycin. Chest X-ray was normal. Liver function tests were normal but serum albumin was low at 2.7. One day after admission, blood cultures grew out *Staphylococcus aureus* sensitive to cefazolin, clindamycin, erythromycin and oxacillin but resistant to penicillin. Urine culture also grew out *Staphylococcus aureus* with the same sensitivity pattern. Additionally, blood cultures grew out *Enterococcus faecalis* resistant to gentamicin and *Streptococcus* species. Antibiotic therapy was changed to IV cefazolin. Though his WBC normalized in 4-5 days and fever resolved in 3-4 days, the patient remained weak and, at times, confused.

A neurologist saw the patient 3 days after admission and recommended CT and MRI scans of the thoracic and lumbar spine because of the prior history of epidural steroid injections and *Staphylococcus* sepsis. The MRI scan demonstrated a central epidural abscess at L4 with a combination of spondylolisthesis with disk bulging causing a severe stenosis at L4. Also noted was posterior paravertebral abscess measuring 3.5 cm in transverse dimension and 5 cm in height. Extensive myositis and muscle necrosis were noted in the paravertebral musculature extending cephalad to apparently to the L1 level. There was also extension of the process anterior to involve the right iliopsoas muscle. The neurosurgery consultant recommended laminectomy and drainage of the abscess.

Seven days after admission, the patient underwent lumbar laminectomy at L3, L4 and L5 with debridement of the lumbar abscess and evacuation of the epidural abscess. The spinal fluid from the abscess grew out *Staphylococcus aureus* with the same sensitivity as that found in the blood and urine cultures. IV cefazolin and IV ampicillin/sulbactam were maintained.

Post-operatively, he had a low-grade fever for about 2 days and then was started on physical and occupational therapy. He was discharged to an acute rehabilitation unit 10 days after admission where he remained for 2 weeks and, eventually, sent home with instructions to stay on IV cefazolin for one month.

At his most recent follow-up, 8-months post

surgery, his legs have increased in strength so he can ambulate with the use of a cane and some assistance without leg or back pain. His sensory abnormalities have also improved.

### Discussion

Spinal epidural abscess is an uncommon illness with an estimated incidence of 1.2 to 1.6 per 10,000 hospital admissions. The age range most commonly associated with this illness is 50 to 70 years with equal distribution among males and females.<sup>1</sup> It is accompanied by high morbidity and mortality, particularly if there is a delay in diagnosis and treatment. The incidence of spinal epidural abscess has increased over the past decade. This rise may be due to the prevalence of IV drug use as well as the increase in procedures performed on the spinal column and the epidural spaces (e.g. nerve blocks, epidural steroid injections, epidural catheters for anesthesia and diskograms.)

Classically, symptoms and signs of spinal epidural abscess are severe localized back pain and fever as well as neurological changes.<sup>2</sup> With time, the spinal pain progresses to root pain followed by weakness and numbness of voluntary and sphincter muscles and finally to paralysis.<sup>3</sup> Classic symptoms and signs may occur in only 37% of cases. The presenting symptoms and signs may be quite variable, however, back pain is usually present in about 85% of cases. Fever is reported in about 30% to 60% of cases. Some patients have no back pain, and others may not have fever associated with the back pain. Up to 29% of cases did not have neurological defects, and some of these patients also did not have back pain. This group represents some of the greatest challenge to diagnosing spinal epidural abscess.<sup>4,5</sup> Others have reported the existence of an axial back pain with progressive neurological symptoms as a reliable sign of spinal epidural abscess.<sup>6</sup>

Imaging techniques have become more sophisticated so that small abscesses can be detected in the epidural spaces, thus aiding in establishing the diagnosis. However, even with our advanced imaging techniques, it is still a challenge to establish the diagnosis due to the misleading initial presenting symptoms. In the case discussed, no back pain existed, fever was present, and numbness and weakness, while present, had presumably pre-existed from a spinal stenosis. After the epidural steroid injections, there was some initial improvement followed by worsening symptoms. The confusing nature of the

presenting symptoms and past medical history made it difficult to establish the diagnosis of spinal epidural abscess in this patient.

Studies have shown that at admission, spinal epidural abscess has been missed up to 50% of the time.<sup>7</sup> In some situations, patients have been seen 2 or 3 times by a physician before diagnosis was established.<sup>8</sup> The neurological symptoms may be obscured by other neurological deficits, thus the patient may not be able to distinguish definite back pain. Whereas in other cases, there may be bacteremia with encephalopathy, thus the patient may not be able to clearly relate his symptomatology.<sup>2</sup> Many elderly patients have had prior spinal disease such as discogenic disease, degenerative joint disease, and even prior spinal surgery. Therefore, a new back pain may be confused with an old back pain. Thus it is very important to carefully distinguish if there have been any changes in a chronic condition, especially if there is associated fever.<sup>8</sup> Imaging with an MRI may be indicated in this situation. If there are associated neurological signs with the fever, an MRI is definitely indicated.

