A Case of Spontaneous Spinal Epidural Hematoma Mimicking a Stroke

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Introduction: For intravenous (IV) thrombolytic therapies to be effective, a correct diagnosis of acute ischemic stroke must be made within 3 hours from the onset of symptoms, a relatively short window period. However, obtaining a diagnosis in the time frame is not easy; a wide variety of conditions mimic a stroke, including seizures, migraine, and even a spinal mass, and often these are diagnosed as acute ischemic stroke and receive thrombolytic therapy.

Case Report: A patient presented suffering progressive and fluctuating painful triparesis coupled with acute onset dissociated sensory loss. The patient complained of dysarthria and transient altered mentality at the onset of symptoms; therefore, we suspected an ischemic infarction of the brainstem and spinal cord accompanied by vertebral artery dissection. As the time at diagnosis was 2 hours 30 minutes after symptom onset, we started IV thrombolytic treatment using recombinant tissue plasminogen activator. Magnetic resonance imaging during the recombinant tissue plasminogen activator infusion revealed a spontaneous spinal epidural hematoma (SSEH) of the cervical and thoracic spine, leading the patient to undergo an emergency surgery.

Conclusions: SSEH is an uncommon clinical condition, and a manifestation of SSEH with anterior spinal artery syndrome is also rare. Furthermore, an emergency operation after IV thrombolytic treatment is an extraordinary situation.

Key Words: stroke mimics, recombinant tissue plasminogen activator (rt-PA), thrombolysis, spontaneous spinal epidural hematoma (SSEH)

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The increase in the use of intravenous (IV) thrombolytic agents in patients with acute ischemic cerebral infarction within 3 hours of the onset of symptoms has increased the interest in the incidence of stroke mimics and the safety of thrombolytic agents in these situations.^{1–5} To date, it has been considered that the use of thrombolytic agents for stroke mimics increases the risk of hemorrhagic complications. However, this theoretical increased risk has not been seen in the clinic, as recent studies have reported that the use of thrombolytic agents in stroke mimics is safe and has not increased the frequency of complications.^{3–5} On the basis of these results, it is expected that cases of stroke mimics receiving thrombolytic agents will increase in the future.

We experienced a patient with spontaneous spinal epidural hematoma (SSEH) of the cervical to thoracic spine.

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In addition to the spinal symptoms, he complained of dysarthria and a transient altered mental state at the onset of symptoms. Because of the time limitation for IV thrombolytic treatments we misdiagnosed the patient with an acute ischemic stroke of the brainstem and spinal cord accompanied by vertebral artery dissection and initiated the administration of IV recombinant tissue plasminogen activator (rt-PA).

CASE REPORT

A 63-year-old man suffering with untreated hypertension for the past few years presented with sudden-onset left lower extremity weakness, which had started 2 hours 30 minutes earlier. The patient lost consciousness for several seconds when he plunged into hot bath water after completing 20 push-ups. Soon after, he suffered severe pain in his neck and left shoulder and was unable to move his left leg freely. He developed weakness in his left arm, and visited a local hospital. The weakness progressed, and extended into his right leg. After a brain computed tomography (CT) scan at a local hospital, function to his right leg recovered temporarily, but relapsed.

On neurological examination, the patient was alert, fully oriented, and exhibited mild dysarthria. A motor examination revealed 4/5 strength in the left upper extremity and flaccid paraplegia with areflexia. A sensory examination revealed that the sensations of pinprick and temperature had decreased in the left upper and both lower extremities, but position and vibration senses were not affected. His National Institute Stroke Scale score was 12 points.

Laboratory investigations were unremarkable, and a brain CT scan indicated no signs of hemorrhage. There was also no evidence of mediastinal widening or cardiomegaly observed by chest x-ray, but left ventricular hypertrophy was observed on an electrocardiogram.

