Minimally Invasive Approach for Drainage of a Sacral Epidural Abscess

A Case Report and Technical Note

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Key words: sacral abscess, osteomyelitis, spine, percutaneous drainage

Summary

Sacral epidural abscesses are rare infections, often managed with open surgery, especially in the presence of acute neurological symptoms. We report a novel approach for minimally invasive drainage of sacral epidural abscesses.

A 51-year-old man presented to the emergency department complaining of low back pain, generalized muscle pain, pain across several large joints, low-grade fever, and weakness of both legs for ten days. MRI of the patient's lumbosacral spine showed osteomyelitis involving his L5, S1 vertebrae, L5-S1 discitis, as well as anterior and posterior epidural abscesses extending from L5-S1 disc space to the S2 vertebral level. Under CT fluoroscopic guidance a 20-gauge spinal needle was inserted into the sacral hiatus, parallel to the pelvic surface of the sacral canal, and directed cranially. A 0.18-gauge microwire was then advanced through the 20-gauge needle. The 20-gauge needle was exchanged over the guidewire for an 18-gauge blunt tipped needle which was curved to approximate the contours of the sacral canal. The curved needle was inserted through the sacral hiatus with its concavity initially facing upwards, and then rotated 180° to gain access to epidural abscess.

Once anatomic access was established 5cc of thick purulent material was evacuated. The patient tolerated the procedure well, and no focal

nerve root symptoms were noted following the procedure.

Image guided aspiration of sacral epidural abscesses can be carried out in a safe and effective manner using CT fluoroscopy. Aspiration of these abscesses combined with intravenous antibiotics may be an alternative to open surgery in select patients.

Introduction

Spinal epidural abscesses are rare but serious infections, managed with open surgery, especially in the presence of acute neurological symptoms. While successful percutaneous drainage of spinal epidural abscesses has been reported at higher levels the circumferential bony anatomy of the sacrum makes needle drainage of sacral epidural abscesses technically difficult¹. We report a novel approach for minimally invasive drainage of a Magnetic Resonance Imaging (MRI) confirmed anterior epidural abscess of the sacral canal.

Case Report

A 51-year-old man presented to the emergency department complaining of low back pain, generalized muscle pain, pain across several large joints, low-grade fever, and weakness of both legs for ten days. The weakness gradually increased over the preceding ten days, and

Figure 1 Sagittal T2W MRI of the lumbosacral spine (A) and sagittal T1W post-contrast MRI (B) show L5-S1 discitis, L5 and S1 VB edema and a large epidural abscess from mid L1 to S2 vertebral body levels. The abscess predominantly involves the anterior epidural space with extension into the posterior.

at presentation he could not get out of bed on his own. The back pain was described as a sharp pain across the lower back, non-radiating, and was not associated with any sensory changes. The patient also reported a five to ten pound weight loss since the onset of illness, owing to mild nausea and decreased appetite. Except for the deterioration of health on presentation the patient had no medical problems. At presentation he was febrile with a temperature of 38.1 oC, with a pulse rate of 88/minute, blood pressure of 130/67 mm of Hg, and a respiratory rate of 20/minute. On physical examination the patient was alert and oriented, had mild scleral icterus, and a grade 2/6 systolic murmur when auscultated over the second intercostal space on the right side. Neurological examination showed grade 4 weakness of both lower extremities. Laboratory examination showed a WBC count of 11,100/mm³ with 79% neutrophils, and 13% lymphocytes, ESR of 121mm, and a CRP of 13.7 mg/dl. Hemoglobin, hematocrit and platelet counts were normal. Blood culture grew methicillin sensitive *Staphylococcus*

aureus for which the patient was managed with intravenous antibiotic therapy.

An MRI of the patient's lumbosacral spine showed osteomyelitis involving his L5, S1 vertebrae, L5-S1 discitis, as well as anterior and posterior epidural abscesses extending from L5-S1 disc space to the S2 vertebral levels. A decision was made to perform a minimally invasive needle aspiration of his sacral epidural abscesses under CT guidance. Following the procedure the patient was administered intravenous antibiotics for eight weeks.

Technical Note

Needle aspiration was performed by the senior author (VK). Briefly, the patient was placed prone on the CT table after intravenous administration of contrast agent. 3x2 mm sequential axial images of the lumbar spine were obtained, from the inferior endplate of L4 vertebral body to that of the S4 vertebral body. The skin over the sacral hiatus was marked and

