Introduction

Iatrogenic type A aortic dissection is rare, with reported incidence rates ranging from 0.12% to 0.29%. It correlates with aortic cannulation, aortotomy repair, endovascular stenting, and aortic cross-clamping. In particular, type A aortic dissection caused by aortic cross-clamping is a very rare but fatal complication, that usually leads to death on the operating table. Herein, we report a very rare case of iatrogenic retrograde type A dissection caused by surgical clamping on the aortic arch 2 days post-surgery.

Keywords: iatrogenic aortic dissection, aortic clamp injury, retrograde aortic dissection

Case Presentation

A 64-year-old man underwent a descending aortic replacement for a chronic type B dissecting aneurysm with left thoracotomy. The patient was weaned from the mechanical ventilator immediately after surgery without any neurological complications. However, on the second post-operative day, he suddenly suffered from cardiopulmonary arrest when talking with his family. Despite 6 hours of cardiopulmonary resuscitation, the patient died. The postmortem examination revealed a 1000 mL blood volume and huge hematoma in the pericardium owing to a retrograde type A dissection, which descended from an intimal laceration between the common carotid and left subclavian arteries that corresponded with aortic cross clamping. We here report a rare case of iatrogenic retrograde type A dissection caused by surgical clamping on the aortic arch 2 days post-surgery.

Keywords: iatrogenic aortic dissection, aortic clamp injury, retrograde aortic dissection
the left subclavian artery, and a 28 mm polyester graft was successfully replaced from the distal level of the subclavian artery to a level just proximal to the diaphragm. The early postoperative course was uneventful, and the patient was weaned from the mechanical ventilator immediately after surgery without any neurological complications. However, on the second post-operative day, although the patient was hemodynamically quite stable with reasonable urine out-put, he suddenly suffered from cardiopulmonary arrest when talking with his family. Despite 6 hours of cardiopulmonary resuscitation, the patient died. The postmortem examination revealed a 1000 mL fresh blood volume and huge hematoma in the pericardium owing to a retrograde type A dissection, which descended from the intimal laceration between the common carotid and left subclavian arteries that corresponded with aortic cross-clamping (Fig. 2). Histological examination of the aortic wall showed the presence of cystic medial necrosis (CMN).

Discussion

Several investigators reported the beneficial effects of thoracic endovascular aortic repair (TEVAR) for type B aortic dissection. However, the incidence of neurological adverse event is slightly high and several cases of stent graft-induced new-entry aortic tear after TEVAR have been reported. Therefore, there remains a lack of consensus regarding when to use TEVAR to treat type B dissecting aneurysms. Retrograde type A acute aortic dissection after TEVAR has been reported worldwide, with incidence rates ranging from 1% to 6.8%. This incidence is much higher than that of iatrogenic aortic dissection associated with open surgery. In our hospital, the best medical care and a fast-track clinical pathway are provided for patients with type B acute aortic dissections, and open surgery with a left thoracotomy is recommended to treat chronic type B dissecting aneurysms.

Retrograde aortic dissection, a mortal complication of cardiac surgery, is well known, with reported incidence rates as high as 3% during femoral cannulation or secondary to aortic cross-clamping. In cases of retrograde aortic dissection caused by aortic cross-clamping, transverse lacerations or tears usually occur at sites where surgical clamps had been placed across the vessel during cardiopulmonary bypass. The injured lesions extend around the circumference of the vessel wall for varying distances and have square, clean-cut edges. Therefore, when such injuries to the aortic root are extensive, the dissections usually cause cardiac tamponade or low-output syndrome, resulting in death on the operating table. In the present case, the early postoperative course progressed very well. However, the patient died of cardiac tamponade from an ascending aorta rupture before surgical repair, and an autopsy revealed an intimal laceration between the common carotid and left subclavian arteries that corresponded with aortic cross-clamping. Black, et al., demonstrated that a cross-clamped aortic wall was necrotic at the site of injury, with a split in the intima that extended at variable depths into the media. Therefore, there was evidence of wound edge healing of some duration before the patient was subjected to a postmortem examination.

In the present case, it was thought that spontaneous
intimal wound edge healings were not sufficient, and the wound ultimately extended to an acute retrograde aortic dissection at 2 days post-surgery. There were no events such as refractory hypertension, arrhythmia, or coughing before the patient suffered cardiopulmonary arrest.

Several investigators reported that dilated ascending aorta, known atherosclerosis, previous coronary bypass surgery, older age, and blood pressure at the time of dissection were risk factors for iatrogenic dissection.13,14) In the present case, however, the patient was still young, diameter of the ascending aorta was less than 40 mm (Fig. 1), and there was no refractory hypertension at the time of type A dissection onset. In the aortic wall with iatrogenic dissection, morphological studies have shown that CMN is only quantitatively different from the histopathological features observed in the normal aging aorta.15) In the present case, CMN might be the only reason why the injured wound edges extended to a retrograde dissection at 2 days post-surgery. In order to prevent the iatrogenic dissection, an open proximal anastomosis under deep hypothermic circulatory arrest may be one of the recommendable techniques.16) On the other hand, deep hypothermic arrest is associated with the incidence of pulmonary bleeding and cerebral complications. We always use the left thoracotomy to treat type B dissecting aneurysm, because it does not require cardiac arrest, temperature control, and brain protection. However, to prevent vascular injuries, we might need to modify our techniques or the instruments used when operating on patients with Marfan’s syndrome, or on relatives of people known to have this syndrome. The present patient did not have Marfan’s syndrome. We have never determined a patient’s histopathology before surgery. Instead, we have only done what is possible to prevent aortic injury, including reducing the cardiopulmonary bypass flow to 1 liter per minute during clamping and de-clamping of the aorta, particularly for patients with dilated ascending aorta, severe atherosclerosis, and elderly patients.

Conclusions

Here, we report a rare case of iatrogenic retrograde type A dissection caused by surgical clamping, which occurred on the aortic arch at 2 days post-surgery for a chronic type B dissecting aneurysm.

Disclosure Statement

There is no conflict of interest.

References