Case Report

ACUTE EPIDURAL HEMATOMA FOLLOWING A CERVICAL EPIDURAL INJECTION IN A PATIENT WITHOUT BLEEDING RISK

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An acute epidural hematoma following a cervical interlaminar epidural injections is rare, but when it occurs, it can be associated with devastating complications if appropriate corrective action is not taken. Surgical decompression or conservative management has been proposed in managing acute epidural hematoma, based on the progression of symptomatology with neurologic dysfunction.

We report a case of a cervical epidural hematoma in a healthy 43-year-old functioning female patient without overt risk factors for procedural hemorrhagic complications including baseline coagulopathy, baseline dysfunction, and intake of anticoagulants. There were no technical difficulties in performing the procedure. The patient developed symptomatology consisting of neck pain, left upper extremity pain, weakness in the left lower extremity, and inability to urinate following the cervical interlaminar epidural. Unbeknownst to the provider, who had performed the epidural injection, the patient presented to the local emergency room and underwent a workup to rule out cardiac etiologies for her symptoms. The patient was also given ketorolac intravenously for neck pain. The provider who performed the epidural injection was informed 18 hours post-procedure.

The patient had progressive symptomatology with neurological dysfunction including weakness and numbness. The provider suspected an epidural hematoma. As a result, an emergent magnetic resonance imaging (MRI) was performed, which showed a significant collection of blood within the epidural space, which clinically required surgical decompression. Subsequently, surgical decompression was carried out with full recovery of neurologic function.

Issues in managing an acute epidural hematoma are related to avoidance of drugs increasing hemorrhagic complications and rapid diagnosis with appropriate therapy, with shared decision making. These hematomas can be managed conservatively or with surgery. Nonsurgical management is influenced by the initial neurological presentation and spontaneous recovery or at least lack of progression of the deficit. After reasonable monitoring, if stable status is absent and neurological dysfunction is increasing, then surgical decompression is recommended.

Key words: Cervical epidural injection, cervical epidural hematoma, bleeding risk factors, surgical decompression, nonsurgical management, ketorolac

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Significant literature continues to accumulate for interventional techniques and related hemorrhagic risks in recent years (1-7). An overwhelming majority of the literature has focused on patients receiving antithrombotic or anticoagulant therapy and discussions about optimal duration to discontinue anticoagulants. Cervical epidural injections with or without steroids are

commonly used in the management of chronic neck pain, secondary to multiple pathologies (8-11) and have been shown to be effective based on the evidence derived from systematic reviews of randomized controlled trials. The analysis of utilization patterns in the United States in the Medicare population for cervical and thoracic epidural procedures demonstrated 397 per 100,000 population in 2016, with significant increases of 101% from 2000 to 2009 with an annual increase of 8%, but with reduced growth in utilization with only a 4% increase (or annual increase of 0.5%) from 2009 to 2016. Multiple prospective evaluations have studied the bleeding risk of interventional techniques in chronic pain (8,12,13). In addition, multiple investigations have been performed to assess the risk of cervical epidural injections in chronic pain management settings (14-19). Manchikanti et al, in studying the role of antithrombotics (15,16) and complications of epidural injections by other investigators (14,17-20), have shown a lack of correlation of epidural hematoma formation with cervical epidural injections and anticoagulant therapy. In a manuscript describing prevalence of epidural hematoma following cervical epidural injections, Manchikanti et al (4) described one patient requiring surgical decompression, with a second patient improving without surgical decompression. Both patients had no history of taking anticoagulants. Epidural hematoma formation has also been reported in patients receiving ketorolac, selective serotonin reuptake inhibitors (SSRIs), flaxseed, fish oil, and other herbal products (1-3,6,14). Smith et al (19), in a recent systematic review, concluded that other than interlaminar procedures, the evidence does not support the view that anticoagulant and antiplatelet medication must be ceased before image-guided spine pain procedures. They showed that procedures involving interlaminar access carry a risk of hemorrhagic complications, regardless of whether anticoagulants are ceased or continued. Further, the evidence also showed that ceasing anticoagulants carried a risk of serious thrombotic consequences, including death. Thus, it is clear that epidural hematoma may be associated with or without anticoagulant therapy during interlaminar access.

We report a case of a healthy female patient with previous anterior cervical discectomy and fusion with no hemorrhagic risk factors related to bleeding.

