

Warfarin-related epidural hematoma: a case report

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Abstract

Spinal epidural hematomas are rare, with trauma being the most common cause. Spinal epidural hematomas caused by coagulation dysfunction are even rarer; however, long-term warfarin therapy increases the risk. The clinical manifestations of spinal epidural hematoma are neurological deficits below the corresponding spinal cord segment level. Magnetic resonance imaging (MRI) is the preferred method for diagnosis, and the main treatment for epidural hematoma with typical symptoms is urgent decompression of the lumbar spine. We describe an almost 80-year-old female patient who received long-term oral warfarin therapy for atrial fibrillation. She developed sudden onset waist pain, and 2 days later, she developed pain and weakness in both lower limbs. Computed tomography (CT) of the thoracolumbar spine showed no obvious hematoma. Eight days after admission, contrast-enhanced CT of the thoracolumbar spine showed intraspinal hematomas at T5–T8 and T12–L2 levels. We performed T3–T7 laminectomy, T5–T8 hematoma removal, and spinal dural repair. The clinical symptoms did not improve significantly, postoperatively. The low incidence of spinal epidural hematoma after anticoagulation treatment means this condition is not recognized timely, and it is misdiagnosed easily. Clinicians should consider this condition when patients treated with anticoagulants have neurological deficits below a spinal segmental plane.

Keywords

Warfarin, anticoagulation therapy, epidural hematoma, spinal canal surgery, contrast-enhanced CT, symptom, incidence, neurological deficit

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Introduction

Spinal epidural hematoma is a rare disease, and even rarer when associated with coagulation dysfunction. The annual incidence is 1 per million people.¹ Epidural hematoma of the thoracolumbar spinal cord has been reported rarely. To date, there have been few studies of the pathophysiology and epidemiology of spinal cord epidural hematoma. Lack of awareness of the disease might be a cause of delayed diagnosis. The exact cause of epidural hematoma is uncertain; possible causes are coagulation dysfunction, vascular disease, and surgery.² Previous studies have shown that epidural hematomas caused by anticoagulation therapy may have accounted for 17% of all reported cases.³ Some scholars believe that anticoagulant therapy alone would not induce spinal hemorrhage. However, when patients receiving anticoagulant therapy experience coughing, sneezing, defecation, and other movements that increase abdominal pressure, it is easy for Batson's plexus to rupture, resulting in epidural hematoma.⁴ Patients with spinal epidural hematoma usually have pain in the area of the body corresponding to the bleeding, and radiating pain in the lower limbs accompanied by motor, sensory, and autonomic dysfunction. However, these symptoms might disappear a few hours or days after the pain at the bleeding site.¹ Magnetic resonance imaging (MRI) is the first choice in making the clinical diagnosis.⁵ In patients with contraindications to MRI, spinal contrast-enhanced computed tomography (CT) or CT myelography are alternatives.⁶ Patients with a confirmed diagnosis or who present with typical clinical symptoms are recommended to undergo timely surgical decompression, while patients without apparent neurological deficits can be treated conservatively.⁷ This report introduces a case of failure to restore nerve function after surgery for spinal epidural

hematoma owing to delays in diagnosis and treatment, to improve clinicians' awareness of this disease and emphasize the importance of timely diagnosis and treatment.

Case report

The reporting of this study conforms to the CARE guidelines,⁸ and all patient details have been de-identified.

On 18 September 2020, an almost 80-year-old female patient suddenly developed low back pain accompanied by fecal incontinence. After 2 days, she came to the emergency department of the First Affiliated Hospital of Jinan University for treatment. In addition to having a pacemaker, the patient had taken warfarin 0.75 mg once a day long-term to treat atrial fibrillation.

On admission, the patient felt weakness in both lower limbs. Her hemoglobin concentration was 110 g/L, and the international normalized ratio (INR) was 12.19. It was unclear whether the patient had increased the dose of warfarin on her own before the onset of illness. Plain CT of the thoracolumbar spine showed degeneration in the thoracic and lumbar spine, osteoporosis, and degeneration of the intervertebral discs from L1/2 to L5/S1 with disc herniation. Schmorl's node of the L4 vertebral body and L1/2 vertebral body endplate inflammation were also seen. Neurological examinations showed extensive tenderness in the interspinous and paraspinal areas of the affected back region, accompanied by radiating pain in both lower extremities. The muscle strength in both lower extremities was grade IV. Muscle tension and sensation, tendon reflexes, and Babinski sign in the extremities were normal. Warfarin was stopped, and the patient was treated with 10 mg vitamin K₁ once a day, intramuscularly. We emphasized the importance of close observation.