After considering the neurological findings, neck pain, and the progressive course of symptoms, we suspected anterior spinal artery syndrome accompanied by vertebral artery dissection. However, the dysarthria and loss of consciousness during the onset of symptoms were not explained by this diagnosis, so we considered there was a possibility for additional brain involvement. We decided to administer bridging thrombolysis with the guardian's permission. Because of the narrow time window for IV thrombolytic therapies, we initiated a partial dose (0.495 mg/kg, 55% of total dose) of rt-PA (Actylase) and, if needed, selective intra-arterial thrombolysis would be performed after a magnetic resonance imaging (MRI) study following the acute ischemic stroke management protocol of our stroke center.

The patient's weight was 62 kg. The calculated dose of rt-PA (approved dosage in Korea: 0.9 mg/kg) was 56 mg. An IV bolus of Actylase (6 mg, 10% of total dose) was initiated at 2 hours 45 minutes after the onset of symptoms, followed by a maintenance dose (25 mg, 45% of total dose). An urgent brain MRI scan showed no evidence of acute infarction and no sign of arterial dissection on the intracranial magnetic resonance angiography. The rt-PA infusion was terminated when the MRI scan was completed, which was 3 hours 30 minutes after the onset of symptoms. The patient's symptoms had not changed on a follow-up neurological examination, so we initiated an MRI scan of the cervical region. This scan demonstrated an acute posterior epidural hematoma, extending from C4 to T2 (Fig. 1). The cord was compressed by hematoma and displaced to the right and anterior side.

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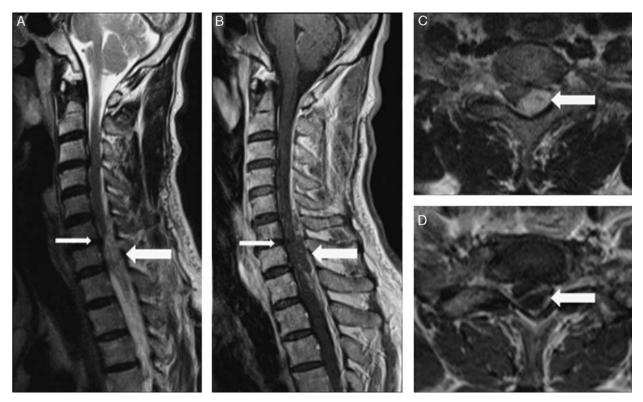


FIGURE 1. Magnetic resonance images of the spinal cord. Sagittal (A) and axial T2-weighted (C) image show a heterogenous hypointense mass in the left and posterior side of spinal cord from C4 to T2 level (large arrows). The mass is nearly isointense on sagittal (B) and axial T1-weighted (D) image (large arrows). The spinal cord is compressed by the mass and displaced to the right and anterior side on the axial images. This represents an acute spinal epidural hematoma. Asymptomatic intervertebral disc herniation is demonstrated at the C6 level (small arrows).

A clotting assay was performed giving normal results [aPTT, 36.2 s; PT (INR), 1.07; BT, 3 min 30 s]. The emergency operation started 2 hours 45 minutes after the initiation of the administration of rt-PA. A left partial laminectomy from C6 to T1 of the spine was performed, and the hematoma was removed. No excessive bleeding occurred during the operation, and no hemorrhagic complications occurred after the operation. Fifty days after the operation, the strength in his lower extremities had improved, with 4/5 strength on the right side and 3/5 on the left side. He could stand but was unable to walk.