CASE REPORT

The patient is a 43-year-old caucasian female with a body mass index (BMI) of 20.7. She suffered from chronic pain associated with radiation into shoulder blades and upper back with headaches. The patient was treated with cervical epidural injections after testing negative for facet joint pain, and had been receiving cervical interlaminar epidural injections once every 3 to 6 months for the prior 4 years with local anesthetic alone without steroids, with no adverse effects. Magnetic resonance imaging (MRI) of her cervical spine with and without contrast performed in September 2012 showed a stable anterior cervical fusion with mild reversal of the mid cervical curvature. There was a small right paracentral disc protrusion at C6-C7 with mild narrowing of the canal at C5-C6 related to the posterior osteophyte that barely contacted the cord, with no cord displacement or compression. No abnormal contrast enhancement was identified.

In November 2017, she presented with usual symptoms of returned pain after good relief lasting almost 3 months for a repeat epidural injection. After initial preparation, she was transferred to the operating room with intravenous placement. She was positioned in prone position and sterile preparation was carried out with DuraPrep. Following this, under appropriate sedation, the epidural space was entered between C6 and C7 with a paramedian approach under posteroanterior fluoroscopy guidance. The needle was placed with loss of resistance technique without difficulty, with intermittent fluoroscopy followed by an injection of Omnipaque 240, 2 mL. This injection showed good filling pattern into the epidural space, without subarachnoid or intravascular entry (Fig. 1). Following this, she was injected with 5 mL of 0.5% lidocaine. Total fluoroscopy time was 5 seconds. There were no side effects or complications noted either in the recovery room or at the time of discharge. The procedure was considered uneventful.

The next morning, (18 hours after the procedure), the patient notified the interventional practitioner that she had started experiencing left upper extremity pain with neck pain and some numbness and weakness in the left lower extremity with inability to urinate. She presented to the emergency room at a local hospital 6 hours after the procedure. In the emergency room,

Fig. 1. Cervical interlaminar epidural injection at C6-C7 with contrast injection.

she underwent a cardiac workup to rule out myocardial infarction and was administered intravenous ketorolac. She was also catheterized since her bladder was full and was subsequently discharged with continued symptomatology. She progressively worsened and called the first author (LM) in the morning. An epidural hematoma was suspected and an emergent MRI was ordered. Review of the MRI with the radiologist revealed a 5.4 x 1.7 x 0.9 cm collection of blood within the right dorsal lateral epidural space, spanning from C6-T2 levels. This collection was intrinsically bright on the T1 weight image with a heterogeneously bright appearance on the T2 weighted images and no enhancement. The collection also displaced the cervical cord anteriorly and to the left with complete

effacement of the normal cerebrospinal fluid signal. Tiny air bubbles were also detected. Overall, there was severe spinal stenosis, even though there was no definite cord signal abnormality identified. Figures 2 and 3 illustrate the hematoma.

Following the assessment, a neurosurgeon at the initial hospital was consulted. That neurosurgeon opted to manage the patient conservatively. She was extremely anxious with increasing symptomatology, including progressive weakness and numbness. The patient desired to be transferred to a different facility for a second opinion. As a result, she was transferred to the second hospital and the first author (LM) reviewed the MRI with the

A. MRI Sagittal STIR imaging, demonstrating borders of epidural hematoma (left), and initial tract of injection (right) into the epidural space.

B. MRI Axial T1 imaging showing borders of epidural hematoma and mild compression of the cord.

C. MRI Axial T1 FS Post imaging showing borders of epidural hematoma and mild compression of the cord to the left.

D. MRI Sagittal T2 imaging showing borders of epidural hematoma.

Fig. 2. MRI of epidural hematoma.

neurosurgeon (TG). A decision was made to proceed with immediate decompression under general anesthesia. Laminectomies were performed at C6, C7, T1, and T2. The surgeon noted a very large acute epidural hematoma in the vicinity of C7 and T1 extending up to C6 and down to T3. The epidural hematoma was evacuated. Posterior instrumented

fusion was performed at C6, C7, T2, and T3 with autologous bone graft and allograft packed over the lateral masses and into the facet joints bilaterally. After the initial hospitalization of 3 days, she was discharged home satisfactorily.

She is being followed on an outpatient basis. She

Fig. 3. MRI of epidural hematoma continued.

continues to have moderate neck pain, but she has returned to work and is functioning well. She has also developed a urinary tract infection on 2 occasions that was treated with antibiotics. There was no residual weakness or numbness.