On the third day, the patient's INR returned to 1.31, but there was a sudden worsening of weakness in both lower limbs. She stated that her feet could not be lifted above the bed or moved off the bed, and she had developed incontinence. Neurological examinations showed that the muscle tension in both lower limbs had decreased, the muscle strength in both lower limbs was grade 0, tendon reflexes in both lower limbs had disappeared, and deep and superficial sensations below the navel had disappeared. The emergency doctor referred her to the orthopedic department. The patient stated that she had not suffered any trauma to the chest or back before the onset of symptoms after hospitalization. The orthopedic surgeon gave the patient neurotrophic and other symptomatic treatment and waited for contrast-enhanced CT scans of the thoracolumbar spine, during which the patient's condition did not improve.

On the eighth day, the neurologist performed a lumbar puncture for the patient. The cerebrospinal fluid was light red, and the red blood cell count was $6 \times 10^9/L$. Contrast-enhanced CT of the thoracolumbar spine revealed the following: T5–T8 and T12–L2 level intraspinal hematomas;

scoliosis; L1, L2, L5, and S1 vertebral body endplate osteochondritis; T9/10 and L5/S1 intervertebral disc degeneration; and T2/3 and L4/L5 intervertebral disc herniation (left posterior type) (Figure 1). The diagnosis of epidural hematoma was confirmed, and the patient consented to our recommended treatment; therefore, she was treated immediately. Surgery involved T3–T7 laminectomy, T5–T8 hematoma removal, and spinal dural repair. During the operation, the neurosurgeons found that the dura mater was attached to a dark brown blood clot. Macroscopically, there was a chronic hematoma clot (Figure 2a). Histopathological examination confirmed the diagnosis of chronic hematoma (Figure 2b). No subdural hematoma or vascular malformations were found during the operation. After the surgery, the patient underwent neurological rehabilitation; however, her muscle strength, sensation, and incontinence did not improve. The patient provided informed consent for the publication of the case.

Discussion

Spinal epidural hematoma is a rare phenomenon and is a rare cause of spinal

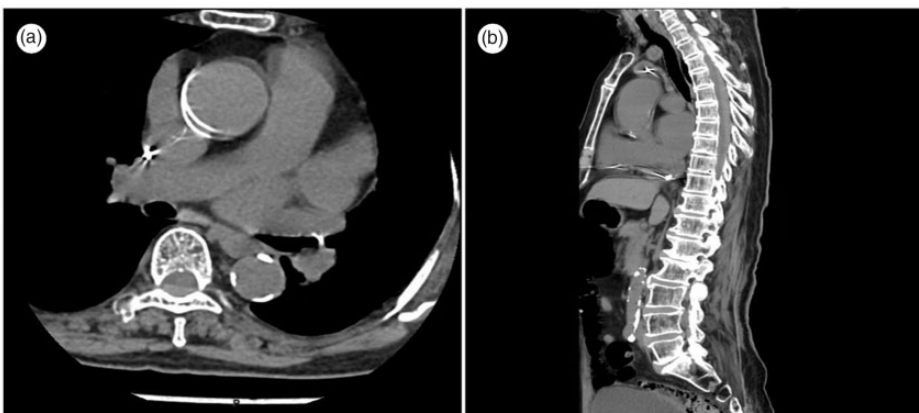


Figure 1. Contrast-enhanced CT images of the thoracolumbar spine (a) The hematoma can be seen in the spinal canal; (b) An epidural hematoma is visible in segments T5–T8. CT, computed tomography.