Predisposing conditions such as diabetes mellitus, prior back surgery, diagnostic spinal procedures, nerve blocks, trauma to the spine, IV drug abuse, immunosuppressed individuals, alcoholism, and even skin infections should be considered in the assessment for spinal epidural abscess.<sup>6,9</sup> Hematogenous spread of infection to epidural spaces from a skin infection such as a furuncle or an abscess or, in some cases, a dental abscess has occurred.<sup>10</sup> The use of chronic steroid treatment as well as trauma to the spine is a risk factor.<sup>5</sup> With the latter, an epidural hematoma can develop secondarily leading to a nidus for infection. A source of infection is unknown in about 50% of patients.<sup>1</sup>

In the case discussed, the patient had diabetes mellitus, prior evidence of spinal disease, and epidural steroid injections all of which are considered risk factors. Furthermore, this patient had bacteremia with *Staphylococcus aureas*, an unusual finding for urinary tract infection, especially with minimal leukocytosis in the urine. Therefore, attempts to locate another site of infection were considered. An echocardiogram was normal. With prior epidural steroid injections, changing neurological symptoms and signs associated with fever, spinal epidural abscess was strongly considered, even without the presence of back pain.

### Laboratory Studies

White blood cell count ranges from 2,900 to 32,000 in one series with a mean of 14,100.<sup>2</sup> The erythrocyte sedimentation rate in most series was uniformly high with a mean of 52 and rarely dropped below 25. In one study a sedimentation rate below 25 was considered to be quite reliable to rule out spinal epidural abscess.<sup>8</sup> An elevated sedimentation rate was felt to be a reliable test for spinal epidural abscess.<sup>2</sup>

Classic symptoms and signs with an elevated sedimentation rate are an absolute indication for an MRI. Moreover, patients with back pain and an elevated sedimentation rate should be considered for an MRI. Spinal fluid examination in various series showed changes compatible with a parameningeal infection with increased CSF protein, pleocytosis and a normal glucose.<sup>2</sup>

The most commonly found organism in spinal epidural abscess is *Staphylococcus aureus* followed by gram-negative rods and *Streptococcus* species. The incidence of *Staphylococcus aureus* ranges from 60% to 75% among various series. With the recent increase of IV drug abuse, methicillin-resistant *Staphylococcus* is now emerging with some series showing an incidence of up to 15%.<sup>6,10</sup>

### Imaging Techniques

The MRI is the best imaging technique we have today to diagnose spinal epidural abscess and a close second is a CT myelogram. The latter has some associated risks in that the procedure may convert an epidural process into an intradural process and at times one has to be careful in the presence of a spinal fluid block as the spinal needle requires correct placement.<sup>4,6</sup>

### Treatment

As soon as the diagnosis is established, IV antibiotics should be initiated once cultures are taken. The concern that the use of antibiotics before surgery may obscure the finding of an organism at the time of surgery has been considered, but in general, there is a 48 to 72 hour window, during which time, one can recover the same organism at the time of surgery.<sup>4</sup> There are studies revealing that if an organism is found by blood culture, generally that organism is also found at surgery. In our case, the same organism was grown from the blood culture and the abscess site even though he had been treated for a week. Treatment with an antibiotic should involve an anti-staphylococcal drug and may call for addition of anti-

MRSA treatment that may consist of vancomycin plus aminoglycoside or a third generation cephalosporin. Once a definitive organism is isolated and sensitivities are known, an appropriate antibiotic regimen can be established.<sup>6</sup>

The most definitive treatment requires an evacuation of the abscess and decompression with laminectomy as soon as possible even when the patient appears stable. The patient may suddenly deteriorate and, once paralysis sets in, recovery is poor, particularly if paralysis persists for more than 48 hours. In certain situations, antibiotic therapy without surgery has been performed with success.<sup>11</sup> Generally, these patients have minimal or no neurologic findings and are clinically stable. However, they do require careful serial observations. Other patients in whom surgery is not indicated are those who have paralysis beyond 48 hours, those who refuse surgery or those who have comorbid conditions for which surgery is extremely risky.<sup>4</sup>

### Outcome

Patients who are diagnosed and treated early in the course of their illness have the best chance of a good recovery; hence the importance of early diagnosis and antibiotic treatment followed by surgery, if indicated. A neurosurgical consultation should be obtained as soon as spinal epidural abscess is suspected. The fatality rate can be as high as 14% when diagnosis and treatment is delayed.<sup>10</sup>

### Conclusion

The diagnosis of spinal epidural abscess can be extremely difficult to establish, especially in those patients who do not present with the classic symptoms of back pain, fever, and changing neurological signs and symptoms. Some may present as bacteremia, and if a *Staphylococcus* infection is found then spinal epidural abscess should be considered, particularly in those with predisposing risk factors. When patients with prior history of spinal disorders who have had a change in their pattern of pain or pre-existent neurological symptoms present with unexplained fevers, spinal epidural abscess should be considered. A sedimentation rate should be obtained, and if positive, the patient should obtain an MRI as well as a neurosurgical consultation. The existence of pre-disposing factors such as diabetes mellitus, IV drug abuse, cutaneous infection, trauma to the spine or immunosuppression should be considered in the assessment of

suspected spinal epidural abscess. IV antibiotics should be initiated once the diagnosis of spinal epidural abscess is established covering *Staphylococcus aureas*, MRSA, as well as gram-negative rods.

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