



A case of type A acute aortic dissection with a common carotid trunk

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Abstract

We present a rare case of common carotid artery with acute type A aortic dissection. A 72-year-old woman underwent emergent aortic arch repair using Antegrade selective cerebral protection. Bottom-tapped cannulae were inserted into three orifices of arch vessels, however, regional cerebral oxygen saturation decreased after rewarming. We found that arch branches were in order from front to back, right subclavian artery, common carotid trunk, and left subclavian artery. The patient complicated stroke in the right middle cerebral artery.

Keywords Aortic arch anomaly · Vascular ring · Acute type A dissection · Aortic arch repair

Introduction

In most patients with anomaly of aortic arch, surgical procedure can be performed safely. However, there are extremely rare anomalies such as common carotid trunk. We present a case of type A acute aortic dissection with common carotid trunk.

Case

A 72-year-old woman was diagnosed with type A acute aortic dissection and referred to our hospital. Hemodynamics was stable, and there are no signs of malperfusion. We performed emergency surgery. We monitored brain oxygen saturation with regional cerebral oxygen saturation (rSO₂; INVOS 5100C; Somanetics, Troy, Mich) throughout the procedure. The aorta and vessels were approached by median

sternotomy. After cardiopulmonary bypass (CPB) establishment, we started systemic cooling. After the tympanic temperature had decreased to 23 °C and a rectal temperature at less than 30 °C, the aortic arch was opened, and inserting perfusion cannulae (Sumitomo, Tokyo, Japan) into three orifices of arch vessels and antegrade selective cerebral perfusion (ACP) was initiated. We transected the aorta between left carotid artery (LCA) and left subclavian artery (LSA) and performed distal anastomosis. As started rewarming, the right rSO₂ began to decrease. We confirmed the location of the cannula, which was inserted in the first arch orifice, using right radial artery pressure and tip pressure of the cannula, again and again. In addition, we tried to increase perfusion flow. However, rSO₂ was not recovered. After completing proximal anastomosis, we dissected arch branches. Finally, we recognized the branch was right common carotid artery (RCA). Her arch branches were in order from front to back, right subclavian artery (RSA), common carotid trunk, and LSA (Fig. 1). We anastomosed RSA, RCA and LCA, individually. After we reconstructed RCA, the right rSO₂ was improved. The degree of left rSO₂ was not changed during the procedure (Electronic supplementary material 1). The transition of SO₂ is shown in Fig. 2.

Postoperative magnetic resonance imaging showed large stroke in the right middle cerebral artery. She was transferred to nursing home with permanent neurologic dysfunction on her left upper extremity, however, she recovered and attended a hospital by walk 1-year after the operation.

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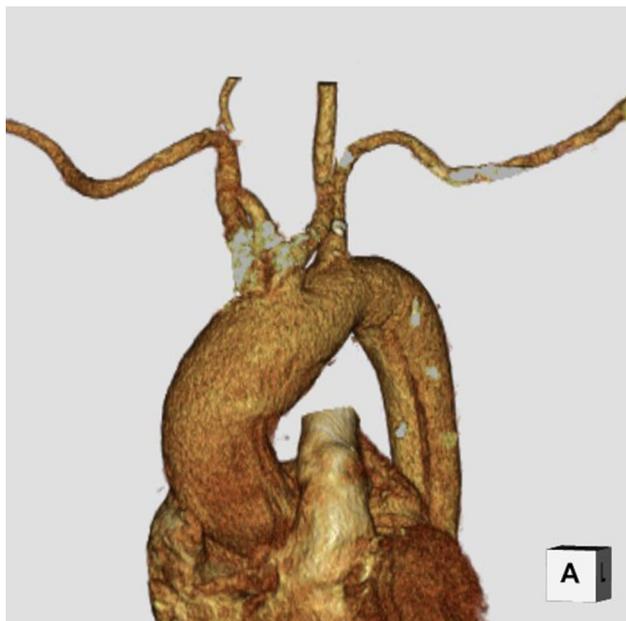


