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CASE REPORT

Neck pain and absence of cranial nerve symptom are clues of cervical myelopathy mimicking stroke: Two case reports

Li-Li Zhou, Shi-Guo Zhu, Yuan Fang, Shi-Shi Huang, Jie-Fan Huang, Ze-Di Hu, Jin-Yu Chen, Xiong Zhang, Jian-Yong Wang

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Abstract

BACKGROUND

Cervical myelopathy is a potential stroke imitator, for which intravenous thrombolysis would be catastrophic.

CASE SUMMARY

We herein present two cases of cervical myelopathy. The first patient presented with acute onset of right hemiparesis and urinary incontinence, and the second patient presented with sudden-onset right leg monoplegia. The initial diagnoses for both of them were ischemic stroke. However, both of them lacked cranial nerve symptom and suffered neck pain at the beginning of onset. Their cervical spinal cord lesions were finally confirmed by cervical computed tomography. A literature review showed that neck pain and absence of cranial nerve symptom are clues of cervical myelopathy.

CONCLUSION

The current report and the review remind us to pay more attention to these two clues in suspected stroke patients, especially those within the thrombolytic time window.

Key Words: Cervical cord; Spinal cord diseases; Stroke; Neck pain; Cranial nerves; Hematoma, epidural, spinal; Neoplasm metastasis; Case report

Core Tip: Cervical myelopathy is a potential stroke imitator, for which intravenous thrombolysis would be catastrophic. Herein we present two cases of stroke mimics whose final diagnoses were spontaneous spinal epidural hematoma and cervical spine metastases, respectively. From our case report and the literature review, we suggested that neck pain and absence of cranial nerve symptom are clues of cervical myelopathy. More attention should be paid to the two features in patients with suspected stroke.

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INTRODUCTION

Stroke is the most common neurological disease, and it is the second most common cause of death worldwide[1]. It is characterized by sudden-onset of neurologic deficit, which results from thrombotic or embolic occlusion of a cerebral artery. Thrombolytic therapy with alteplase within 3 h of the onset of ischemic stroke has been proven effective in the clinical outcome of the patients[2]. Further study showed that intravenous alteplase between 3.0 h and 4.5 h after the onset of ischemic stroke is also beneficial[3]. The narrow time window makes it very important to distinguish stroke mimics from ischemic stroke.

Stroke mimics are a series of diseases characterized by acute onset and focal neurological deficits, which are later found to have a non-vascular origin[4]. These conditions include peripheral vestibular disorder, psychogenic disorder, seizure, migraine, and drugs[5,6]. Due to the different diagnostic criteria, the prevalence of stroke mimics ranged from 1.2% to 32.0%[5,7-9]. In consideration of the emergency situation, many patients with stroke mimics erroneously received thrombolytic therapy. However, studies indicated that intravenous thrombolysis therapy is usually safe in most mimics[4,6,8,10].

Cervical myelopathy may mimic stroke when it present with hemiparesis, for which intravenous recombinant tissue-type plasminogen activator (rt-PA) would be catastrophic[11,12]. Herein, we present two cases of stroke mimics, which turned out to be spinal epidural hematoma (SEH) and cervical metastatic carcinoma. Both of them avoided intravenous thrombolysis because of neck pain and lack of cranial nerve symptom.

CASE PRESENTATION

Chief complaints

Case 1: A 76-year-old female patient was admitted for right limb weakness and urinary incontinence for 4 h.

Case 2: A 57-year-old male patient was admitted for posterior neck pain and weakness in the right leg for 2 h.

History of present illness

Case 1: The patient was found to have an acute onset of right limb weakness and urinary incontinence 4 h before she was sent to the emergency department of the Second Affiliated Hospital of Wenzhou Medical University. The patient was diagnosed as having acute ischemic stroke, and intravenous thrombolysis was considered with her permission. Before the IV thrombolytic therapy (rt-PA), the patient told us that she suffered moderate pain in her neck.

Case 2: The patient presented with sudden-onset pain in his posterior neck and weakness in the right leg 2 h before he was sent to emergency department of the Second Affiliated Hospital of Wenzhou Medical University. His condition deteriorated rapidly. Within the next 1 h, he developed weakness in all four limbs and paresthesia below the neck.

History of past illness

The two patients' past medical history included hypertension.

Personal and family history

The two patients' personal and family history was unremarkable.

