

## Case Report

# DIAGNOSIS AND SPONTANEOUS RESOLUTION OF AN EPIDURAL HEMATOMA IN A PATIENT PRESENTING AFTER CERVICAL EPIDURAL STEROID INJECTION

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While not a cure for the underlying spinal pathology, cervical epidural steroid injections (CESI) are an important minimally invasive treatment for neck pain with radiculopathy. Although CESIs are considered safe, cervical epidural hematoma (CEH) is a major complication and has previously been reported. Patients, who develop CEH, present with acute neck pain and upper extremity radiculopathy. A prolonged time to treatment may lead to worsened neurological outcome. Diagnostic magnetic resonance imaging and surgical decompression is the mainstay of treatment. This report presents a patient with a history of chronic neck pain and repeat cervical injections, who presented with increased neck pain and upper extremity weakness after undergoing a CESI. Initial radiographic findings were complicated and inconclusive of a definitive epidural

hematoma. With conservative management, the patient showed signs of clinical improvement and ultimately had spontaneous resolution of his CEH.

Though CEH are frequently rapidly progressing and most often surgically decompressed, some acutely presenting cases may be approached conservatively. Though MRI is an important diagnostic tool for CEH, interpretation of radiographic findings, following a recent CESI, may be challenging due to distortion of the epidural space anatomy. Patients with a history of multiple cervical epidural injections may have an increased risk for the development of CEH.

**Key words:** Cervical epidural steroid injection, cervical epidural hematoma, spontaneous resolution, conservative management, magnetic resonance imaging, complication

Neck pain is a leading cause of disability in adults. It is estimated to affect 37% of the entire adult population in a given year and approaches a 50% lifetime prevalence rate (1). Risk factors for developing neck pain include female gender, depression, smoking, middle age, and obesity (2). Duration of symptoms is the best predictor of outcome and when managed conservatively, longer duration of neck pain is associated with worsened prognosis (3,4). Cervical radiculopathy is an important cause of neck pain and

is estimated to affect 83 per 100,000 annually (5). The pathophysiology of cervical radiculopathy stems from mechanical compression of the cervical nerve root (6). Most commonly, this is caused by spondylosis due to chronic degenerative disk changes: loss of disc height, formation of osteophytes, facet joint hypertrophy, and foraminal narrowing (7). Ultimately, impingement of the exiting cervical nerve root causes focal ischemia and associated inflammatory biochemical changes, resulting in neuropathic symptoms and pain (8,9).

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While not a cure for the underlying spinal pathology, cervical epidural steroid injections (CESI) are an important nonsurgical treatment for neck pain with associated upper extremity radiculopathy. It is a commonly performed procedure in managing radicular discomfort and when successful, CESI can provide relief of pain and restoration of function to the affected

extremity (10). Current literature supports the use of CESI in the treatment of cervical disc herniation and spondylolytic foraminal stenosis (11). Though the therapeutic mechanism remains controversial, it is believed that corticosteroids deposited in close approximation to the affected nerve roots decreases the synthesis and release of pro-inflammatory mediators. Moreover, the addition of local anesthetic to the injectate blocks nociceptive input and may interrupt self-sustaining nociceptive transmission (12-14).

Although CESIs are considered safe, various adverse events have been reported. Overall, complication rates have been reported in the range of 0% to 16.8% (15). Common symptoms include axial neck pain and headache, secondary to soft tissue trauma and large volume injection. In this case report, we present the clinical course of a single patient who presented with acute neck pain and associated neurological deficits secondary to an epidural hematoma, after having undergone CESI for chronic neck pain with radiculopathy.

## **CASE REPORT**

JB is a 65-year-old male with history significant for diabetes, bipolar disorder, schizoid personality disorder, anxiety, chronic back and neck pain with radiculopathy, secondary to multilevel cervical spondylosis and associated foraminal stenosis. He had been taking prophylactic aspirin 81 mg daily; otherwise, he was not on any anticoagulation or non-steroidal anti-inflammatory therapy. On October 25th, 2017 JB presented for his eighth C7-T1 ESI. Over the past 2 years, he had been undergoing repeat CESIs for neck pain and bilateral radiculopathy, right greater than left, and reported significant benefit with pain and symptom relief after each. Though his interlaminar CESI was uncomplicated, after obtaining loss of resistance for identification of the epidural space, spread of contrast dye was restricted to the dorsal epidural space (Fig. 1). Immediately following the procedure, there was no evidence of ecchymosis or bleeding. On October 26th, 2017 JB complained of increased neck pain and presented to the emergency department (ED) for evaluation. There, he was found to have a 2 cm ecchymosis at the site of injection without erythema or induration. He had no fever or leukocytosis. His motor exam demonstrated 4/5 strength for right