Fig. 1 Preoperative computed tomography. Arch branches were in order from front to back, right subclavian artery, common carotid trunk, and left subclavian artery

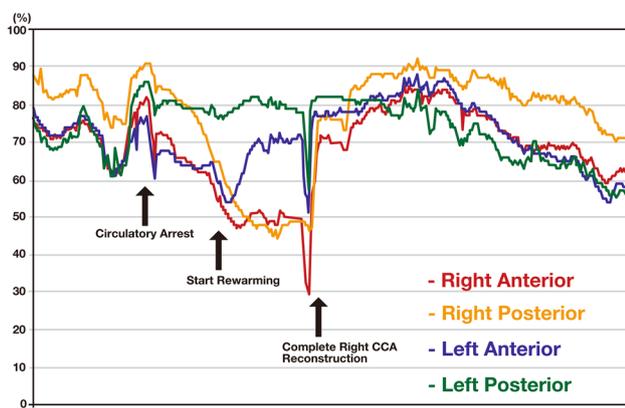


Fig. 2 Transition of intraoperative regional cerebral oxygen saturation (rSO₂). CCA common carotid artery

Discussion

The development of the aortic arch and its branches occurs within the first few weeks of the fetal life. In humans, these great vessels arise from six pairs of aortic arches. The anomaly of aortic arch is result from some failures of regression of the arches [1]. Natsis et al. proposed the clinical classification system of variations in branching pattern of aortic arch in their angiographic study [2]. There were eight types according to the incidences recorded with type I being the most and type VIII being the least frequent.

This case was classified as type IV; common carotid trunk, aortic arch with three branches; and the prevalence was reported as 0.16%.

In our experience, 1175 patients underwent proximal aortic surgery between 1999 and 2014 in our institution, aortic arch variations were consisted of bovine arch (6.0%), left vertebral artery arising from aortic arch (3.7%), right aortic arch with aberrant left subclavian artery (0.6%), aberrant right subclavian artery (0.4%), inferior thyroid artery arising from aortic arch (0.3%), cervical aortic arch (0.2%), common carotid trunk with common subclavian trunk (0.1%) and this anomaly (0.1%). In our best knowledge, this is the first report of common carotid trunk with acute type A dissection.

The common carotid trunk is usually asymptomatic, however, because only type IV has three orifices of aortic arch branches with “normal location” except for normal type, we could not recognize anomaly in the view from the inside of aortic arch. We reflected on extracting “first” cannula which supposed to be inserted into brachiocephalic trunk due to cope with reduction of the rSO₂. We should have pulled “second” cannula in the common carotid trunk. Urbanski et al. reported low incidence of postoperative stroke by their 2 cannula brain perfusion technique (they perfused BT and LCA) [3]; in this case, cerebral ischemia might be occurred by insufficient blood protection of the RCA region.

The three-dimensional computed tomography (CT) imaging shown in Fig. 1 was reconstructed postoperatively. If we made three-dimensional computed tomography imaging of aortic arch preoperatively, we could diagnose the common carotid trunk. This is an extremely rare case of open surgical repair for acute type A aortic dissection with common carotid trunk.

Conclusion

We presented a rare case of type A acute aortic dissection with common carotid trunk. Even in emergency cases, it is important to evaluate aortic arch vessels preoperatively in aortic arch surgery and recognize this anomaly.

Compliance with ethical standards

Conflict of interest Yuki Ikeno has no conflict of interest; Masamichi Matsumori has no conflict of interest. Koki Yokawa has no conflict of interest. Soichiro Henmi has no conflict of interest. Hidekazu Nakai has no conflict of interest. Takashi Matsueda has no conflict of interest. Katsuhiko Yamanaka has no conflict of interest. Takeshi Inoue has no conflict of interest. Hiroshi Tanaka has no conflict of interest. Yutaka Okita has no conflict of interest.

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