Case report
Should we consider surgical intervention for spinal cord ischemia due to acute type B aortic dissection?
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Abstract
We present a 46-year-old man with a sudden onset of severe back pain following leg pain. An emergent computed tomography showed acute type B aortic dissection. The true lumen was almost completely occluded because of compression of a massive thrombus in the false lumen. The patient developed paraplegia by the time he was taken into the operation room. After induction of anesthesia, partial cardiopulmonary bypass was initiated, and then the chest was opened via left thoracotomy. The entry was found in the distal aortic arch and was successfully repaired. The descending aorta was replaced with a Dacron graft and antegrade re-perfusion was established in the descending aorta three hours after the onset of paraplegia. The patient recovered uneventfully without any neurological deficit. Paraplegia caused by acute type B aortic dissection is a rare complication. Usually it is treated medically. However, if the true lumen is occluded due to a massive thrombus in the false lumen, multiple malperfusion of the distal organs may occur. In such a case, surgical intervention should be considered to resume antegrade perfusion in the descending aorta as soon as possible.

Keywords: Paraplegia; Acute type B aortic dissection; Thrombus; Surgical intervention

1. Introduction
Malperfusion caused by acute aortic dissection often necessitates emergent intervention to improve organ ischemia. Nonetheless, preoperative paraplegia associated with acute aortic dissection is seldom treated surgically. We report a patient who presented spinal cord ischemia and leg ischemia due to acute type B aortic dissection and underwent emergent surgical intervention.

2. Case report
A 46-year-old man was admitted to the emergency room with an acute onset of severe back pain following leg pain. An emergent computed tomography showed acute type B aortic dissection. The false lumen was completely thrombosed from distal to the left subclavian artery down to the aortic bifurcation, and the true lumen was almost completely occluded because of compression of a massive thrombus in the false lumen (Fig. 1). On his admission, he presented bilateral leg ischemia but there was no paraplegia or paraparesis. His past medical history was remarkable for uncontrolled hypertension. Because the occluded portion in the aorta was extensive, we decided to perform emergent operation. When the patient was taken into the operation room, we realized that he presented acute onset of paraplegia. After induction of anesthesia, partial (femoro—femoral) cardiopulmonary bypass was established. The fourth intercostal left thoracotomy was made, and the aortic arch was cross-clamped between the brachiocephalic artery and the left common carotid artery. Because the back flow from the left common carotid artery was observed, the left common carotid artery was also clamped. Although resection of the entry was first considered, as it might have necessitated total arch replacement under circulatory arrest, we decided not to do it to avoid invasive procedure. The entry was closed with 4-0 polypropylene pledgeted mattress sutures. The proximal anastomosis for graft replacement was carried out with 4-0 polypropylene sutures so that it was reinforced with Teflon felts both inside and outside of the aorta. Then, the descending aorta was transected at the
main pulmonary artery level. The false lumen was filled with a jelly-like thrombus. We removed as much of the thrombus as we could, and the distal anastomosis was performed using Teflon felts as well. The cross-clamp was removed and antegrade aortic flow was re-established into the descending aorta three hours after the onset of paraplegia. The patient awakened and was extubated eight hours after surgery without any neurological deficit. Postoperative course was uneventful except for serum creatinine kinase elevated up to 43,380 IU/l due to leg ischemia. He maintained good urine output for hydration therapy and did not require hemodialysis. Postoperative computed tomography showed widely opened true lumen (Fig. 2).

3. Discussion

Unlike acute type A aortic dissection, acute type B aortic dissection has been treated medically if it is not complicated. According to Trimarchi et al. [1] the incidence of surgery for acute type B aortic dissection was 23.1%. Malperfusion is one of the common reasons for surgical intervention [1,2]. Among them, visceral ischemia, renal ischemia, and limb ischemia are usually tractable with fenestration, extra-anatomical bypass, or graft endovascular treatment. In contrast, spinal cord ischemia is seldom considered to require surgical or percutaneous intervention [3]. The thrombosed type is especially difficult to treat with fenestration whether percutaneously or surgically [4]. The only option has been conservative therapies that include cerebrospinal fluid drainage, intravenous administration of drugs, and systolic blood pressure augmentation [5]. Preoperative spinal cord ischemia associated with acute type B aortic dissection was reportedly recognized in 6.2% of the cases [1]. Although half of the cases were transient with or without conservative treatment [2], paraplegia will devastate the quality of life of the patients if it persists. Therefore, treatment for paraplegia should be considered aggressively.

In our case, although he did not show any malperfusion except for leg ischemia in the emergency room, we decided to perform central aortic repair as the true lumen was almost completely occluded in the thoracic and abdominal aorta, which may have caused multiple malperfusion [4,6]. Because we noticed that the patient was presenting paraplegia in the operation room, we initiated partial cardiopulmonary bypass immediately before thoracotomy. While exclusion of the entry is essential in the operation of aortic dissection, it was also crucial in the present case to resume antegrade perfusion into the descending aorta as soon as possible. Not only leg ischemia and spinal cord ischemia, but also visceral ischemia might have happened to the patient. It was obvious that the delay of reperfusion into the descending aorta may have resulted in mortality. Therefore, to avoid more complicated procedures under circulatory arrest, we repaired the tear first, and then performed descending aortic replacement with reinforcement of anastomoses to secure prompt reperfusion without bleeding annoyance. Reperfusion was established only three hours after the onset of paraplegia, which might have contributed to the good recovery.

In conclusion, we performed emergent descending aortic replacement under partial cardiopulmonary bypass for a patient with acute type B aortic dissection presenting paraplegia and leg ischemia. If a massive thrombus in the false lumen is considered to be an etiology of spinal cord ischemia, surgical intervention may be indicated as an option for treatment.

References