Physical examination

Case 1: Neurological examinations revealed right limb weakness: 3/5 strength in the arm and 2/5 strength in the leg. The strength of her left extremities was normal. Mild hypoesthesia of the right limbs was found, and we did not note any dysarthria, dysphagia, or facial palsy in the patient. Her National Institute Health Stroke Scale (NIHSS) score was 6 points.

Case 2: Neurological examinations revealed a right leg monoplegia (grade 0/5). The strength of his right arm and left limbs was normal. Cranial nerve symptom was not found in this patient. His NIHSS score was 4 points.

Laboratory examinations

Blood tests including complete blood count and coagulation indices were within normal range in the two cases.

Imaging examinations

Case 1: An emergency brain computed tomography (CT) scan showed no sign of hemorrhage (Figure 1A), and brain CT angiography (CTA) showed stenosis of both middle cerebral arteries (Figure 1B). After the patient told us that she suffered moderate pain in her neck, a cervical spine CT scan was taken, and an SEH was found from C2-C7 (Figure 1C-E).

Case 2: Brain CT and CTA revealed no abnormality (Figure 2A and B). The patient was diagnosed as having acute ischemic stroke at first. However, another CT scan of the cervical spine revealed bone erosion at the C7 level (Figure 2C). Further magnetic resonance imaging (MRI) was taken, and a destructive soft tissue mass was detected in the C7 vertebra, with its adjacent spinal cord moderately compressed (Figure 2D-F). In the days following, the primary tumor was found in the left lung (Figure 2G), and histological examination confirmed that it was small cell lung carcinoma (SCLC). In addition to the vertebral body, the cancer also metastasized to the brain (Figure 2H).

MULTIDISCIPLINARY EXPERT CONSULTATION

Case 1

The consultation included specialists in spine surgery, neurology, and radiology. After discussion by several specialists, an emergency operation was decided.

Case 2

The consultation included specialists in spine surgery, neurology, oncology, and radiology. They preferred chemotherapy.

FINAL DIAGNOSIS

Case 1 was diagnosed as having SHE, and case 2 was diagnosed with cervical metastatic carcinoma.

TREATMENT

Case 1

An emergency partial laminectomy from C3 to C7 of the spine was performed, and the hematoma was removed (Figure 1F). Postoperative pathology showed that the hematoma originated from a vascular malformation.

Case 2

The patient received combination chemotherapy with irinotecan and cisplatin.

OUTCOME AND FOLLOW-UP

Case 1

Two weeks after operation, the strength of her right extremities had improved (grades 4/5 in the upper limb and 4/5 in the lower limb).

