Received: 28 January 2024 | Revised: 11 March 2024 | Accepted: 16 March 2024

DOI: 10.1002/ccr3.8760

CASE REPORT

Clinical Case Reports Open Access WILEY

Conservative management of spontaneous spinal epidural hematoma: A case report with favorable prognosis

Satoshi Nakao[1] | **Hirohito Hirata**[1] | **Tomohito Yoshihara**[1] | **Takaomi Kobayashi**[1] | **Masatsugu Tsukamoto**[1] | **Yoshiaki Egashira**[2] | **Masaaki Mawatari**[1] | **Tadatsugu Morimoto**[1]

[1]Department of Orthopedic Surgery, Faculty of Medicine, Saga University, Saga, Japan

[2]Department of Radiology, Faculty of Medicine, Saga University, Saga, Japan

Correspondence
Tadatsugu Morimoto, Department of Orthopedic Surgery, Faculty of Medicine, Saga University, 5-1-1 Nabeshima, Saga, Japan.
Email: sakiyuki0830@gmail.com

Key Clinical Message

Sudden spinal epidural hematoma (SSEH) is relatively rare. Sudden pain from the neck to the back and subsequent extremity paralysis necessitate immediate head and cervical magnetic resonance imaging or computed tomography, keeping SSEH in mind. Although surgery is recommended for progressive paralysis, conservative treatment is indicated for mildly symptomatic cases.

KEYWORDS

conservative treatment, neck pain, paralysis, rare diseases, spinal epidural hematoma

1 | INTRODCUTION

Sudden spinal epidural hematoma (SSEH), first described by Jackson in 1869, is a disabling disease that is often associated with paralysis and long-term disability. It is a relatively rare disease with a reported prevalence of 0.1–1 per 100,000 people; the male-to-female ratio is approximately 1.4 to 1.[1,2] In cases of no traumatic or iatrogenic cause, the pathogenesis of SSEH seems to be hematoma formation in the epidural space due to bleeding in the epidural posterior venous network of the spinal cord. This formation not only causes direct spinal cord compression but also leads to venous congestion, white matter edema, and axonal swelling due to impaired venous drainage.[3] The known risk factors for SSEH include coagulation disorder, taking anticoagulants or antiplatelet medications, presence of mild trauma, spinal cord tumor, high blood pressure, vascular malformations, pregnancy, and Valsalva-like actions (coughing, sneezing, exertion), which can increase intravascular pressure and cause hemorrhage.[2]

As a general rule, patients with serious neurologic damage require emergency surgery.[4,5] However, conservative treatment is indicated for patients with SSEH with mild, rapid, and spontaneously recovering neurologic deficits.[6–8] Therefore, there has been no consensus on the best method of SSEH management.

This report presents a case of spontaneous SSEH with paralysis, which was completely cured by conservative treatment.

2 | CASE PRESENTATION

2.1 | Case history and examination

A 72-year-old woman with posterior neck pain was brought to our hospital for emergency care. She had no history of spinal surgery. The patient only had a history of appendicitis and dyslipidemia. The patient's vital signs at the time of admission were temperature, 37.5°C; pulse, 87 bpm; respiratory rate, 21 breaths; and blood pressure,

182/88 mmHg. The patient had no history of medication or remarkable family medical history. The onset was sudden, with discomfort in the posterior neck region, which gradually spread to both shoulders; the patient became unable to move her neck. There was no paralysis in the extremities.

Computed tomography (CT) and magnetic resonance imaging (MRI) performed at the previous hospital suggested an epidural hematoma. A hematoma of high-density area in the right posterior portion of the spinal cord was detected on CT scanning of the cervical spine (Figure 1). Contrast-enhanced MRI (sagittal T2-weighted MRI) showed a heterogeneous high-signal mass posterior to the spinal cord from C2 to C5 (Figure 2).

2.2 | Treatment, outcome, and follow-up

At the time of presentation, no posterior neck tenderness was noted. There were no obvious symptoms of paralysis. Therefore, the patient was conservatively treated with a neck collar, without medical treatment administration. The patient was also informed that emergency surgery would be required if paralysis occurred. The patient was given a wheelchair for mobility. Two days later, follow-up MRI showed that the hematoma had resolved. Moreover, the symptoms of posterior neck pain had improved. The neck collar was removed and the patient began walking (Figure 3). She had no further symptoms and was discharged home walking on day 5 after hospitalization. At discharge, she could walk by herself without assistance. The patient was independent in her daily life. She came to the hospital 2 months later, exhibiting no significant symptoms, wherein MRI showed complete resolution of the hematoma.