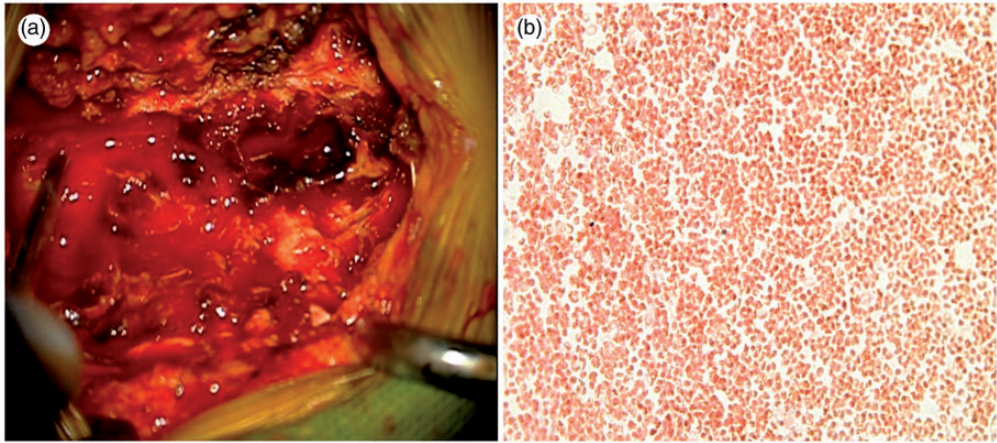


Figure 2. Intraoperative visual field and pathological findings (a) A dark brown blood clot is attached to the dura mater; (b) Pathology showing numerous red blood cells, which further confirmed hematoma formation (hematoxylin and eosin staining; $\times 100$).

cord compression, accounting for less than 1% of all spinal epidural space-occupying lesions.⁹ Epidural hematomas may occur in any spinal cord segment, but occur mainly in the cervical and thoracic medulla.¹⁰ A meta-analysis showed that the male to female ratio of the condition is approximately 1.4:1. The disorder can occur at any age, with most cases occurring between 50 and 70 years of age.¹¹ Although the etiology is undetermined, possible causes of spinal epidural hematoma are coagulopathy, vascular disease, surgery, hypertension, and trauma.¹² However, to date, it has not been possible to determine from existing data whether the origin of bleeding is an artery or a vein. A currently emerging hypothesis is that anticoagulation therapy alone may not cause spinal cord hemorrhage in vertebral venous plexus rupture. It is possible that there is a “locus minoris resistentiae” and increased pressure inside the vertebral venous plexus, which may lead to spinal cord hemorrhage and spontaneous spinal hematoma.⁴ Depending on the location and size of the hematoma, the clinical manifestations may

vary. However, the most common and typical clinical manifestation is sudden severe pain with or without radiating pain at the corresponding segment of the affected spinal cord, followed by signs and symptoms of spinal cord compression.¹³ These symptoms usually occur 3 hours after the onset of pain, and some patients even develop the typical clinical symptoms and signs after 2 to 3 days, as in our case.¹

MRI is the preferred diagnostic method for spinal epidural hematoma. MRI can show the location and extent of the hematoma, degree of spinal cord compression, and the spinal cord’s signals.^{10,14} In patients with artificial valves, stent implants, and pacemakers, who cannot undergo MRI examination, contrast-enhanced CT and other examinations are feasible. However, contrast-enhanced CT imaging is not as distinct as MRI in the spinal canal, which may cause incorrect diagnosis, misdiagnosis, or missed diagnosis.¹⁵ CT myelography is superior to MRI in showing the contours of intravertebral extramedullary lesions, which solves the difficult problem in patients with intraspinal space-occupying

lesions who cannot undergo MRI for various reasons.⁷ After confirming the diagnosis, surgical decompression should be performed as soon as possible to remove the hematoma.¹⁶ Hemilaminectomy is the first choice because most hematomas are located in the lateral or dorsolateral spinal canal. Conservative treatment should only be attempted in patients with mild or non-progressive neurological deficits, especially infants or children. Close follow-up is recommended.¹⁰

In this case, our patient had atrial fibrillation and took warfarin therapy long-term; however, INR was not monitored regularly. Compared with warfarin, direct oral anticoagulants (DOACs) have more favorable efficacy and safety profiles in patients with atrial fibrillation.¹⁷ However, our patient chose and insisted on warfarin as the preferred method owing to its low price, when she began therapy. She eventually developed low back pain that progressed gradually to radiating pain to her lower limbs with abnormalities in motor, sensory, and autonomic nerve function. She could not undergo MRI because of the pacemaker and underwent plain CT of the thoracic and lumbar spine because of atypical symptoms, minor bleeding, and unclear radiography. The clinician did not consider the formation of an epidural hematoma at this time. When the patient's condition worsened on the third day, and thoracolumbar contrast-enhanced CT was performed and revealed hematomas at the T5–T8 and T12–L2 levels of the spinal canal, intraoperative treatment was further proof of the presence of an epidural hematoma. As symptoms persisted for approximately 10 days before surgery, the patient did not experience significant improvement in muscle strength, sensation, or bowel movements, postoperatively, despite rehabilitation.