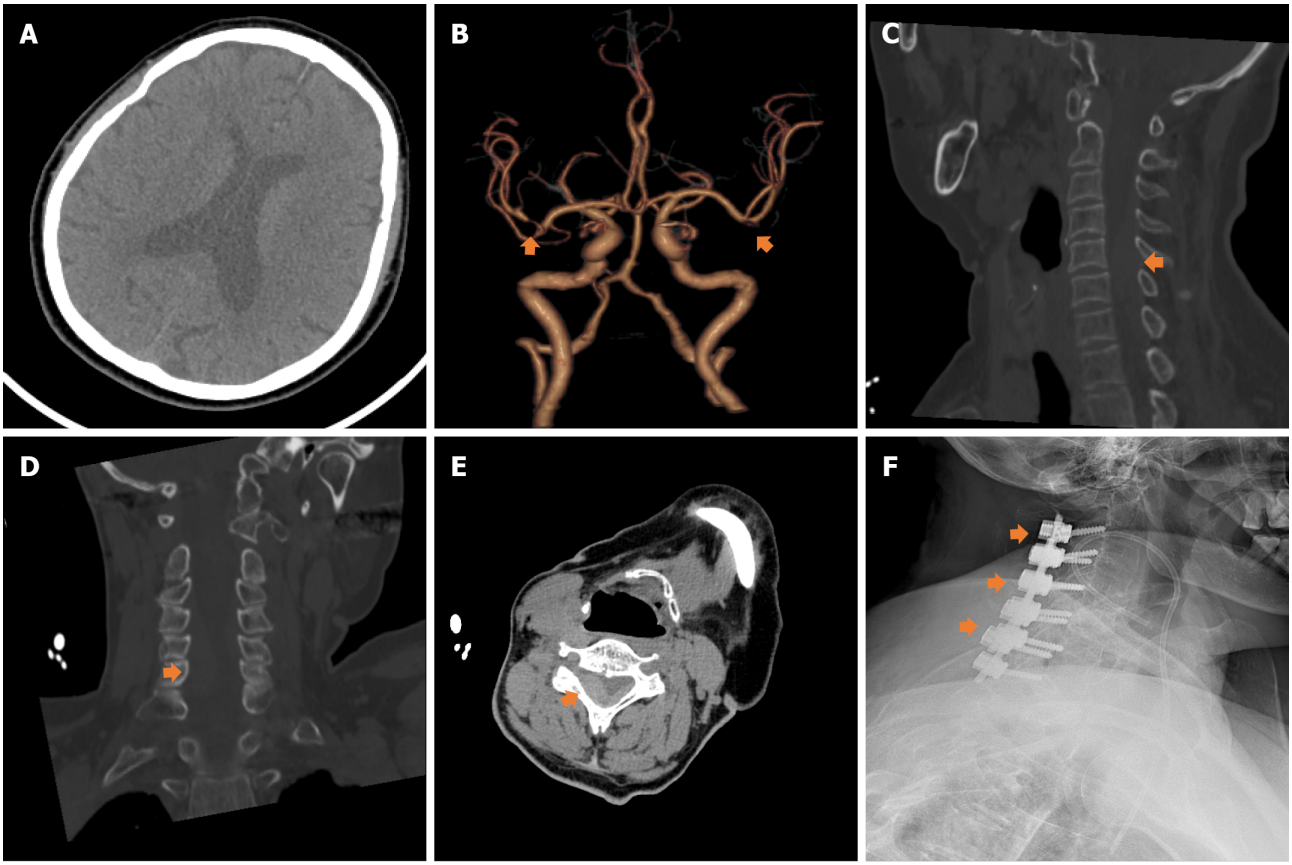

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Figure 1 Images of case 1. A: Brain computed tomography (CT) showed no sign of hemorrhage; B: Brain CT angiography (CTA) showed stenosis of both middle cerebral arteries (orange arrows); C-E: Sagittal, coronal, and axial views of cervical CT showed an epidural hematoma over the posterior site of spinal canal from C3 to C7 level (orange arrows); F: Cervical CT after the emergency partial laminectomy.

Case 2

His condition was still getting worse.

DISCUSSION

It is a challenge to balance the accurate diagnosis and timely treatment of acute ischemic stroke within the time window. Cervical myelopathy sometimes presents with hemiparesis and monoplegia, which may be mistakenly diagnosed as ischemic stroke. These patients may erroneously receive thrombolysis in the emergency department, and it is potentially harmful to them. In the current report, we present two patients with stroke mimics, which were later proved to be SEH and cervical metastatic carcinoma, respectively, by cervical spine CT. Both of them suffered neck pain and lacked cranial nerve symptom, which were regarded as clues to spinal cord injury by us in the emergency department.

The first patient was diagnosed as having spontaneous SEH (SSEH). The causes of SSEH include coagulopathy, drugs, spinal puncture, trauma, and pregnancy[13]. In our case, the SHE originated from a vascular malformation. The annual incidence of SSEH was estimated to be 1/1000000[14]. Typical symptoms of SEH are quadriplegia and paraplegia. It is sometimes misleading when SEH presented with hemiparesis or monoplegia[15]. The most effective treatment is early surgical intervention[16]. Owing to the emergency operation, our patient recovered quickly.

The second patient had cervical spine metastases, a neurologic complication of SCLC. Vertebral column is a common site of metastases. A study of 600 cases of spinal metastases found that 15% of the metastases were located in the cervical spine[17]. Lung, lymphoma, and breast cancers are the most common primary tumors associated with spinal metastases[18]. The symptoms of cervical spine metastases depend on the location. It can present as myelopathy or radiculopathy, while pain is the most common symptom[19,20]. The treatment methods include surgery, radiation therapy, and chemotherapy. Patients' neurologic status, severity of primary tumor, and number of metastases are associated with their prognosis[20]. Our patient has developed multiple metastases from SCLC. Although chemotherapy was performed, his condition deteriorated rapidly.