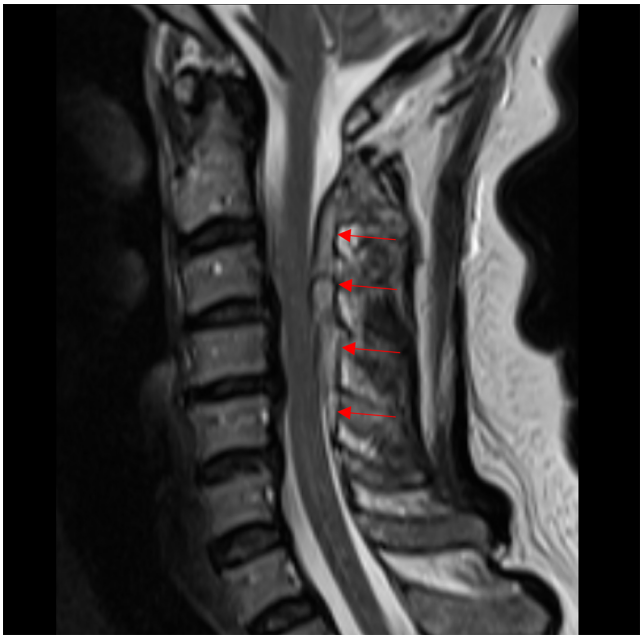

FIGURE 2 Sagittal T2-weighted cervical magnetic resonance imaging indicating a heterogeneous high-signal mass in the epidural space posterior to the spinal cord between C2 and C5 (red arrow).

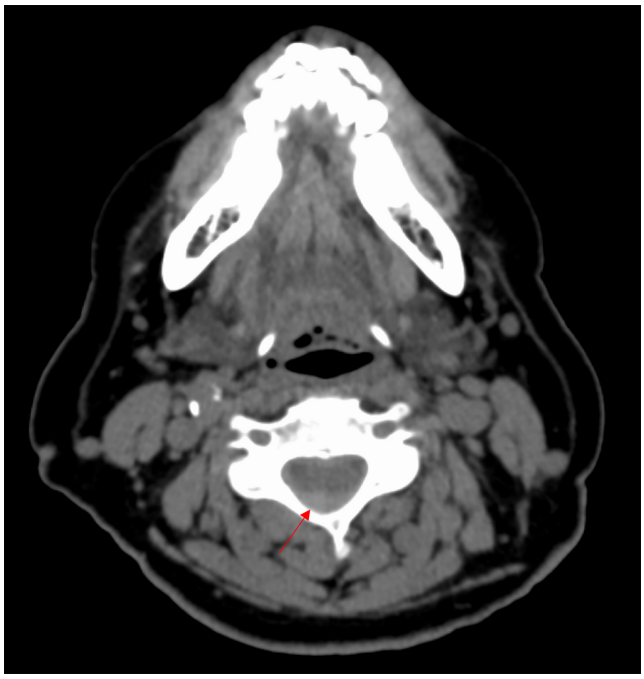

FIGURE 1 Axial cervical computed tomography indicating a heterogeneous high-density mass in the epidural cavity posterior to the spine (red arrow).

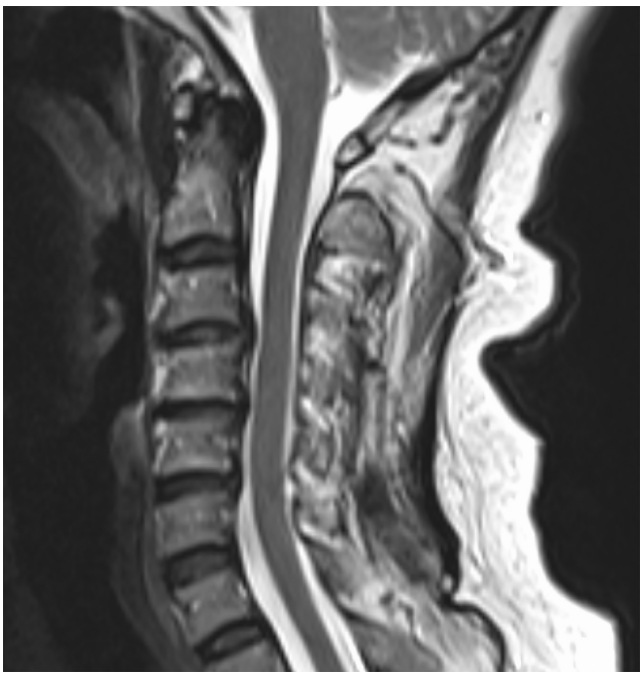

FIGURE 3 Sagittal T2-weighted cervical magnetic resonance imaging on the second day after onset indicating that the hematoma is observed to have disappeared.