handgrip, triceps extension, wrist flexion and extension, deltoid abduction, and 5/5 strength on the left throughout. Magnetic resonance imaging (MRI) was obtained on October 26th 2017 revealing C6-7 and T1-2 epidural fluid collections (Fig. 2 and 3). There were no signal abnormalities; however, the cord was displaced at these spinal levels. Signal intensity of the epidural fluid collection was not fully consistent with either residual injectate or blood. Because of concern for a possible epidural hematoma, he was admitted to the hospital for observation; serial neurologic exams and MRI's were obtained. On October 29th, 2017 his pain and strength began to improve and a repeat MRI was obtained which revealed a persistent fluid collection, now radiographically consistent with hematoma. Given an improvement in symptoms and stable imaging, he was soon discharged to home with instructions to return to the ED should his condition deteriorate. An MRI at 2 months demonstrated resolution of the hematoma. He reported near complete improvement of his neck and upper extremity pain. On physical exam, his neurological examination was consistent with baseline recovery to 5/5 strength in both extremities.

## **DISCUSSION**

Despite an uneventful repeat CESI, our patient presented with symptoms of increased pain and upper extremity motor weakness. Cervical and radicular pain is an expected minor complication of CESI and can mask the initial presentation of an epidural hematoma. The patient's minor associated upper extremity weakness and profound pain were particularly concerning for the development of an epidural hematoma, prompting further investigation with imaging. Interestingly, the MRI Day 1 was not entirely consistent with acute hematoma; signal intensities on T2 images suggested the presence of either CSF or injectate fluid in the epidural space, while the visualized isointense signal intensities on T1 were suggestive of a hyper-acute hematoma. The injectate may be suspected as having interfered with the usual MRI signals. Given the lack of spinal cord signal abnormality and the patient's clinical stability, nonoperative management was elected. Follow-up MRI, on post CESI day 4, revealed signal intensities which followed a pattern of evolution that was confirmatory for epidural hematoma rather than injectate

