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Selected Topics: Neurological Emergencies

UPPER CERVICAL EPIDURAL ABSCESS RESULTING IN RESPIRATORY COMPROMISE AFTER LUMBAR STEROID INJECTION

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☐ **Abstract—Background: Spinal epidural abscesses have a prevalence of 3 out of every 10,000 admissions. Abscesses above the level of C2, defined as upper cervical epidural abscesses, are even rarer still. Case Report: We discuss a case in which a 45-year-old male patient developed an upper cervical epidural abscess 48 h after receiving a lumbar steroid injection. The patient presented with diminished strength in all four extremities and respiratory distress secondary to the space-occupying lesion near his spinal cord. His hospital course included surgical decompression and antibiotics. He was eventually discharged to rehabilitation, but never regained full strength in his arms or legs. Why Should an Emergency Physician Be Aware of This?: Patients who present with back or neck pain, fever, and neurologic deficits may have epidural abscess. In some patients, neurologic deficits may include respiratory distress if the upper cervical region is involved, and these patients have the possibility of airway decompensation. The diagnostic imaging modality of choice in patients with epidural abscess is MRI with gadolinium. Management involves supportive care, broad-spectrum antibiotics, which include coverage for methicillin-resistant *Staphylococcus aureus*, and early neurosurgical consultation.**

☐ **Keywords—epidural; abscess; lumbar; steroid; injection**

INTRODUCTION

We describe the case of a 45-year-old male who developed an upper cervical epidural abscess (UCEA) 2 days after a lumbar epidural steroid injection (ESI). He had rapidly progressing deterioration requiring intubation and emergent neurosurgical intervention. Spinal epidural abscesses are present in approximately 2.5–3 out of every 10,000 patient admissions (1,2). Spinal epidural abscesses, although well described, are an uncommon complication of ESI. Patients presenting with otherwise unexplained fever, back/neck pain, and neurologic deficit may have this diagnosis considered during their workup, especially after undergoing a recent procedure.

CASE REPORT

A 45-year-old male with no medical history presented to the emergency department (ED) via emergency medical services (EMS), complaining of gradual onset of worsening low back pain with associated weakness, which began initially in his bilateral lower extremities and rapidly progressed to include his bilateral upper extremities. En route to the hospital, EMS noted him to be febrile with labored breathing. Upon ED arrival, the patient had increasing respiratory distress despite supplemental oxygen. He reported he had recently been diagnosed with a lumbar back strain, which began after driving, but denied any other recent illness. He was seen by a pain management physician as an outpatient and received a lumbar epidural steroid injection 2 days before his ED visit.

His vital signs on arrival were a temperature of 37.7°C (100°F) temporally, a pulse of 78 beats/min, respiration

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rate of 18 breaths/min, and a blood pressure of 164/84 mm Hg. He was saturating 91% on room air. Physical examination revealed a well-developed, obese male in moderate respiratory distress. His cardiac examination was unremarkable. His respiratory examination revealed increased accessory muscle use without rhonchi, wheezing, stridor, or rales. His abdominal examination was normal and there was no tenderness to his back or extremities. He was alert and oriented to person, place, and time. Examination of his bilateral lower extremities showed diminished sensation to light touch globally, with 1/5 strength bilaterally in all muscle groups. He also displayed 1/5 strength throughout his left upper extremity and 2/5 strength in the right upper extremity. The patient failed to improve with oxygen therapy and noninvasive positive pressure ventilation (NPPV), and eventually his respiratory effort and oxygen saturation decreased. He failed to achieve adequate tidal volumes on NPPV despite increased pressure support, and therefore rapid sequence intubation was performed for increasing respiratory distress, respiratory failure, and impending airway compromise.

Pertinent laboratory studies revealed a leukocytosis of 17.16 $\times$ $10^3/\mu$L with neutrophil predominance. Blood cultures were drawn and the patient was started empirically on broad-spectrum antibiotics for a presumed epidural abscess. Immediate magnetic resonance imaging was attempted; however, the machine was unable to accommodate the patient's shoulders, as they were greater than the hospital's MRI bore size. A computed tomography (CT) scan with contrast of his entire spine was performed and the images of the cervical spine demonstrated a space-occupying mass versus fluid collection extending from C1–C5 measuring 2.0 $\times$ 0.9 cm at the level of C2 with associated left and anterior displacement of the thecal sac (Figures 1 and 2). There was no evidence of pathology on the thoracic and lumbar spine imaging. Neurosurgery took the patient to the operating room for emergent surgical decompression. During the surgery, they evacuated purulent material from the epidural space and subsequently performed a C2–C4 laminectomy. A drain was left in place and the patient was left intubated and transferred to the surgical intensive care unit for further management. Both surgical wound cultures and blood cultures grew methicillin-resistant *Staphylococcus aureus* (MRSA). The patient underwent tracheostomy and percutaneous endoscopic gastrostomy tube placement. The patient's hospital stay was prolonged due to multiple failed attempts to wean him from ventilator support. Eventually he was stabilized and he had his tracheostomy de-cannulated. The patient was discharged to rehabilitation after 57 days in the hospital. On discharge, the patient was speaking and had passed a swallow evaluation, but had persistent diminished strength and sensation in all four extremities.