3 | DISCUSSION

3.1 | Epidemiology and differential diagnosis of SSEH

SSEH is more common in middle-aged and older adults, with a predilection for the posterior epidural cavity of the cervicothoracic spine (C5–Th2) and thoracolumbar spine (Th10–L2) spine.[9] The clinical course of SSEH often begins with neck and back pain, followed by radiating pain to the upper extremities, progressing to spinal symptoms.[10]

Differential diagnoses in patients presenting with a sudden onset of pain and neurologic manifestations include herniated disk, cerebral infarction, spinal cord infarction, rhabdomyolysis, subarachnoid hemorrhage, aortic dissection, vertebral artery dissection, and acute myocardial infarction. In this case, before transfer to our hospital, a brain CT scan at another facility ruled out a cerebrovascular disorder. The patient was then transferred to us due to suspicion of a cervical epidural hematoma. Since the distribution of hematoma varies from side to side, hemiplegia and Brown-Séquard syndrome-like symptoms may occur; differentiation from cerebral infarction is particularly important.[11] In this case, the hematoma was located slightly to the right posterior to the spinal cord, and there was no association between the location of the hematoma and neurologic symptoms.

3.2 | Characteristic imaging findings of SSEH

The hematoma of SSEH is depicted as an isointense mass on T1-weighted image of MRI and as a hyperintense mass with internal heterogeneity on T2-weighted image of MRI during the acute phase within the first 24 h. After 24 h, the hematoma of SSEH is depicted as a hyperintense mass on T1- and T2-weighted MRI images, then lesion is depicted as a hypointense mass on T1- and T2-weighted MRI images.[12] The MRI images in this case were identical to the findings of acute SSEH within 24 h of onset.

To accurately diagnose SSEH, excluding cerebrovascular and cardiovascular disease is important; performing MRI is the gold standard of imaging or CT with a soft tissue window if MRI is not available.[13–15]

3.3 | Management of SSEH

Diagnosing SSEH, emergency surgery was the general rule; decompressive laminectomy was recommended immediately within 12–48 h of onset in patients with neurologic deficits to remove hematoma.[3] In addition, the reported indications for surgery include severe paralysis with Frankel classification A or B, cases that do not improve within 15 h, and cases that deteriorate over time.[16] However, the evidence for surgical indications has not been sufficient. The limitations of the reports that have recommended surgeries in the past included retrospective analysis, lack of representativeness of the study cohort to the general population, and the potential for various selection and exclusion biases. To apply the results of the previous studies, considering these limitations is crucial. In addition, developing treatment plans tailored to the individual circumstances of each patient is necessary.

Patients with mild clinical symptoms or significant recovery from an early stage would likely be treated conservatively.[3] With recent advances in imaging technology, there have been reports of patients with spontaneously resolving SSEH based on imaging evidence of complete resolution of SSEH within 3 days to 10 months.[9,17] Furthermore, many patients with SSEH with mild or recovering symptoms have never undergone MRI scan and may recover spontaneously without being diagnosed. Musha et al. stated that the choice of conservative treatment in patients with SSEH should be implemented considering no anticoagulation, paralysis equivalent to Frankel grade C or D, and recovery within 15 h after onset.[18–22] In addition, the management decision for SSEH should also take into account risk factors, poor prognosis-related factors, and the localization of the hematoma. In particular, thrombolytics, anticoagulants, thrombocytopenia, hematologic disorders, neoplasms, coagulopathy, and vascular malformations such as spinal arteriovenous malformations may be not only risk factors for SSEH but also exacerbating factors. These risk factors should be fully assessed as they affect prognosis and selecting surgery as an option. Poor prognosis of SSEH has been associated with lower thoracic spine, ventral spinal cord, use of anticoagulants, loss of sphincter muscle function, poor neurologic function on admission, short progression intervals, and spinal cord edema on MRI.[2]

In our case, conservative treatment was administered, as the clinical findings were mild and improving, and there were no risk or prognostic factors as previously described. Conservative treatment requires repeated assessment of neurologic findings and careful observation using MRI. If patients receive conservative treatment, they should be closely monitored to ensure that the neurologic deficit does not worsen during the recovery period, in which prompt surgical intervention may be necessary. Notably, in this case, MRI showed that the hematoma compressing the spinal cord had shrunk 2 days after onset. The improvement in neurologic deficits without surgical treatment may be due to the decompression effect on the spinal cord caused by the slowly spreading hematomas toward

the epidural space, leakage of fluid hematoma from the intervertebral foramen, and reduction in cellular edema by steroids in steroid-treated cases.