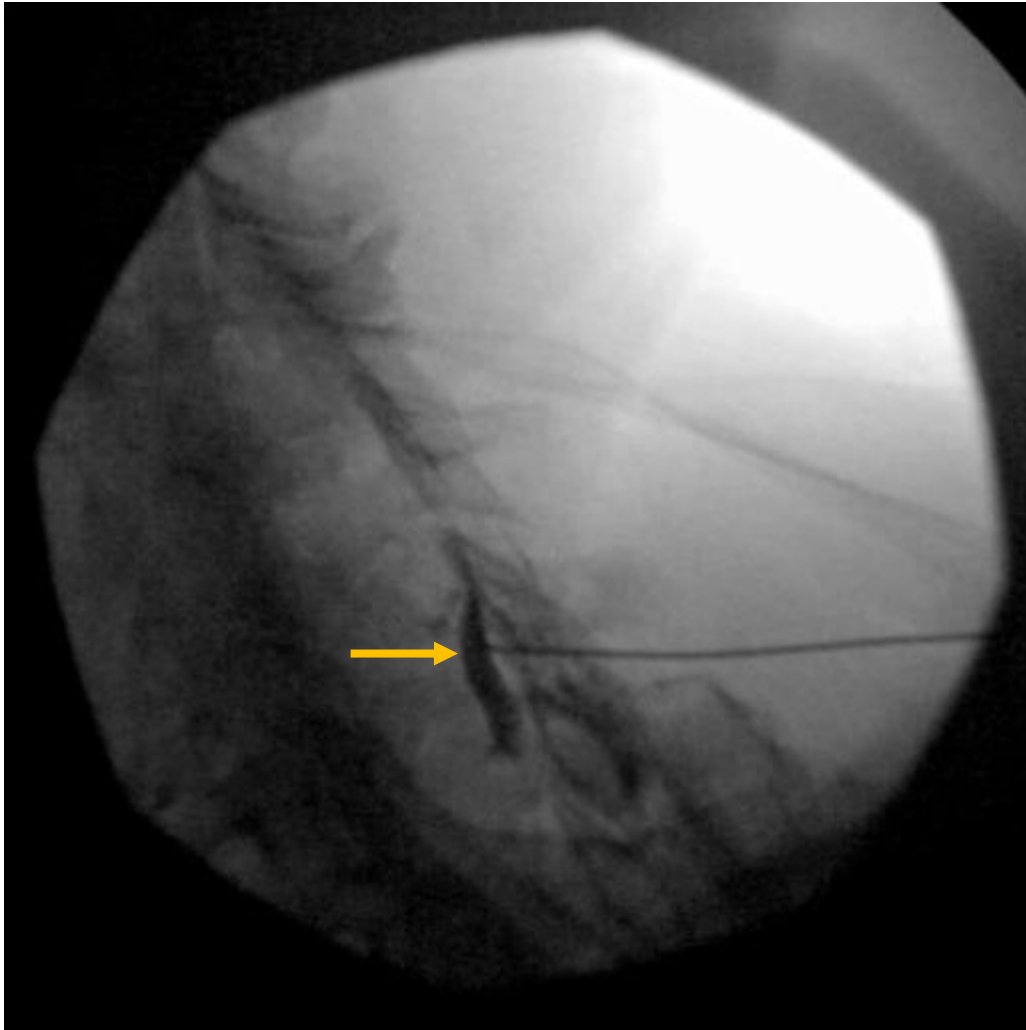


Fig. 1. Left contralateral oblique (CLO) view of contrast dye spread after cervical epidural steroid injection (CESI).

material. Moreover, in addition to the characteristic MRI findings, persistent leftward deviation of the spinal cord was consistent with the formation of an acute epidural hematoma (16). At this time, however, the patient had improved clinically, and reported decreased neck pain as well as decreased weakness in his upper extremities. Ultimately, a final follow up MRI, obtained at 2 months post CESI, revealed complete resolution of the hematoma. In this case, it was unclear if the initial MRI demonstrated residual injectate or a developing hematoma, delaying the establishment of a firm diagnosis. Though lumbar epidural injections have been shown to have no effect

on MRI findings, the effect of CESIs has not yet been evaluated (17-19).

Cervical epidural hematomas (CEH) are frequently rapidly progressing and lead to acute worsening of neurological deficits. Increased time to treatment is associated with worsened neurological prognosis (20-23). CEH initially presents with sharp neck pain radiating to the shoulder and arm. Clinical recognition of spinal bleeding following a CESI is difficult, as the symptoms of pain are often nonspecific and moreover masked by underlying pathology and analgesic effects of neuraxial blockade. Early diagnosis of a

