Case report - Vascular thoracic

Single-stage repair of extended thoracic aortic aneurysm

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Abstract

We report the case of a 78-year-old man with an extended thoracic aortic aneurysm in whom replacement of the ascending aorta, aortic arch, and descending aorta were performed by single-stage repair. Single-stage repair surgical approach in this case was selected rather than two-stage repair because of the risk of rupture of the aneurysm in the period before the second surgery and the patient’s somewhat unstable mental condition that could have reduced his motivation for a second surgery. At surgery, replacement of descending aorta was performed with thoracotomy in a right semisupine position, and replacement of ascending aorta and aortic arch was performed with a median sternotomy in the supine position by changing the position of the left forearm. The postoperative course was smooth without major complications. This case illustrates that the choice of surgical procedure should be made based on the shape of the aortic aneurysm and the mental and general conditions of the patient.

Keywords: Extended thoracic aortic aneurysm; Single-stage repair

1. Introduction

Thoracic aortic replacement for an aneurysm existing simultaneously in the ascending aorta, aortic arch, and descending aorta and for acute and chronic dissecting aortic aneurysms can be performed as a single-stage or two-stage repair. The strategy for extensive aortic replacement varies depending on the patient’s condition and background, and the diameter of aneurysm.

2. Case report

A 78-year-old man visited a previous physician with a chief complaint of dorsal pain that appeared suddenly. A dilated mediastinum was detected on a chest X-ray, and the patient was admitted to our hospital for a thorough examination. After admission, a chest X-ray showed a cardiothoracic ratio of 53%, and the mediastinum and aortic arch were dilated to a maximum of 62 and 80 mm, respectively, but no dissection or rupture was noted (Fig. 1). Transthoracic echocardiography showed no pericardial effusion, and the left ventricular ejection fraction was 76.7%, indicating normal systolic function. Mild aortic regurgitation was present. Extended aneurysm of the thoracic aorta was diagnosed, and surgery was scheduled.

The procedure in the left thoracic cavity was performed with the patient in a right semisupine position, and a midline incision was created by changing the position of the left forearm (Fig. 2). First, the thorax was opened at the left 5th intercostal site. The descending aorta was dilated to a maximum of 80 mm, but anastomosis of the peripheral side in the region protruding into the right thorax was considered possible, and taping of the descending aorta was applied. The left forearm position was changed and the heart was approached by a median sternotomy in the supine position. Extracorporeal circulation was initiated with blood withdrawn from the right atrium and returned to the ascending aorta. Cooling was initiated, ventricular fibrillation was induced, and a vent was inserted into the right superior pulmonary vein. When the rectal temperature decreased to 26.1 °C, the aorta was clamped, and cardioplegic solution was infused to induce cardiac arrest. The circulation was then arrested and the ascending aorta was opened. The incision line was extended to the arch. Antegrade selective cerebral perfusion was performed at the same time. The posture was changed to the right semisupine position and the procedure was continued via the left thorax. Since the peripheral side of the descending aorta was slightly vulnerable, the outer circumference was strengthened with Teflon felt, and the graft with four branches was used for anastomosis. The posture was then changed to the supine position and perfusion of the lower half of the body was started via the side branch of the graft. The ascending aorta was trimmed, the outer circumference of the graft was strengthened with Teflon felt, and the graft was anastomosed to the ascending aorta 1 cm above the sinotubular junction. After central anastomosis, the clamped aorta was released, and the cervical branch was reconstructed under cardiac beating. The duration of extracorporeal circulation was 200 min, the aorta was...
clamped for 76 min, and the duration of circulatory arrest was 54 min.

The postoperative course was smooth without major complications, but the patient still had clinical depression. He sometimes rejected meals and medication, and had a negative attitude towards activities and rehabilitation. Based on his request, and after consultation with his family, the patient was transferred to another hospital for rehabilitation. The patient is doing well and has had no cardiovascular event after surgery.

3. Discussion

The therapeutic strategy for extended and dissecting aortic aneurysms varies depending on the pathology and the patient’s background. For aortic aneurysms, some facilities perform single-stage repair by bilateral thoracotomy or via a trans mediastinal approach by median sternotomy because the aneurysm may rupture or the general condition of the patient may deteriorate during the waiting period before the second surgery [1–5]. Furthermore, repeated surgery itself carries a risk, the cost also differs, and favorable outcomes can be achieved with one-stage repair [1–5]. We decided to perform one-stage repair based on the risk of rupture during the period prior to the second surgery, the difficulty in anastomosis with the native blood vessel using the elephant trunk method and a stent graft, and the patient’s somewhat unstable mental condition that could have reduced his motivation for the second surgery.

Regarding the surgical procedure, Safi et al. examined early outcomes of two-stage extended replacement by the elephant trunk method, and found that the hospital mortality rates after the first and second steps were 6.3% and 9.6%, respectively [6]. LeMaire et al. found the hospital mortality rates after the first and second step were 12.0% and 4.0%, respectively, and reported that 51.0% of patients were able to reach the second step [7]. There are some reported cases of one-stage extended surgery. The outcomes in these cases are comparable to the early outcomes of two-stage repair. Kouchoukous et al. and Doss et al. suggested that bilateral thoracotomy is particularly useful for repeated surgery in cases that have undergone a midline incision, in which the great blood vessels are relatively undamaged, and the visual field is favorable; however, there is an increased probability of wound infection due to decreased blood flow caused by cutting of the internal thoracic artery, and possible pulmonary complications associated with thoracotomy [1–3]. Furthermore, Beaver et al. reported that lesions extending maximally to the diaphragm can be approached by a midline incision alone [4]. We approached the lesion by a midline incision and thoracotomy, similar to Hu et al. who performed procedures on the midline and in the left thorax by changing the position of the left arm [2]. We selected this method because changing the arm position is easy and allows a very good visual field to be maintained, thus avoiding potential complications due to bilateral thoracotomy.

References