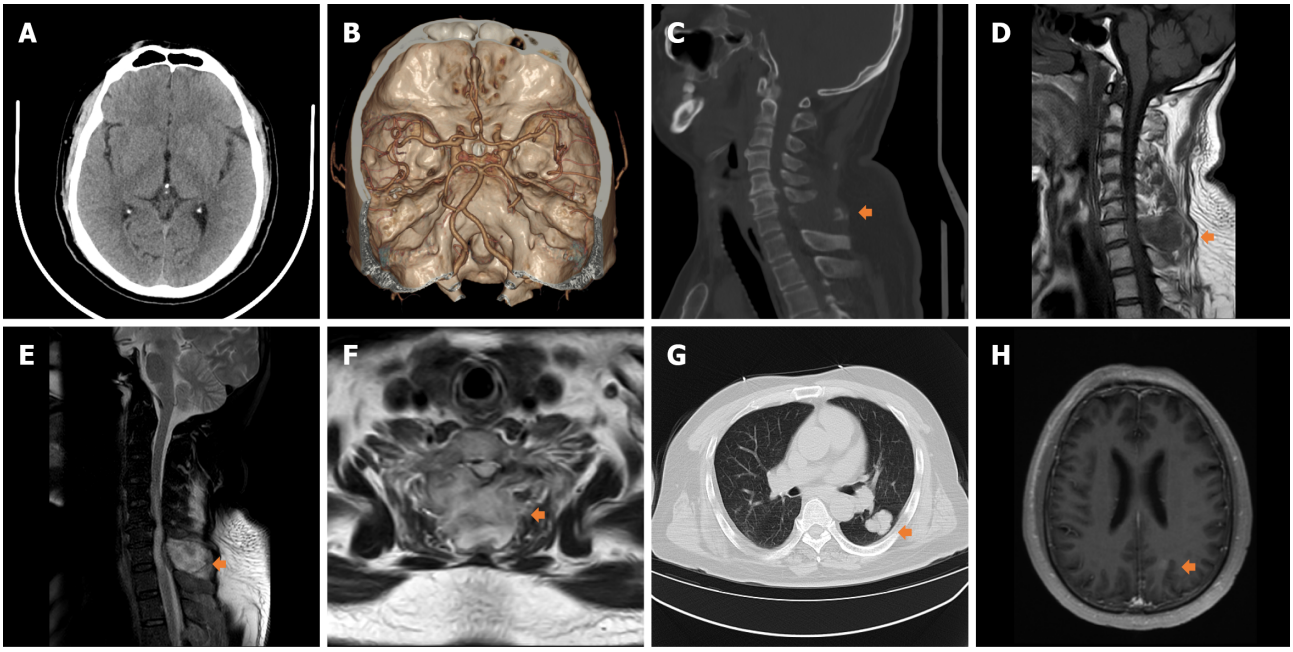

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Figure 2 Images of case 2. A: Computed tomography (CT) revealed no abnormalities in the brain; B: Brain CT angiography (CTA) revealed no abnormalities; C: Cervical CT revealed a bone erosion at the C7 level (orange arrow); D and E: Sagittal T1-weighted and T2-weighted cervical spinal magnetic resonance imaging (MRI) revealed bone erosion and metastasis in the C7 vertebra (orange arrows); F: Axial T2 weighted MRI detected a destructive soft tissue mass in the C7 vertebra (orange arrow); G: A tumor was found in the left lower lung (orange arrow); H: Contrast enhanced MRI revealed a metastasis in the left parietal lobe (orange arrow).

The initial diagnoses of the two patients were acute ischemic stroke, because both of them presented with sudden onset of focal neurological symptoms, and intracerebral hemorrhage was excluded by non-contrast CT in the emergency department. However, they lacked cranial nerve symptom and suffered neck pain at the beginning of onset. Before IV thrombolysis, they were correctly diagnosed with cervical myelopathy in time.

Many studies have emphasized that cervical myelopathy is an important stroke mimic[21-35,12,36-39,15,40-52]. Most of these cases started with hemiparesis, and were often initially diagnosed as ischemic stroke (Table 1). Due to the limited time, some of them received corresponding treatments, including intravenous thrombolysis, argatroban hydrate, aspirin, and heparin[19,24,29-32,35,43,47,49]. There were also some patients who were identified by cervical CT or MRI, and underwent surgery or conservative treatment in time[12,15,21,26-28,33,36,37,39,41,42,44,45,51,52]. Most patients with timely correction of diagnosis and treatment still have good outcomes.

The two patients experienced neck pain at the beginning of onset. Pain is a common symptom of myelopathy and radiculopathy. In addition to our patients, most cases in the literature suffered pain in the neck, shoulder, occipital, arm, or interscapular during the disease (Table 1). Cranial nerve symptom is not a typical feature of cerebral infarction. Both of the two patients lacked cranial nerve symptom. Only a few reported patients presented cranial nerve symptoms, such as equivocal facial paralysis, mild dysarthria, and mild droop in nasolabial fold[12,27,38,48]. However, they may be subjective symptoms of patients, or symptoms that existed before the onset of the disease[46,38]. In addition, there are other clues that can help us make the identification. Neck movement and trauma may trigger cervical myelopathy, while they are not necessarily related to stroke[53]. For patients with a history of cancer and tuberculosis, we need to be alert to the metastasis and invasion of the spinal cord.