DISCUSSION

When determining the use of rt-PA for this patient, we considered the loss of consciousness at the onset of symptoms, dysarthria, and the fluctuating nature of the symptoms. The neurological deficits of the patient were compatible with acute transverse myelopathy. However, we clinically excluded compression and inflammation as they did not explain the fluctuations in symptoms. We also considered that the initial mental changes and dysarthria were accompanied by a brainstem lesion. We considered arterial dissection as the cause of his severe neck and radiating pain but there was no sign of aortic dissection on his chest x-ray, pointing to the possibility of a vertebral artery dissection. A case of symmetrical spinal cord infarction has been reported due to vertebral artery dissection,⁶ and ischemic cervical myelopathy is the most frequent spinal manifestation of vertebral artery dissection.7 Also, in posterior circulation ischemia, the most frequent arterial source of emboli are the intracranial vertebral arteries.⁸ These observations indicate a possible explanation about the transient loss of consciousness at the onset of symptoms: an embolus from the vertebral artery dissection was

occluding the basilar artery (top-of-the-basilar infarcts), and recanalized spontaneously.⁸ The basilar artery occlusion could interrupt the reticular activation system, which is located in the paramedian tegmentum of the upper brainstem, leading to an impairment of consciousness.⁸ To date, the acute phase treatment guideline for spinal cord infarction has not been established. Nevertheless, a case of a favorable outcome treated with IV thrombolytic therapy has been reported.⁹

SSEH is rare, and the annual incidence is 1 case per 1,000,000.10 The cause of SSEH is uncertain, but it has been associated with hypertension, anticoagulation, elevated venous pressure, pregnancy, labor, and vascular malformation.¹¹ The initial clinical manifestations of SSEH are back and neck pain and, eventually, compressive myelopathy symptoms. In most cases the hematoma is located on the dorsal aspect of the spinal cord, leading to the belief that the posterior epidural venous plexus is the main source of SSEH.¹² The mechanism for a rupture in the venous plexus is thought to be a reversal of venous flow when intrathoracic or intra-abdominal pressure increases due to excessive strain. In this case, an excessive number of push-ups seemed to have been the cause of the SSEH. We also considered that the loss of consciousness was related to this maneuver. It may be that the patient was under a condition of insufficient venous return due to increased intrathoracic pressure. Plunging into hot water just after the pushups resulted in peripheral vasodilatation, causing syncope. The main cause of his dysarthria is unclear, but dysarthria is a rather subjective symptom of patients undergoing a stroke. It was possible that removing his dentures for CT scans at a local hospital influenced his slurring.

Only 1 case has been reported, in 2009, in which typical anterior spinal artery syndrome was induced by SSEH.¹¹ The authors suggested that the anterior spinal artery syndrome resulted from a counterforce due to a preexisting asymptomatic cervical intervertebral disc herniation inducing direct pressure on the anterior spinal cord. They also considered that the blood flow in the anterior spinal artery was modified by a combination of the SSEH and the herniated intervertebral disc, causing a pinching effect.¹¹ In our case, asymptomatic intervertebral disc herniation was observed at the C6 level (Fig. 1). However, in this case, we believe that modified blood flow in the anterior spinal artery was the principal mechanism explaining the fluctuating nature of the symptoms rather than direct pressure on the spinal cord.¹³

The treatment for SSEH is prompt surgical evacuation. The postoperative recovery from SSEH depends, predominantly, on the interval between symptom onset and surgical decompression.¹⁴ However, cases in which an operation was performed after the use of rt-PA are rare, and guidelines for this situation are unavailable. It is known that tissue plasminogen activator (t-PA) has a short half-life of approximately 5 minutes, but t-PA fibrolytic activity may persist for 24 hours.¹⁵ We were unable to judge the effect of t-PA on bleeding tendency during the operation, despite normal results on the follow-up clotting assay.

Although it was unclear whether the rt-PA had a detrimental influence on the patient, we regret our misdiagnosis. Neurologists are always under pressure to meet the 3-hour deadline when determining thrombolytic treatment in patients with acute neurological symptoms. However, we think it is important to give time-appropriate IV-tPA when acute ischemic stroke is suspected, with continued evaluation in the acute setting; we continued cautiously with partial IV-tPA therapy dosing and the urgent MRI scan helped identify the correct diagnosis. As such, prudent modifications to standard therapies and continued work up are very important and useful.

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