In patients with spinal epidural hematoma, removing the hematoma within

12 hours after the onset of symptoms is essential to maximize recovery.¹² Therefore, when clinicians encounter patients undergoing long-term oral anticoagulation treatment who have neurological deficits below the spinal cord's compression level, clinicians should consider this disease and obtain clear MRI or contrast-enhanced CT images. Timely surgical removal of hematomas can avoid serious consequences.

In conclusion, our case report emphasizes the importance of being aware of the possibility of spontaneous spinal epidural hematoma, particularly in elderly patients receiving anticoagulant treatment. Furthermore, we emphasize the importance of prompt surgery when epidural hematoma causes severe neurological symptoms.

Declaration of conflicting interest

The authors have no conflicts of interest to declare.

Ethics statement

Approval for the study protocol was not necessary because our institutional review board does not require approval for case reports. The patient provided verbal informed consent for the publication of the case. We obtained informed consent for treatment from the patient.

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References

1. Al-Mutair A and Bednar DA. Spinal epidural hematoma. *J Am Acad Orthop Surg* 2010; 18: 494–502.
2. Uribe J, Moza K, Jimenez O, et al. Delayed postoperative spinal epidural hematomas. *Spine J* 2003; 3: 125–129.
3. Sandvig A and Jonsson H. Spontaneous chronic epidural hematoma in the lumbar spine associated with Warfarin intake: a case report. *Springerplus* 2016; 5: 1832.
4. Kreppel D, Antoniadis G and Seeling W. Spinal hematoma: a literature survey with meta-analysis of 613 patients. *Neurosurg Rev* 2003; 26: 1–49.
5. Kou J, Fischgrund J, Biddinger A, et al. Risk factors for spinal epidural hematoma after spinal surgery. *Spine (Phila Pa 1976)* 2002; 27: 1670–1673.
6. Rajz G, Cohen JE, Harnof S, et al. Spontaneous spinal epidural hematoma: the importance of preoperative neurological status and rapid intervention. *J Clin Neurosci* 2015; 22: 123–128.
7. Yi S, Yoon DH, Kim KN, et al. Postoperative spinal epidural hematoma: risk factor and clinical outcome. *Yonsei Med J* 2006; 47: 326–332.
8. Gagnier JJ, Kienle G, Altman DG, et al. The CARE guidelines: consensus-based clinical case reporting guideline development. *Headache* 2013; 53: 1541–1547.
9. Alexiadou-Rudolf C, Ernestus RI, Nanassis K, et al. Acute nontraumatic spinal epidural hematomas. An important differential diagnosis in spinal emergencies. *Spine (Phila Pa 1976)* 1998; 23: 1810–1813.
10. Zhong W, Chen H, You C, et al. Spontaneous spinal epidural hematoma. *J Clin Neurosci* 2011; 18: 1490–1494.
11. Groen RJ and van Alphen HA. Operative treatment of spontaneous spinal epidural hematomas: a study of the factors determining postoperative outcome. *Neurosurgery* 1996; 39: 494–508.
12. Lawton MT, Porter RW, Heiserman JE, et al. Surgical management of spinal epidural hematoma: relationship between surgical timing and neurological outcome. *J Neurosurg* 1995; 83: 1–7.
13. Raeouf A, Goyal S, Van Horne N, et al. Spontaneous spinal epidural hematoma secondary to rivaroxaban use in a patient with paroxysmal atrial fibrillation. *Cureus* 2020; 12: e10417.
14. Tawk C, El Hajj Moussa M, Zgheib R, et al. Spontaneous epidural hematoma of the spine associated with oral anticoagulants: 3 case studies. *Int J Surg Case Rep* 2015; 13: 8–11.
15. Kokubo R, Kim K, Sugawara A, et al. [Treatment of spontaneous spinal epidural hematoma]. *No Shinkei Geka* 2011; 39: 947–952.
16. Matsumura A, Namikawa T, Hashimoto R, et al. Clinical management for spontaneous spinal epidural hematoma: diagnosis and treatment. *Spine J* 2008; 8: 534–537.
17. Carnicelli AP, Hong H, Connolly SJ, et al. Direct oral anticoagulants versus warfarin in patients with atrial fibrillation: patient-level network meta-analyses of randomized clinical trials with interaction testing by age and sex. *Circulation* 2022; 145: 242–255.