DISCUSSION

This is a case of epidural hematoma with an uneventful, short, single attempt cervical epidural injection with a 5-second fluoroscopy, requiring surgi-

cal decompression with complete recovery without residual sequelae, without antithrombotic therapy, SSRI therapy, fish oil, or any other drugs related to coagulopathy. However, she had an anterior cervical discectomy and fusion in the past, which may have presented a remote risk factor. This situation has been described as an intraoperative risk factor with increased bleeding from arteries in the posterior longitudinal ligament (20).

The literature has no prevalence statistics for cervical epidural hematoma, though a range of 1.38 in 10,000 to 1 in 250,000 epidural procedures has been reported (14). Even though Manchikanti et al (15,16) have reported no instance of cervical epidural hematoma in patients taking anticoagulants, they have reported 2 cases of acute cervical epidural hematoma following a cervical epidural injections in 2 patients without active anticoagulant therapy (4). These 2 case reports provided a prevalence rate of 0.0085% (2 of 23,552) over a 16-year period at their facility. The present case report adds to these numbers. Others have also reported cases in patients without antithrombotic therapy or associated bleeding risk (5,7). However, there have been reports of cases related to antithrombotic therapy, fish oil, ketorolac, as well as SSRIs (1-3,6,20-25).

Cervical epidural hematoma is a rare complication of cervical epidural steroid injections. Anticoagulant therapy alone or with concomitant use of multiple drugs or supplements may increase the ultimate risk. An epidural hematoma may develop with or without anticoagulant therapy, and interlaminar entry into the epidural space has been categorized as high risk (1-3,19). Risk factors other than anterior cervical laminectomy and fusion include anatomic abnormalities of the vertebral column, technically difficult or repeated epidural procedures, older age, intrinsic thrombocytopenia, platelet dysfunction, renal failure, and coagulopathy related to hemophilia (1-7,14,18). The majority of the cases reported in the literature are related to idiopathic or spontaneous origin with 17% being related to anticoagulation and only 10% related to spinal or epidural needle placement (26). In addition, the majority of the cases were also related to continuous epidurals in anticoagulated patients or in patients with thrombocytopenic disorders (27-29).

Consequently, single epidural injections are safer than continuous epidurals. Further, without technical difficulties and major anatomical risk factors, it is unusual to develop an epidural hematoma in a patient as in our case report. Anatomically, the cervical spinal cord is the most vulnerable to compression with defects in the dura because of the small diameter and small epidural space in this area compared to thoracic and lumbar levels (28). In addition to this, a wide anatomic variation has been reported with arterial distribution in the cervical spine, which may increase such risk with interlaminar epidural injections, but more commonly with transforaminal epidural injections (30).

In considering appropriate management of cervical epidural hematoma, conservative or surgical management may be offered. In general, large hematomas with rapid and debilitating onset of symptoms warrant urgent surgical decompression to avoid permanent deficits. Thus, conservative management is a recommendation for cervical epidural hematomas in patients presenting with minimal neural deficits and spontaneous recovery has been observed in these patients with minimal neurological deficits (4-7). Some individuals have recommended nonsurgical management with the postulation that it is 25% more effective than surgery in achieving complete recovery in spontaneous epidural hematoma, regardless of neural deficit upon presentation (31-34). However, in acute epidural hematoma following epidural injection, surgical management should always be considered as a priority in terms of decision making. Further, surgical management is always associated with inherent risks of nerve damage, leaks, and infections associated with multilevel laminectomies required to decompress often extensive hematomas (31). Based on current opinion and the case reports, it is recommended that ketorolac be avoided in interlaminar procedures in the post-operative period. Administration of ketorolac in the patient in this case report may have contributed to exacerbation of hematoma.

In summary, vigilance and appropriate therapy, including surgical intervention, is crucial in managing an acute epidural hematoma following an interlaminar epidural injection in patients with or without bleeding risks.

CONCLUSION

Cervical interlaminar epidural injections are frequently used in managing chronic neck pain with local anesthetic alone or with steroids. Well-known causes of epidural hematoma include antithrombotic therapy, bleeding disorders, challenging placement/multiple

attempts, and extensive anatomical anomalies. None of these were present in this patient. Rapid diagnosis and appropriate management with multidisciplinary decision making is crucial in achieving a successful and acceptable outcome.

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