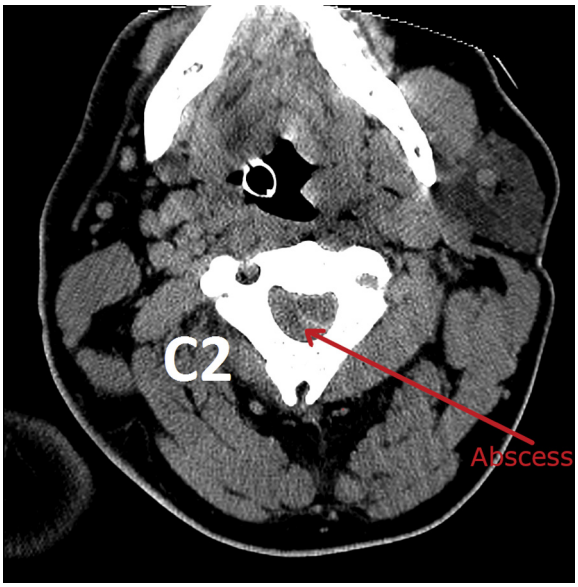

Figure 1. Computed tomography scan at the level of C2 in the transverse plane showing an abscess with anterior displacement of the thecal sac.

DISCUSSION

Spinal epidural abscesses are present in approximately 2.5–3 out of every 10,000 patient admissions. UCEA, defined as abscesses that include the sub-occipital region to C2, are much rarer, with as few as 34 cases published since the 1900s (2). Epidural injections are a common procedure, and literature estimates document that as many as 680,000 were performed in 1998 alone (3). Despite how common epidural injections are becoming, they are rarely complicated by cervical epidural abscess (4). The majority of patients who go on to develop

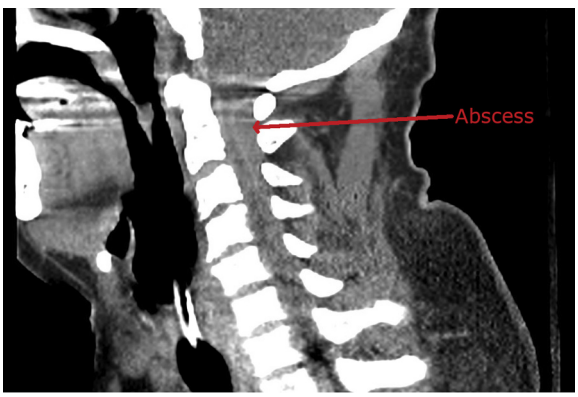

Figure 2. Computed tomography scan of cervical spine in sagittal view showing and abscess with anterior displacement of the thecal sac.

cervical epidural abscesses have risk factors that compromise their immune system. The most common immunocompromising disease associated with epidural abscess is diabetes mellitus (5). The classic presentation of a spinal epidural abscess includes the triad of pain, fever, and neurological deficit (1). Unfortunately, this triad is only present 13% of the time, and even then, it is considered a late finding. Due to vague initial presenting symptoms, patients with epidural abscesses are typically subject to significant diagnostic delays, including multiple ED visits before diagnosis (6). Because of these factors, spinal epidural abscess is an often missed and frequently litigated diagnosis of which emergency physicians can be made aware (7).

This patient presented with the classic triad for epidural abscess, but was also in acute respiratory failure. A prior case study reviewed a patient with UCEA that was complicated by respiratory distress thought to be secondary to hydrocephalus diagnosed by CT scan of the brain (8). This patient, however, lacked hydrocephalus on CT scan. It is more likely that our patient's respiratory compromise was secondary to the space-occupying lesion near his spinal cord, which was his sole discovered nidus of infection. This is also supported by the fact that he had clear lungs on auscultation and lacked any other pulmonary pathology. Cervical spinal cord injury can lead to disruption of the descending phrenic motor neurons, the axons of which travel in the ventral horn of the spinal column at the levels of C3–C5 (9). Disruption of the posterior horns of the upper cervical region can lead to loss of function of the respiratory muscles, and typically coincides with upper extremity weakness, as it did in this case (10).

The risk of developing an epidural abscess after any procedure has a variable time frame and a review of the literature shows the window for symptoms to develop extends for as many as 21 days after the procedure is performed (3). A prior case study that was complicated by a lumbar epidural abscess had development of symptoms 2 days after lumbar steroid injection; a similar time frame as our case (11). To our knowledge, this is the first documented case of lumbar steroid injection resulting in UCEA complicated by acute neuromuscular respiratory failure.

As in this patient, the majority of UCEA (60%) are associated with MRSA (2). Some authors have hypothesized that povidone iodine, a commonly used antiseptic, does not contain a strong enough bactericidal effect against MRSA (12,13). Though the antiseptic used prior to the steroid injection is not known in this patient, it is possible this could have contributed to the complication. Even with strict antiseptic technique, as many as 18% of needles can be contaminated after epidural or subarachnoid block (14). Many patients diagnosed with UCEA require surgical decompression, as our patient did. Independent predictors of failure of nonoperative management include age older than 65 years, diabetes, active MRSA infection, and neurological deficit (15). The final outcome of a patient depends most on their initial presenting neurological status, and patients who undergo surgery are no worse than if they had not (16). This suggests that early identification can lead to improved outcomes (17).

WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?

This case represents a rare complication of an epidural steroid injection in an immunocompetent host. Patients who present with back or neck pain, fever, and neurological symptoms may have an epidural abscess, especially when they are immunocompromised. Though it was not available in our case, the diagnostic imaging modality of choice in epidural abscess is MRI with gadolinium, which has a specificity and sensitivity of > 90% (1). Imaging to include all spinal levels can ensure that all lesions are noted. Management of UCEA includes patient stabilization, airway management, early broad-spectrum antibiotics, and emergent neurosurgical consultation. Physicians may consider antibiotics that include coverage for MRSA infections. Emergency physicians can consider early neurosurgical consultation in these patients.

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