Spontaneous spinal epidural hematoma following IV heparin and catheter-directed thrombolysis for deep vein thrombosis

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ABSTRACT

Spontaneous spinal epidural hematoma (*SSEH*) is a rare condition, and it usually presents with acute onset neck or back pain, progressive weakness, and other symptoms of spinal cord compression. Catheter-directed thrombolysis is one option for limbs threatened by iliofemoral venous thrombosis; other options, such as venous thrombectomy (either open or percutaneous), are also available. There are few reported cases of SSEH owing to catheter-directed thrombolysis for deep venous thrombosis (*DVT*). We present a case of a 65-year-old man who presented with left lower limb extensive iliofemoral DVT and received catheter-directed thrombolysis. The patient initially had rapid improvement in his symptoms with restoration of limb perfusion. However, within 6 hours of starting catheter-directed thrombolysis, the patient developed extensive SSEH and underwent emergent spinal decompression surgery with laminectomy of T11 to T12 with complete resolution of the neurological deficit. Clinicians should consider SSEH in differential diagnosis if the patient develops acute onset neck or back pain after catheter-guided thrombolysis for DVT. (J Vasc Surg Cases Innov Tech 2024;10:101541.)

Keywords: Spontaneous spinal epidural hematoma; Catheter-directed thrombolysis; Iliofemoral deep vein thrombosis (DVT); Neurological deficit; Laminectomy

As per the American Society of Hematology guidelines for patients with proximal deep venous thrombosis (*DVT*), anticoagulation therapy alone is recommended over thrombolytics. Thrombolysis can be considered in patients who develop phlegmasia cerulea dolens, or younger patients who are at low risk for bleeding and have iliofemoral DVT. Phlegmasia cerulea dolens is an uncommon but life-threatening complication of acute DVT, and it is characterized by marked swelling of the extremities with pain and cyanosis and causes arterial ischemia and ultimately gangrene with high amputation and mortality rates. For patients with extensive DVT in whom thrombolysis is considered, catheter-guided thrombolysis (*CDT*) is recommended over systemic thrombolysis.[1] CDT is also recommended as first-line therapy by the American Heart Association for extensive iliofemoral DVT with a risk of limb compromise.[2] The most common complication of CDT is bleeding and most incidents of bleeding are minor and are confined to the access site, whereas major bleeding complications are infrequently reported including intracranial hemorrhage (<1%), retroperitoneal hematoma (1%), and musculoskeletal, genitourinary, and gastrointestinal bleeds (3%).[3] Spontaneous spinal epidural hematoma (SSEH) is a rare complication of CDT and to our knowledge, there are few reported cases of SSEH after CTD for iliofemoral DVT. Our case report highlights a rare but devastating complication of CDT, if remains undiagnosed can lead to significant morbidity and mortality. The case report is published with the consent of the patient.

CASE REPORT

A 65-year-old man presented to the emergency department with complaints of sudden onset of left lower extremity swelling that started 6 hours before presentation. His past medical history included hypertension, hyperlipidemia, and a history of smoking. Vital signs upon presentation to the emergency room were relatively stable. On physical examination, he was noted to have left lower extremity swelling, erythema, and tenderness. There was a mild sensory loss to pain and tactile sensation. Dorsalis pedis and posterior tibial pulses were present bilaterally. A venous duplex ultrasound examination was performed showing extensive DVT in the left common femoral, profunda femoral, popliteal, posterior tibial, peroneal, and external iliac veins, which was also seen on the venogram performed during intervention (Fig 1).

The patient was immediately anticoagulated with 5000 units of intravenous heparin bolus followed by weight-based heparin infusion and was admitted to the intensive care unit for close

