Successful reversal of immediate paraplegia associated with repair of acute Type A aortic dissection using cerebrospinal fluid drainage

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Abstract

We present a case of a 49-year old man who suffered from immediate paraplegia upon awakening from anaesthesia after surgery for acute aortic dissection Type A. A catheter was promptly inserted into the spinal canal for cerebrospinal fluid drainage, and the cerebrospinal fluid pressure was maintained <10 cmH₂O. Although magnetic resonance imaging showed extensive spinal cord ischaemia, the patient gradually recovered from the paraplegia and was able to walk by himself after rehabilitation. In some cases, cerebrospinal fluid drainage can be effective for the treatment of immediate postoperative spinal cord damage.

Keywords: Acute aortic dissection • Paraplegia • Cerebrospinal fluid drainage

INTRODUCTION

Conzelmann et al. [1] reported that the incidence of new postoperative spinal cord damage (SCD) after surgery for acute aortic dissection Type A (AADA) was 1.9%. The prognosis of immediate SCD that occurs upon awakening from anaesthesia is considered to be very poor [2]. We report a case of a patient who successfully recovered from immediate paraplegia associated with repair of AADA.

CASE REPORT

A 49-year-old man was admitted to the hospital 8 h after the onset of initial chest and back pain. He showed no neurological deficit in the extremities. Computed tomography (CT) indicated an AADA that extended into both common iliac arteries (Fig. 1A). It was identified that only the 10th and 11th intercostal arteries branched from the border of true and false lumen, and other intercostal arteries were unable to reveal. Emergency surgery was undertaken through a median sternotomy. Partial cardiopulmonary bypass was started via femoral perfusion and bicaval drainage. Then, the femoral inflow was clamped after ascending aortic cannulation using the Seldinger technique to establish complete antegrade perfusion. Hypothermic circulatory arrest was established <18°C at the blood temperature of the venous drainage cannula, and the lowest rectal temperature was 25.7°C. Hence, the entry tear was identified in the proximal ascending aorta, and ascending aortic replacement was performed using a woven Dacron one-branched graft (Junken Medical Corp., Tokyo, Japan). Distal false lumen was closed by a continuous horizontal mattress suture buttressed with Teflon felt strips. After completion of distal anastomosis, antegrade perfusion was re-established via the branch graft. Proximal aortic stump was repaired by the modified Collins procedure using gelatin-resorcin–formalin biological glue (Caridal SA, Saint-Etienne, France). The total duration of operation and extracorporeal circulation were 371 and 181 min, respectively, and the duration of circulatory arrest was 27 min. His perioperative circulatory state was stable. Eight hours after the operation, the patient got clear consciousness and exhibited complete paraplegia upon awakening. He remained cardiovascularly stable with a systolic blood pressure of 123 mmHg and a mean of 81 mmHg. Haemoglobin level was 9.4 mg/dl. In addition, oxygen saturation on pulse oximetry was 99%. A decision was made to insert a spinal drain. A catheter was inserted into the spinal canal for cerebrospinal fluid (CSF) drainage 1 h after the diagnosis of paraplegia. The initial CSF pressure was 18 cmH₂O. A total volume of 124 ml of clear CSF was drained over the next 24 h in order to maintain the CSF pressure <10 cmH₂O. Eight hours after the initiation of CSF drainage (CSFD), the patient regained both motor function and sensation of touch in his legs, and he was able to draw his knees up. He was extubated after 17 h postoperatively. Forty-eight hours after the initiation of drainage, we removed the catheter as the CSF outflow had ceased. Postoperative CT showed delayed enhancement of the false lumen which was not thrombosed in the descending aorta (Fig. 1B). It showed that the hairpin curve of the anterior spinal artery at the 12th thoracic segments. It was suggested that Adamkiewicz artery was the 12th intercostal artery which branched from the border of true and false lumen, though the continuity of the 12th intercostal artery was unable to identify clearly. Magnetic resonance imaging (MRI) performed on the fourth postoperative day showed T2 abnormality in the anterior spinal cord from the second to ninth thoracic segments, suggesting acute spinal cord ischaemia (Fig. 2). The patient was able to maintain a seated position by himself on the 19th postoperative day. By the 37th postoperative day, he was able to walk with
support, and he was transferred to another hospital for rehabilitation. The rectovesical disturbance was recovered at 2 months postoperatively. He was able to walk by himself at 4 months postoperatively. Ultimately, the bilateral numbness of the feet disappeared at 6 months postoperatively.

**COMMENT**

Postoperative SCD associated with AADA repair was previously reported by Conzelmann et al. [1]. A total of 2137 patients undergoing AADA repair were included in their study, of which 1.9% experienced new postoperative SCD associated with AADA repair. Although it has been reported that CSFD during repair of the descending or thoracoabdominal aorta can reduce postoperative spinal complications, immediate postoperative spinal cord damage was unlikely to recover and was associated with an increased risk of early death [2]. In this report, we described a case of immediate postoperative spinal cord damage that was reversed by CSFD. There have been some case reports of successful reversal of delayed-onset paraplegia using CSFD after surgical treatment of AADA [3]; however, there are few reports of recovery from immediate-onset paraplegia. Yamashiro et al. [4] described a case of immediate paraplegia after surgical treatment of AADA. The patient did not recover from paraplegia despite CSFD, but his symptom was alleviated by hyperbaric oxygenation.

In our case, it was suggested that the blood supply to the intercostal arteries depended on blood circulation via the false lumen prior to the surgery. Therefore, resection of entry in the ascending aorta decreased the blood flow in the false lumen, and extensive spinal cord ischaemia occurred. There was a high possibility that the blood supply to the spinal cord via Adamkiewicz artery remained. The prompt CSFD decreased the CSF pressure, and the increased spinal perfusion through the collateral circulation prevented irreversible ischaemic changes of the spinal cord. MRI performed on the fourth postoperative day revealed swelling of the spinal cord. Both spinal cord swelling and T2 abnormality are usually detected several days after symptom onset [5]. Since it is difficult to detect the acute phase of spinal cord ischaemia by MRI, we believe that immediate bedside diagnosis of spinal cord damage is essential, and that prompt CSFD may have an impact on treatment of immediate postoperative spinal cord damage. Although it will not always be successful to reverse postoperative paraplegia with CSFD, it certainly presents an option that should always be considered in the face of such a devastating postoperative complication.
Conflict of interest: none declared.

REFERENCES