Our report highlights the importance of neck pain and lack of cranial nerve symptom in distinguishing stroke from mimics. However, stroke mimics are a series of more complex and heterogeneous diseases, and more research is needed to explore more practical identification methods in the future.

CONCLUSION

In summary, we herein report two cases of stroke mimics whose final diagnoses were SSEH and cervical spine metastases, respectively. Together with the literature review, our data provide further evidence that neck pain and absence of cranial nerve symptom are clues of cervical myelopathy. More attention should be paid to the two features in patients with suspected stroke.

Table 1 Patients with cervical myelopathy mimicking ischemic stroke in the literature

Ref.	Age/Sex	Initial symptoms	Neck pain	Cranial nerve symptoms	Initial diagnosis	Final diagnosis	Initial treatment	Outcomes
Lobitz and Grate[52], 1995	85/F	Neck pain and right hemiparesis	Yes	No	SEH	SEH	Corticosteroids	Improved after surgery
Marinella and Barsan [51], 1996	60/F	Neck pain and left hemiparesis	Yes	No	SEH	SEH	Conservative treatment	Improved
Sakamoto *et al*[50], 2003	75/F	Neck pain and right hemiparesis	Yes	No	Ischemic stroke	SEH	Antiplatelet therapy	Improved after surgery
Adamson *et al*[49], 2004	66/M	Neck pain and right hemiparesis	Yes	No	TIA	SEH	Heparin	Improved after surgery
Lin[48], 2004	82/F	Neck pain and right hemiparesis	Yes	Equivocal facial palsy	SEH	SEH	Intubated and resuscitated	Died of respiratory sepsis
Hsieh *et al* [47], 2006	65/M	Right hemiparesis	Yes	NA	Ischemic stroke	SEH	Heparin	Improved after surgery
D'Souza *et al* [46], 2008	62/M	Right hemiparesis	Interscapular pain	No	Ischemic stroke	SEH	IVT	Improved after surgery
Ishikawa *et al*[45], 2008	82/M	Neck pain and left hemiparesis	Yes	No	SEH	SEH	Surgery	Improved
Ofluoğlu *et al*[44], 2009	63/M	Neck pain and right hemiparesis	Yes	No	Cerebrovascular accident	SEH	Surgery	Improved
Wang *et al* [43], 2009	69/M	Neck pain and right hemiparesis	Yes	NA	Ischemic stroke	SEH	Heparin	Improved after surgery
Nakanishi *et al*[42], 2011	73/F	Neck pain and left hemiparesis	Yes	No	SEH	SEH	Surgery	Improved after surgery
	62/M	Neck pain and numbness of the right lower extremity	Yes	No	SEH	SEH	Surgery	Improved after surgery
	60/F	Neck pain and left hemiparesis	Yes	NA	SEH	SEH	Conservative treatment	Improved
Lee *et al*[41], 2011	58/F	Quadriparesis and neck pain	Yes	NA	SEH	SEH	Surgery	Improved after surgery
Lemmens *et al*[40], 2012	66/F	Interscapular pain and right hemiparesis	Interscapular pain	No	Ischemic stroke	SEH	Antihypertensive drugs	Improved
Liou *et al* [15], 2012	60/F	Neck pain, dizziness, and right hemiparesis	Yes	No	Ischemic stroke	SEH	Surgery	No significant improvement after surgery
	58/F	Neck pain and right hemiparesis	Yes	No	Ischemic stroke	SEH	Megadose steroid therapy	Improved
Matsumoto *et al*[39], 2012	71/F	Neck pain and right hemiparesis	Yes	No	Ischemic stroke	SEH	Steroids and glycerine	Improved
	54/F	Neck pain and right hemiparesis	Yes	No	Ischemic stroke	SEH	Conservative treatment	Improved
Son *et al* [38], 2012	63/M	Left lower extremity-weakness	Yes	Mild dysarthria	Anterior spinal artery syndrome	SEH	IVT	Improved after surgery
Shima *et al* [37], 2012	84/F	Neck pain and right hemiparesis	Yes	No	SEH	SEH	Conservative treatment	Improved
Bailey *et al* [36], 2012	62/M	Neck pain and right hemiparesis	Yes	No	SEH	SEH	Surgery	NA
Schmidley *et al*[12], 2013	96/F	Neck pain and left hemiparesis	Yes	Mild droop in the left nasolabial fold	Ischemic stroke	SEH	Surgery	Improved after surgery