infiltrated with 20 cc of 1% Xylocaine. A 20-gauge spinal needle was then inserted into the sacral hiatus, parallel to the pelvic surface of the sacral canal and directed cranially. After introduction of approximately 2 cm of the needle under direct CT fluoroscopic guidance, the stylet was removed. A second, 25-gauge needle (20 cm long), was roughly hand curved to the contours of the sacral curve, and gradually inserted through the 20-gauge needle in a co-axial manner. The needle was then advanced under CT fluoroscopic guidance and placed within the anterior epidural space at the level of the S2 vertebral body. The stylet was removed at this point and an attempt was made to drain the anterior epidural abscess, which was unsuccessful. While maintaining the established needle access a 0.018 inch microwire was advanced through the 20-gauge needle. The 20-gauge needle was removed and exchanged over the guidewire for an 18-gauge blunt tipped needle which was curved to approximate the contours of the sacral canal. A special technique was used to obtain access to the epidural space through the posteriorly convex sacral canal. The curved needle was first inserted through the sacral hiatus with its concavity facing upwards. After reaching approximately half way through the distance of the sacral canal, it was rotated 180° such that its concavity faced downwards. The tip of the needle could now be inserted further following the contours of the sacral canal and was placed into the anterior epidural space at the level of the S1 vertebral body. Once anatomic access was established the stylet was removed and approximately 3 cc of thick purulent material was evacuated. Following this, using CT fluoroscopic guidance, the tip of the needle was placed into the posterior epidural space and an additional 2 cc of pus was drained. The patient tolerated the procedure well, and no focal nerve root symptoms were noted during the procedure.

Results

Once anatomic access was established 5 cc of thick purulent material was evacuated. The patient tolerated the procedure well, and no focal nerve root symptoms were noted following the procedure. Postoperatively, the patient improved dramatically. At three month follow up he showed complete resolution of neurological symptoms.

Figure 2 Axial CT images of the pelvis taken during CT fluoroscopy guided aspiration of anterior epidural abscess at the level of L5-S1 disc (A) and S2 vertebral body (B). Needle is seen within the anterior epidural space after placement through the sacral meatus.

Discussion

Spinal epidural abscesses represent an uncommon clinical condition but are often associated with significant morbidity and mortality^{2,3,4,5}. Most cases of SEA occur in patients aged 30 to 60 years⁶. Reihaus et Al. in a meta-analysis of 915 cases found the most common risk factor for SEA was diabetes mellitus, followed by trauma, intravenous drug abuse, and alcoholism⁶. Epidural anesthesia or analgesia had been performed in 5.5% of the patients with SEA. Skin abscesses and furuncles were

Figure 3 Post procedure 3-month follow-up sagittal T2W MRI of the lumbosacral spine (A) and sagittal T1W post-contrast MRI (B) show decrease in size of the epidural abscess, but there is progression of osteomyelitis at the S1 vertebral body.

the most common source of infection. Of the patients, 71% had back pain as the initial symptom and 66% had fever (first stage). The second stage is radicular irritation is followed by a third stage of early neurological deficit including muscle weakness and sphincter incontinence as well as sensory deficits. Paralysis (the fourth stage) affected 34% of the patients. The average leukocyte count was 15,700/ μ l (range 1,500-42,000/ μ l), and the average erythrocyte sedimentation rate was 77 mm in the first hour (range 2-50 mm).

SEA is primarily a bacterial infection, and *Staphylococcus aureus* is its most common causative agent. Because clinical deterioration of spinal epidural abscesses can be rapid and irreversible, early diagnosis and treatment are important for good functional recovery^{6,7}. Magnetic resonance imaging (MRI) displays the greatest diagnostic accuracy and is the method of first choice in the diagnostic process^{4,5}. Treatment options include a long course of antibiotic therapy in the absence of neurologic symptoms or surgical decompression and drainage followed by intravenous antibiotic therapy when neurologic symptoms are present and progressive. Needle drainage has traditionally been used for establishing an etiologic diagnosis, although recently several reports have been published of minimally invasive aspiration and drainage of abscess contents as a primary form of decompression even in the presence of neurologic symptoms, with good resultant outcomes^{1,8,9,10,11}. Siddiq et Al in a retrospective analysis of 57 cases of spinal epidural abscess concluded that prolonged use of parenteral antibiotics alone or combined with percutaneous needle drainage yielded clinical outcomes at least comparable with antibiotics plus surgical intervention, irrespective of patient age, comorbid illness, disease onset, neurologic abnormality at time of presentation, or abscess size¹¹. Although an interesting finding, patients in the medical treatment and needle drainage groups had less severe neurologic dysfunction at presentation than patients in the surgical decompression group.

Our patient's clinical presentation, including low back pain, generalized muscle pain, pain across several large joints, low-grade fever, and systemic symptoms strongly suggested a spinal epidural abscess at the lumbosacral level. MRI scans revealed an abscess in the anterior part of

the epidural space, spanning levels L1 to S2, which was subsequently confirmed with direct, percutaneous, CT-guided, needle aspiration of the pus. The patient's clinical condition responded favorably to needle aspiration with significant relief of back pain and systemic symptoms soon after aspiration of the abscess. The successful navigation of the sacral canal for access makes this case unique and represents a novel approach for drainage of sacral epidural abscesses.

Conclusions

Image guided aspiration of sacral epidural abscesses can be carried out through the sacral canal in a safe and effective manner using CT fluoroscopic guidance. Such drainage can be an effective alternative to surgical drainage in select patients. Aspiration of these abscesses combined with intravenous antibiotics may be an alternative to open surgery in selected patients.

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