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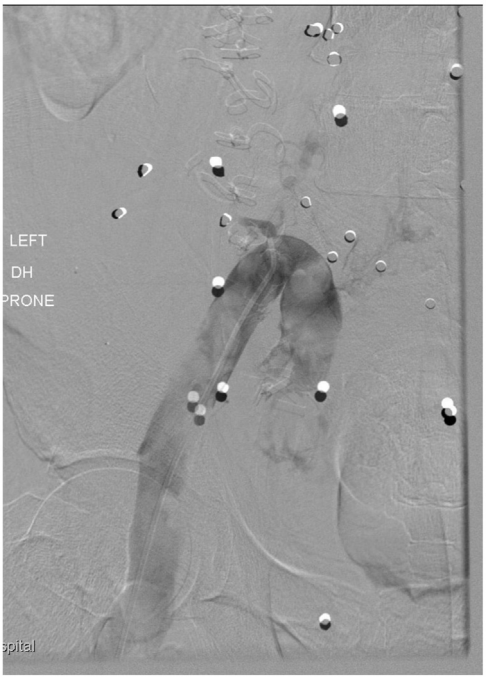

Fig 1. A venogram showing extensive left iliofemoral deep venous thrombosis (*DVT*).

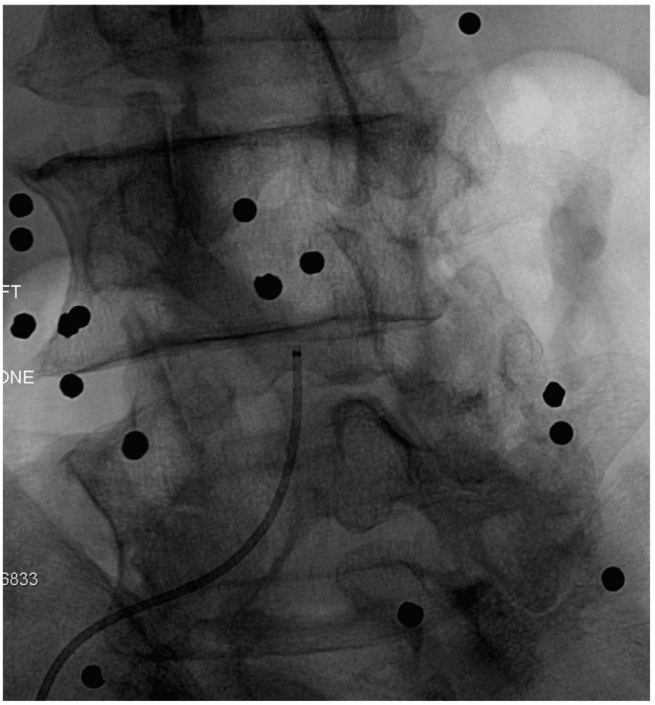

Fig 2. Fluoroscopic image of catheter-guided thrombolysis (*CDT*) catheter extending into the inferior vena cava from the left femoral vein.

monitoring. Despite anticoagulation therapy, he experienced a deterioration of symptoms, including worsening pain, swelling, and left lower extremity cyanosis concerning for phlegmasia cerulea dolens. CDT was considered because the patient's symptoms were worsening and to prevent limb ischemia. The initial laboratory workup and past medical history showed no contraindications to fibrinolytic therapy (eg, no prior history of brain bleed, stroke within the past 3 months, uncontrolled blood pressure, active internal bleeding, or thrombocytopenia). Consequently, he underwent catheter-directed thrombolysis using alteplase, 5 mg IV bolus followed by 1 mg/hour dosage for 12 hours via the femoral vein sheath (Fig 2).

Throughout the treatment, the partial thromboplastin time ranged from 60 to 95 seconds, and fibrinogen levels varied from 175 to 280 mg/dL. Patient symptoms of left lower extremity pain and cyanosis improved; however, approximately 6 hours after CDT, he began to complain of lower back pain. He received pain medication to alleviate his back pain, but subsequently the patient developed urinary retention and weakness of his lower extremities. Alteplase was stopped after a discussion with the consulting physician. Given the concern for concealed hematoma, an MRI of the spine was performed, and it showed SSEH extending from T11 to T12 (Fig 3).

The CDT catheter was removed, and heparin was reversed with tranexamic acid. Neurosurgery was consulted, after which the patient underwent emergent spinal hematoma evacuation with laminectomy of T11 to T12. There were no intraoperative complications, and the procedure was well-tolerated. Within 24 hours of epidural hematoma evacuation, the patient's symptoms almost resolved. On postoperative day 5, anticoagulation with intravenous heparin was started after neurosurgery clearance and the patient was discharged to a rehabilitation facility on oral anticoagulation with apixaban. Patient was followed up in the office and was doing well with no residual focal deficit.

