A Case of Effective Cerebrospinal Fluid Drainage for Paraplegia Caused by Acute Aortic Dissection

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A 65-year-old man with sudden back pain was transferred to our hospital by ambulance, who also complained of sensory and motor disorder of bilateral legs on arrival. The neurological disorder was gradually aggravated and paraplegia below the level of Th10 was manifested. Computed tomography demonstrated DeBakey IIIb acute aortic dissection; therefore, the paraplegia was thought to be due to spinal cord ischemia caused by the acute aortic dissection. Emergent cerebrospinal fluid drainage was performed, and it was very effective for the relief from paraplegia. The hospital course after the drainage was uneventful and he was discharged on the 39th day after the onset of symptoms.

Keywords: acute aortic dissection, paraplegia, cerebrospinal fluid drainage

CASE

A 65-year-old man with sudden and severe back pain was transferred to our hospital. On arrival, several signs of paraplegia below the level of Th10 were observed, and it was gradually aggravated. Other physical examinations and laboratory data were normal except for slight inflammatory changes. As acute aortic dissection was suspected, an emergent plain computed tomography (CT) was performed because of an allergy to contrast medium. The CT showed DeBakey type IIIb acute aortic dissection. Physical examinations and the CT suggested no other visceral malperusions without the paraplegia. It was thought to be by spinal cord ischemia due to acute aortic dissection, and we performed only cerebrospinal fluid (CSF) drainage immediately for the relief from the paraplegia. A catheter (Shirasukon L-P shunt type K®: KANEKA MEDIX CORP) for CSF drainage was introduced into intervertebral space between 4th to 5th lumbar vertebra in which the pressure of CSF was about 25 mmHg. CSF, which was drained vigorously, and soon after the drainage, the paraplegia was dramatically improved. Continuous CSF drainage was started about 4 hours after his onset and continued for 85 hours. Muscle strength in his legs improved from grade 1/5 to grade 4/5 when he left ICU. The catheter was removed on the 4th day after initiation, and 250 mL of CSF was drained for 85 hours. The clinical course of the patient in the hospital was uneventful. The CT on 29th hospital day showed a true aortic aneurysm at distal aortic arch and the thrombosed dissecting aneurysm extended from distal aortic arch to the level of diaphragm. The Adamkiewicz artery was identified as arising from left 9th intercostal artery penetrating the thrombosed aortic aneurysm. The patient was discharged on the 39th day after his admission and is under close observation at our outpatient clinic.

COMMENT

Paraplegia is a rare but devastating complication associated with acute aortic dissection. It is reported to occur in 4% of all patients.1,2 A third of the ventral spinal cord was perfused by the anterior spinal artery, and two thirds of the dorsal spinal cord was perfused by the posterior spinal artery. Poor fluctuation continuity and segmental
Fig. 1  Plain computed tomography of the patient. Acute aortic dissection was suspected from distal aortic arch to the level of diaphragm as the difference of CT values. Arrows mark dissecting portions.

Fig. 2  Enhanced computed tomography of the patient. The computed tomography shows thrombosed aortic dissection from distal aortic arch to the level of the diaphragm. Arrows mark thrombosed dissecting portions.

Fig. 3  Adamkiewicz artery arises from left 9th intercostal artery (arrow).
blood supply was pathognomonical in the perfusion area of anterior spinal artery. Especially, the anterior spinal artery below the level of Th4 is very narrow, and some of intercostal or lumbar arteries are very important sources of blood supply in this area. The largest and most important artery for an anterior spinal artery is called Adamkiewicz artery and it often arises from an intercostal artery between Th8 to L2. In this case, abrupt breakdown of blood flow to anterior spinal artery due to the thrombosed acute aortic dissection was the main cause of paraplegia. Futhermore, it was thought that collateral arteries such as the intercostal artery played a very important role to maintain Adamkiewicz artery flow, but it was not obvious in CT scan. And there are some mechanisms of spinal cord injury, the most important process is spinal cord edema after ischemia. Spinal cord edema increases CSF pressure and induces severe microcirculatory dysfunction which aggravates spinal cord circulation, moreover, and finally develops into paraplegia.1, 5, 6

Effectiveness of CSF drainage for the prevention of paraplegia combined with thoracoabdominal aortic surgery is certified, and it is performed widely. However the therapeutic strategy for the paraplegia associated with acute aortic dissection is controversial. CSF drainage for the paraplegia with aortic dissection was first reported by Killen D et al. in 20005) and several reports have been presented since then. However, the effectiveness was not fully clarified, and it is unclear when CSF drainage should be started and when it should be discontinued. The longest case that had been reported from onset to SFD was 3.5 hours, though our case was 4 hours and the time from onset to CSF drainage may depend on the presence of collateral flow to anterior spinal cord. However, we thought that the usability of SFD up to 4 hours from onset was a remarkably safe and effective procedure for paraplegia from an acute aortic dissection.

On the other hand, the effectiveness of several drugs such as steroid, edaravone and naloxone6) for paraplegia has been reported, but they are not fully effective. Our result demonstrated not only the effectiveness of CSF drainage for the paraplegia caused by acute aortic dissection, but also the time when it should be started and when discontinued.

Recently, Endovascular Aneurysm Repair (EVAR) has been actively employed for thoracic aneurysm and the paraplegia is reported to occur at a frequency of 7%.7) Although the risk of paraplegia associated with EVER is lower than that with surgical interventions, paraplegia is a serious complication and should be avoided. CSF drainage can also be a feasible and potential clinical option in that setting.

In conclusion, CSF drainage was remarkably effective for relief from paraplegia caused by acute aortic dissection. Paraplegia is a rare but devastating complication and so CSF drainage should be considered as the first choice in order to prevent paraplegia from progressing when the signs are observed in DeBakey acute aortic dissection.

References