Conservative treatment may include hemostatic agents, steroids, antihypertensive therapy, and hyperbaric oxygenation, similar to that of intracranial hemorrhage. However, the effectiveness of treatment has not been fully investigated. In addition, there were no reports that clearly indicated in detail the level of rest and duration of rest during the acute phase of the disease. To date, there is a lack of evidence for the effectiveness of treatment, requiring a future study to establish.

3.4 | Reminder to clinicians

In cases of sudden pain from the neck to the back and subsequent paralysis of the extremities, immediate MRI or CT imaging of the head and neck is necessary, keeping SSEH in mind. Severe neurologic deficits and progressive paralysis should be treated with emergency surgery, whereas mild neurologic deficits and cases of early symptomatic improvement should be conservatively treated. However, it must be kept in mind that tissue plasminogen activator is used in cases misdiagnosed with cerebral infarction, and there is a risk of exacerbating paralysis. This is a treatable disease, and appropriate early diagnosis and treatment is the key to improved prognosis.

4 | CONCLUSION

SSEH is a rare disease that can be treated with proper diagnosis and appropriate therapy. Surgery has been recommended in many reports, but conservative treatment is indicated in cases of mild symptoms and in patients in which symptoms improve early in the course of the disease. In this case, conservative treatment resulted in the disappearance of SSEH in multiple intervertebral spaces on MRI only 2 days after onset.

AUTHOR CONTRIBUTIONS

Satoshi Nakao: Data curation; formal analysis; investigation; writing – original draft. **Hirohito Hirata:** Conceptualization; methodology; validation; writing – review and editing. **Tomohito Yoshihara:** Investigation; methodology; validation. **Takaomi Kobayashi:** Data curation; validation; visualization. **Masatsugu Tsukamoto:** Formal analysis; validation; visualization; writing – review and editing. **Yoshiaki Egashira:** Data curation; supervision; validation; visualization. **Masaaki Mawatari:** Formal analysis; writing – review and editing. **Tadatsugu Morimoto:** Conceptualization; data curation; supervision; writing – original draft; writing – review and editing.

FUNDING INFORMATION

None.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

DATA AVAILABILITY STATEMENT

Data pertaining to this case can be obtained by contacting the corresponding author.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

ORCID

Satoshi Nakao https://orcid.org/0009-0008-0723-0091
Hirohito Hirata https://orcid.org/0000-0003-3114-1685
Tomohito Yoshihara https://orcid.org/0000-0002-9918-203X
Takaomi Kobayashi https://orcid.org/0000-0002-2319-5440
Masatsugu Tsukamoto https://orcid.org/0000-0003-0688-0451
Masaaki Mawatari https://orcid.org/0000-0003-4330-0057
Tadatsugu Morimoto https://orcid.org/0000-0002-3359-9684

REFERENCES

1. Motamedi M, Baratloo A, Majidi A, Rahmati F, Shahrami A. Spontaneous spinal epidural hematoma: a case report. *Emerg (Tehran)*. 2014;2(4):183-185.
2. Peng D, Yan M, Liu T, et al. Prognostic factors and treatments efficacy in spontaneous spinal epidural hematoma: a multicenter retrospective study. *Neurology*. 2022;99(8):e843-e850. doi:10.1212/WNL.0000000000200844
3. Figueroa J, DeVine JG. Spontaneous spinal epidural hematoma: literature review. *J Spine Surg*. 2017;3(1):58-63. doi:10.21037/jss.2017.02.04
4. Xian H, Xu LW, Li CH, et al. Spontaneous spinal epidural hematomas: one case report and rehabilitation outcome. *Medicine*. 2017;96(44):e8473. doi:10.1097/MD.0000000000008473
5. Raasck K, Habis AA, Aoude A, et al. Spontaneous spinal epidural hematoma management: a case series and literature review. *Spinal Cord Ser Cases*. 2017;3:16043. doi:10.1038/scsandc.2016.43
6. Zhang B, Chen J, Zou N, et al. Spontaneous resolution and complete recovery of spontaneous cervical epidural hematoma: report of two cases and literature review. *Neurochirurgie*. 2019;65(1):27-31. doi:10.1016/j.neuchi.2018.10.008