	81/F	Neck pain and right hemiparesis	Yes	No	Ischemic stroke	SEH	Aspirin	Improved after surgery
Park *et al* [35], 2013	69/M	Weakness in the right upper extremity	NA	NA	TIA	SDH	Aspirin	Improved after surgery
Terabe *et al* [34], 2015	61/F	Neck pain, paralysis and numbness in the left upper limb	Yes	No	Ischemic stroke	SEH	Argatroban hydrate	Improved after surgery
Buyukgol *et al*[33], 2015	58/M	Neck pain and right hemiparesis	Yes	NA	SEH	SEH	Antiedema treatment	Improved
Morimoto *et al*[32], 2016	71/M	Left hemiparesis	Yes	NA	Ischemic stroke	SEH	IVT	Improved after surgery
Patel *et al* [31], 2018	51/M	Neck pain, right hemiparesis, and drooping of right side eyelids	Yes	No	Ischemic stroke	SEH	IVT	Improved after surgery
Romaniuc *et al*[26], 2018	74/M	Left hemiparesis	Left shoulder pain	No	Ischemic stroke	SEH	Surgery	Improved after surgery
Tsou *et al* [30], 2019	83/M	Left hemiparesis	No	No	Ischemic stroke	Atlantoaxial dislocation	IVT	Improved after surgery
Emamhadi *et al*[29], 2019	77/F	Left hemiparesis	Neck pain irradiating inboth shoulders	No	Ischemic stroke	SEH	Enoxaparin and aspirin	Improved after surgery
Chen *et al* [28], 2020	52/M	Unilateral weakness of the limbs	Right arm pain	No	SEH	SEH	Dexamethasone	Improved
Inatomi *et al* [27], 2020	65/F	Right back pain and right hemiparesis	Right back pain	No	SEH	SEH	Rest and adminis-tration of analgesics	Improved
	78/F	Neck pain and left hemiparesis	Yes	No	SEH	SEH	Rest using a neck collar and adminis-tration of analgesics	Improved
	79/M	Occipital pain and lefthemiparesis	Occipital pain	Anisocoria and mild dysarthria	SEH	SEH	Rest using a neck collar andadminis-tration of analgesics;	Improved
	63/F	Occipital and neck pain, and left hemiparesis	Occipital and neck pain	Mild dysarthria	SEH	SEH	Rest and adminis-tration of analgesics	Improved
	64/M	Neck pain and left hemiparesis	Yes	No	SEH	SEH	Surgery	Improved
Teles *et al* [25], 2020	63/F	Neck and left shoulder pain, and right side hemiparesis	Yes	NA	Ischemic stroke	SEH	IVT	No significant improvement after surgery
Huang *et al* [24], 2020	54/F	Neck pain, right facial numbness, and right hemiparesis	Yes	No	Ischemic stroke	SEH	IVT	Improved after surgery
Rahangdale *et al*[23], 2020	67/M	Right hemiparesis and hemianesthesia	NA	NA	Ischemic stroke	SEH	IVT	Improved after cryoprecipitate
Szeto *et al* [22], 2021	61/F	Neck pain and left hemiparesis	Yes	No	Ischemic stroke	SEH	IVT	Improved after conservative treatment
	58/M	Left hemiparesis	No	No	Ischemic stroke	SEH	IVT	Improved after surgery
Tay *et al* [21], 2021	77/F	Right hemiparesis	No	No	Ischemic stroke	SEH	Surgery	Improved
This study	76/F	Right hemiparesis	Yes	No	Ischemic stroke	SEH	Surgery	Improved
	57/M	Right leg monoplegia	Yes	No	Ischemic stroke	Cervical metastatic carcinoma	Chemotherapy	Deteriorated

IVT: Intravenous thrombolysis; NA: Not available; SDH: Subdural spinal hematoma; SHE: Spinal epidural hematoma; TIA: Transient ischemic attack.

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FOOTNOTES

Author contributions: Zhou LL, Zhu SG, and Wang JY examined the patient and carried out the treatment strategy; Wang JY, Zhou LL, Fang Y, Huang SS, Huang JF, Hu ZD, and Chen JY acquired and analyzed all the clinical data; Wang JY, Zhou LL, and Zhu SG reviewed the literature and drafted the manuscript; Wang JY and Zhang X supervised the study; all authors read, revised, and approved the final version of the manuscript.

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