DISCUSSION

SSEH is a rare neurological emergency, and it occurs in about 0.1 in 100,000 people per year.[4] SSEH occurs owing to blood accumulating in the epidural space compressing the spinal cord and nerve roots leading to neurological deficits.[5] SSEH mainly occurs in the cervicothoracic (C5-T2) and thoracolumbar (T10-L2) levels.[6] SSEH is characterized by its acute onset compression of neural tissue, either by direct injury or ischemia,[7] and hence immediate surgical intervention is required in the presence of neurological dysfunction.[8] Spontaneous refers to idiopathic and atraumatic etiology of bleeding and risk factors include coagulation dysfunction, vascular deformities, and pregnancy.[9] SSEH typically presents with acute spinal pain, affecting approximately 84.8% of cases.[8] Patients can present with either neck or back pain, depending on the hematoma location with or without radiculopathy symptoms. After the initial presentation of severe spinal pain, it can take up to 12 to 24 hours before neurological symptoms manifest. Surgical decompression and hematoma evacuation are the first line of treatment.[10]

In this case, the patient's complaint of acute onset back pain prompted the diagnosis of SSEH, but other

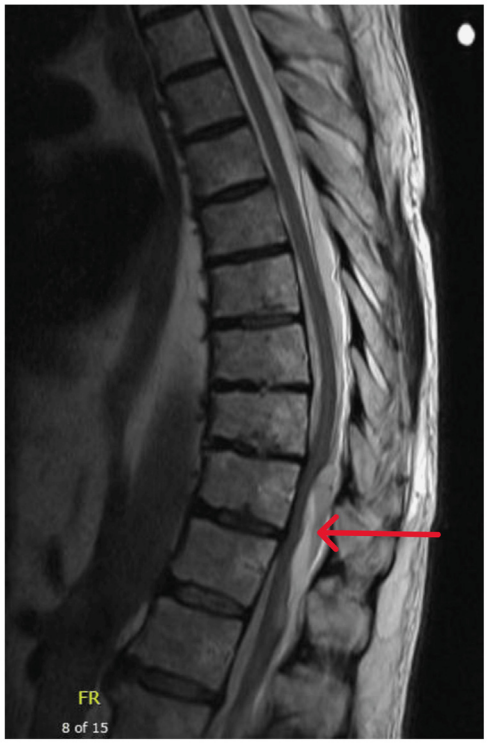

Fig 3. Transverse view of magnetic resonance imaging of the spine at T12 showing spontaneous spinal epidural hematoma (*SSEH*).

differentials include retroperitoneal hematoma, ischemia, tumor, spinal epidural abscess, transverse myelitis, or acute vertebral disc disease. The outcome of operative spinal cord decompression relies heavily on the duration of symptoms; time lost to make a diagnosis leads to poor prognosis. Early identification and treatment are essential to ensure the reduction of neurological deficits.[6] Emergent magnetic resonance imaging is the first-line diagnostic method since it allows for fast evaluation of the vertebral column and spinal cord. Lawton et al[11] showed an inverse relationship between neurological outcomes and the time interval between symptom onset and surgery. Thus, this condition needs to be diagnosed and treated promptly for better recovery. Surgery performed >12 hours after symptom onset can have detrimental effects. The incidence of SSEH after CDT is rare and there are very few reported cases of SSEH after CDT.[12,13]

CONCLUSIONS

This case report highlights the importance of early diagnosis and prompt treatment of SSEH, although it is a rare complication of CDT. Catheter-directed thrombolysis is recommended for extremity DVT at risk of limb ischemia. The common complication of CDT is bleeding, it is usually related to the access site and in most cases is minor. SSEH is a rare complication of CDT. We suggest that the patient should be monitored closely after the initiation of the CDT for DVT. Physicians must have a high degree of clinical suspicion for SSEH when a patient develops acute onset spinal pain independent of neurological compromise after CDT. SSEH is associated with significant morbidity and mortality if diagnosis or treatment is delayed. Timely diagnosis and early treatment are the mainstays for a good prognosis and recovery.

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