Effectiveness of the Use of Near-Infrared Spectroscopy to Treat Acute Type A Aortic Dissection Complicated with Limb Ischemia: Report of a Case

Kentaro Tamura, MD, Kousuke Nakajima, ME, Genta Chikazawa, MD, PhD, Arudo Hiraoka, MD, Toshinori Totsugawa, MD, PhD, Taichi Sakaguchi, MD, PhD, and Hidenori Yoshitaka, MD, PhD

We report an effectiveness of the use of near-infrared spectroscopy to evaluate the limb perfusion, which helps to continuously measure the tissue oxygen index of bilateral legs in treating acute type A aortic dissection complicated with limb ischemia. A 62-year-old man underwent total arch replacement for acute type A aortic dissection with limb ischemia. Intraoperative retrograde true lumen perfusion via bilateral femoral arteries during cardiopulmonary bypass improved ischemic condition of bilateral legs before the resection of primary intimal tear, and the use of near-infrared spectroscopy made it possible to assess additional revascularizations to the lower limbs were required or not.

Keywords: aortic dissection

Introduction

There is still no consensus on how to best manage limb ischemia in acute type A aortic dissection. Most cases of limb ischemia correct themselves after proximal aortic repair with primary intimal tear resection. However, some groups advocate immediate peripheral revascularization prior to proximal aortic repair to avoid reperfusion injury from a prolonged limb ischemia. We describe the usefulness of near-infrared spectroscopy (NIRS) to monitor limb perfusion and effectiveness of retrograde true lumen perfusion via femoral arteries to restore limb ischemia in acute type A aortic dissection.
Lower limb revascularizations such as aorto-bifemoral or axillo-bifemoral bypass were not required in the final analysis during the operation. A postoperative enhanced CT showed adequate enlargement of the true lumen, and bilateral renal arteries and bilateral iliac arteries were well enhanced (Fig. 1R). Postoperative blood examination revealed peaked creatinine kinase of 20000 U/L and myoglobin of 6000 ng/mL. Although temporary hemodialysis was required after surgery, the patient was discharged home on the 24th postoperative day with complete recovery of renal function, and his lower extremity function completely returned to normal.

**Discussion**

Intraoperative evaluation of lower extremity perfusion to assess limb ischemia in acute type A aortic dissection has not been well argued because limb ischemia itself does not seem to be critical in general. However, we believe that management of limb ischemia is important because it is often associated with ischemia of other vital organs, especially visceral ischemia. Although ischemic duration in both legs was expected to last longer because dissecting dense adhesions inside the pericardial cavity was required in the present case, central aortic repair was successfully performed by arterial cannulation into the true lumen via bilateral femoral arteries under the monitoring of TOI, resulting in prompt recovery from limb ischemia after initiating CPB. Kuo et al. reported that axillofemoral bypass was effective for limb and visceral malperfusion in acute type B dissection. We consider that enlarging the true lumen by retrograde arterial cannulation through the femoral artery can contribute to improving visceral organ ischemia in acute type A dissection repair as well. As intraoperative monitoring of regional brain oxygen saturation with NIRS has been widely used for the assessment of cerebral perfusion during thoracic aortic surgery, we introduced this methodology to monitor the leg oxygen saturation level to evaluate limb ischemia in acute type A aortic dissection. NIRS can be relatively easy to quickly install, and it can be performed even in the emergency settings of cardiovascular surgery. In contrast to inadequate assessment of leg perfusion by direct palpation of femoral arteries or Doppler signals, the measurement of the TOI in lower limbs with NIRS can be monitored continuously and quantitatively. Therefore, we consider the use of near-infrared spectroscopy made it possible to surely assess the perfusion status of lower limbs and decide that additional peripheral revascularizations were not required in the final analysis during the operation.

**Conclusion**

In conclusion, intraoperative retrograde true lumen perfusion via bilateral femoral arteries during CPB significantly improved ischemic condition of limb ischemia in
the present case, and NIRS was considered to be one of the reliable devices to evaluate the limb perfusion by continuously monitoring the leg oxygen saturation level, especially for acute type A aortic dissection repair.

Disclosure Statement
The authors have no particular disclosures to make.

References