7. Huang DW, Sun JM, Chen YH, Huang KC. Acute hemiparesis. A rare presentation of spontaneous spinal epidural hematoma mimicking acute stroke. *Neurosci J*. 2020;25(4):316-319. doi:10.17712/nsj.2020.4.20200027
8. Yoshimatsu H, Wakioka T, Yoshida K, et al. Clinical results of spontaneous spinal epidural hematoma in the cervical area. *J West Jpn Soc Orthop Traumatol*. 2009;58:237-240. (in Japanese). doi:10.5035/nishiseisai.58.237
9. Baek BS, Hur JW, Kwon KY, Lee HK. Spontaneous spinal epidural hematoma. *J Korean Neurosurg Soc*. 2008;44(1):40-42. doi:10.3340/jkns.2008.44.1.40
10. Inatomi Y, Nakajima M, Yonehara T. Spinal epidural hematoma as a stroke mimic. *J Stroke Cerebrovasc Dis*. 2020;29(9):105030. doi:10.1016/j.jstrokecerebrovasdis.2020.105030
11. Zhou LL, Zhu SG, Fang Y, et al. Neck pain and absence of cranial nerve symptom are clues of cervical myelopathy mimicking stroke: two case reports. *World J Clin Cases*. 2022;10(32):11835-11844. doi:10.12998/wjcc.v10.i32.11835
12. Ogawa K, Akimoto T, Hara M, Fujishiro M, Uei H, Nakajima H. Two patients with spontaneous spinal epidural hematoma carrying a good prognosis without surgical operations. *Neurol Int*. 2023;15(1):362-370. doi:10.3390/neurolint15010024
13. Huang D, Iken S, Elbadri S, Falgiani M, Ganti L. Spontaneous spinal epidural hematoma: a case of a benign presentation and emergency department management. *Cureus*. 2022;14(3):e23532. doi:10.7759/cureus.23532
14. Eto F, Tatsumura M, Iwabuchi S, Ogawa T, Mammoto T, Hirano A. Clinical features of spontaneous spinal epidural hematoma. *J Rural Med*. 2019;14(2):206-210. doi:10.2185/jrm.3005
15. Shima H, Yasuda M, Nomura M, et al. A spinal epidural hematoma with symptoms mimicking cerebral stroke. *Nagoya J Med Sci*. 2012;74(1–2):207-210.
16. Kazuaki I. [Minor Experience with Idiopathic Spinal Dural Hematoma]. Tokuhatuseisekizuikoumakugaikessyunosyou keiken. *Seikeigekatosaigaigeka*. 2022;71(3):592-594. (in Japanese).
17. Mukerji N, Todd N. Spinal epidural haematoma; factors influencing outcome. *Br J Neurosurg*. 2013;27(6):712-717. doi:10.3109/02688697.2013.793289
18. Musha Y, Ito K, Sunakawa T, Nagahari H, Ikegami H, Kaneko T. Indications and timing for conservative treatment and surgical treatment in acute spinal epidural hematoma. *Spin Surg*. 2015;29(3):310-314. doi:10.2531/spinalsurg.29.310
19. Shin JJ, Kuh SU, Cho YE. Surgical management of spontaneous spinal epidural hematoma. *Eur Spine J*. 2006;15(6):998-1004. doi:10.1007/s00586-005-0965-8
20. Serizawa Y, Ohshiro K, Tanaka K, Tamaki S, Matsuura K, Uchihara T. Spontaneous resolution of an acute spontaneous spinal epidural hematoma without neurological deficits. *Intern Med*. 1955;34(10):992-994. doi:10.2169/internalmedicine.34.992
21. Laissy JP, Milon P, Freger P, Hattab N, Creissard P, Thiebot J. Cervical epidural hematomas: CT diagnosis in two cases that resolved spontaneously. *AJNR Am J Neuroradiol*. 1990;11(2):394-396.
22. Liu Z, Jiao Q, Xu J, Wang X, Li S, You C. Spontaneous spinal epidural hematoma: analysis of 23 cases. *Surg Neurol*. 2008;69(3):253-260. doi:10.1016/j.surneu.2007.02.019

How to cite this article: Nakao S, Hirata H, Yoshihara T, et al. Conservative management of spontaneous spinal epidural hematoma: A case report with favorable prognosis. *Clin Case Rep*. 2024;12:e8760. doi:10.1002/ccr3.8760