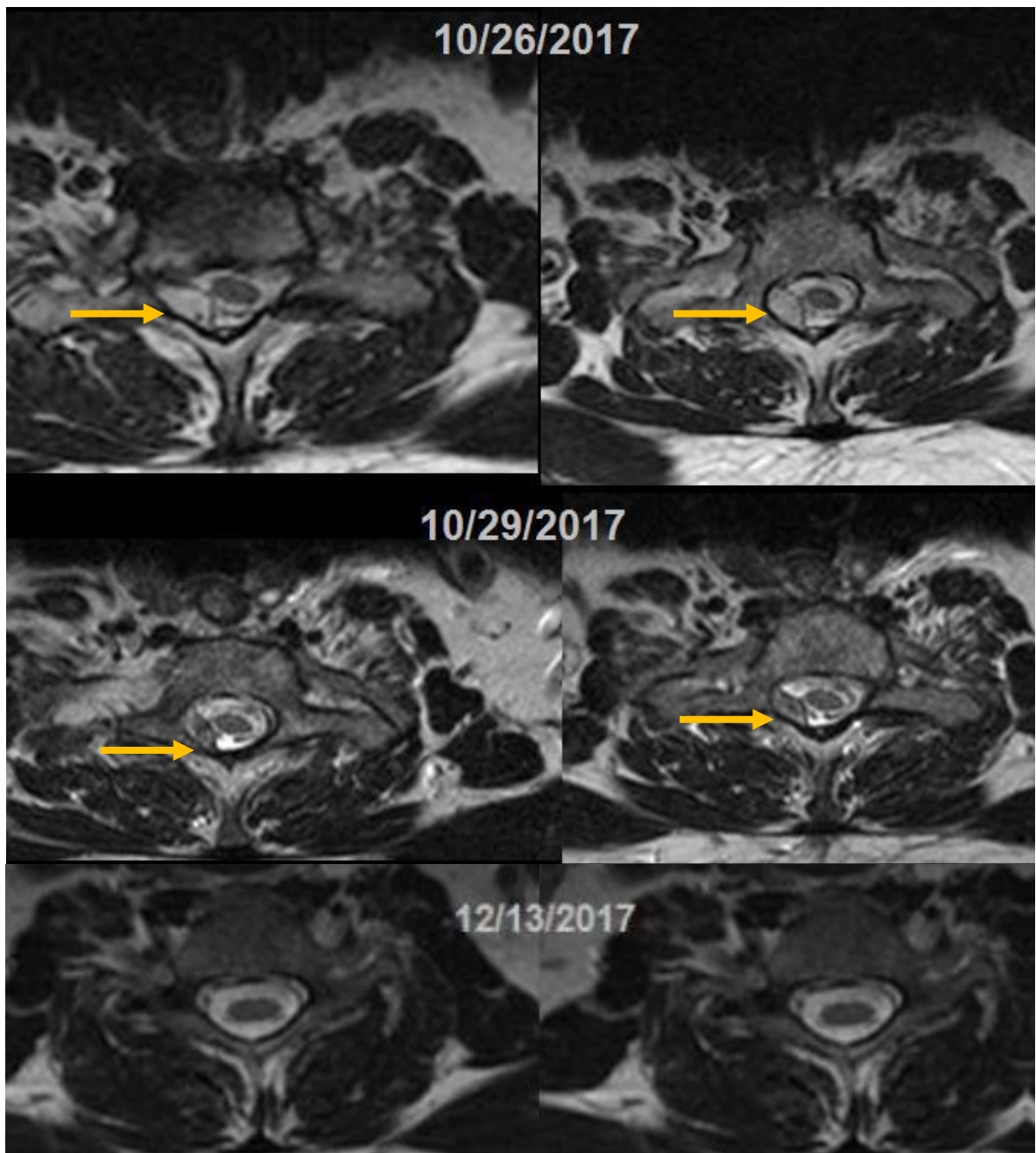


Fig. 2. Axial cervical magnetic resonance imaging (MRI). 10/26: Right C6-7 through T1-2, 1.5 x 0.7 x 4.0 cm, T2 hyper-intense with signal intensity similar to CSF, epidural fluid collection causing leftward deviation of the cord and mild deformation, with severe stenosis of the right neural foramina at C7-T1 and T1-T2. 10/29: Slight decrease in size of the right epidural collection, producing similar degree of mild spinal canal narrowing and associated severe neural foraminal narrowing. The collection is T2 hypo-intense to the CSF and spinal cord suggesting early blood products. 12/13: Interval resolution of right posterolateral epidural collection.



Fig. 3. Sagittal cervical magnetic resonance imaging (MRI). 10/26: T1 images show a collection which is isointense to slightly hyperintense to the spinal cord and cerebellum. 10/29: The collection is now hyperintense to the spinal cord and cerebellum.

rapidly evolving spinal hematoma and emergent surgical decompression is the mainstay of treatment and necessary in order to promote neurological recovery (24,25). Despite this, patients demonstrating a significant improvement of symptoms over short periods of time may have spontaneous resolution of epidural hematoma when managed conservatively (26). Given that epidural hematomas frequently present with acute onset and rapidly worsening symptoms, reports of nonsurgically managed epidural hematomas after CESI are scarce.

Epidural hematoma is a major complication of ESI

and has previously been reported (27-29). Associated patient risk factors for developing an epidural hematoma include anticoagulation and technically difficult placement (15,30-32). The overall incidence however is low. In a prospective 8 year single institution study of 1182 CESIs, a total of 2 CEH were identified and subsequently decompressed surgically (33). Similarly, over the course of 16 years, only 2 cases were identified, in a retrospective study (27) of 23,552 patients, at a single facility. Our patient was not on anticoagulation or NSAID therapy. He was on maintenance low dose aspirin; though this is not considered a significant risk factor for spinal hematoma,

concomitant aspirin use has been reported in cases of CEH (34,35). Placement of his CESI was uneventful; however, unique to our patient was a history of multiple repeat CESIs, which may be a contributing risk factor in the development of a CEH. A similar observation was made once prior by Williams et al (23), who reported CEH in a patient following repeat CESIs for chronic pain. Underlying spinal pathology, such as spinal stenosis, herniated intervertebral disc, and tissue hypertrophy, as well as prior manipulation of the epidural space, can cause tissue fibrosis and scarring (36). All of these risk factors were present in this patient and may have led to an increased risk of epidural bleeding following CESI. Multiple repeat CESIs may be a risk factor for the development of CEH and practitioners should have a heightened suspicion of epidural hemorrhage in patients with this history. A larger retrospective multi-center study

is needed to assess the risk of CEH developing in patients with a history of multiple CESIs.

## CONCLUSION

CEH after a CESI is a rare, though serious, complication. In this case study, we report a developing CEH after a repeat CESI. The initial radiographic findings were not entirely consistent with hematous fluid and diagnosis may have been complicated by residual injectate from the patient's recent CESI. Though symptoms of CEH are frequently dramatic in onset, requiring urgent surgical decompression, we report a spontaneous resolution of CEH with watchful waiting. Our patient's medical history was significant for multiple cervical injections which may constitute a risk factor for the development of CEH.

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