**CASE REPORT**

A 54-year old woman was transferred from her primary-care physician to our institution for surgical care. In 1992, she underwent aortic root (mechanical conduit) and hemiarch replacement including reimplantation of coronary arteries using the Cabrol technique. Upon admission to the hospital, she presented with a pulsatile presternal protrusion. Computed tomography (CT) angiography (Fig. 1) showed a pseudoaneurysm, arising from the distal suture line of the aortic graft. In the imaging reconstruction, the aneurysmal sac is seen to extend into the body of the sternum and continue almost to the skin plane. The largest diameter of the ascending aorta measured 9.1 cm and preoperative CT scan revealed that the pseudoaneurysm reached as close as 7 mm underneath the skin.

In variance to our previously published standard techniques including selective antegrade cerebral perfusion (ACP) and mild systemic hypothermia for aortic arch surgery, we had to cautiously prepare a safe entry into the chest by the establishment of an individual safety net [3]. For this reason, we first dissected out the right axillary artery and snared it with two vessel loops. We, additionally, exposed the right carotid artery through a jugular incision and followed it to its origin from the innominate artery. In a next step, we encircled the innominate artery with a vessel loop so that we could guarantee cerebral perfusion through the axillary artery in case of a pseudoaneurysm rupture during sternotomy. Cardiopulmonary bypass (CPB) was established via the right axillary artery and a percutaneous venous cannula placed through the right groin. Since venous drainage was suboptimal, we placed a second venous cannula through the right jugular vein. To protect visceral organs and the spinal chord from the risks of resternotomy, including an expected pseudoaneurysm rupture, we slowly cooled down the patient to an aimed temperature of 28°C of the bladder which is ≏2°C cooler than our routine protocol suggests. With this technical preparation, we felt comfortable starting the challenging resternotomy by moving stepwise from the cranial and caudal end of the sternum towards the region of the penetrating pseudoaneurysm. We had almost dissected out the entire aneurysm formation when the anticipated rupture occurred. From the

**Abstract**

Aortic pseudoaneurysms have the potential for eroding bony structures in the chest, including the sternum, over time. Here, we report the case of a 54-year old woman with a giant pseudoaneurysm of the ascending aorta, 19 years after aortic root (mechanical conduit) and hemiarch replacement. The patient presented to her primary-care physician with a pulsatile presternal subcutaneous protrusion in the midline of her median sternotomy scar. We performed a challenging midline resternotomy after the establishment of a surgical safety net for cerebral and visceral organ protection followed by a supracoronary ascending and hemiarch replacement including a reinsertion of the coronary ostia employing selective antegrade cerebral perfusion and mild systemic hypothermic circulatory arrest. We discuss here the specific surgical considerations of this case.

**Keywords:** Aortic operation • Cerebral protection • Reoperation

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preoperative CT scan, we knew that the anterior portion of the pseudoaneurysm penetrating through the sternum was thrombosed, which is why massive bleeding did not occur. We immediately switched to selective ACP through the right axillary artery by snaring the innominate artery and gained access to the coronaries for selective antegrade cardioplegia. Once the heart was arrested, we first dissected out the aortic arch and performed the new distal anastomosis in an open fashion so that we could cross clamp the new prosthesis and switch back to full-body perfusion. The time from aneurysmal rupture to reinstitution of full body perfusion was 42 min. Being prepared to perfuse the lower body either via the open arch using a balloon cannula or via the femoral artery provides an additional safety net and could be considered during a prolonged selective ACP time if necessary. Replacement of the old aortic graft was completed by a standard supracoronary suture line and a renewal of the Dacron graft to the right coronary artery. Since the Dacron graft to the left coronary was thrombosed, we additionally performed coronary artery bypass grafting with a saphenous vein graft to the left anterior descending artery. CPB time was 186 min and myocardial ischaemic time accounted for 103 min. The patient was transferred to the ICU in stable condition. The postoperative course was uneventful, including an early extubation 6 h postoperatively and discharge from the hospital on Day 6 after surgery. Figure 2 illustrates postoperative CT images showing a good result following ascending and hemiarch replacement (Fig. 2).

**COMMENT**

There are no larger clinical series available on the treatment of aortic pseudoaneurysms following cardiac surgery, and despite intense literature search, we were only able to find 1 similar case to the pathology described here with a giant pseudoaneurysm eroding the sternal bone. The surgical approach described in this report was different and consisted of a bilateral thoracotomy to avoid a midline sternotomy. The aortic valve was replaced, and a supracoronary Dacron tube was implanted. Unfortunately, the patient had an unfavourable postoperative course, requiring
prolonged intubation for severe respiratory failure, and died 45 days after surgery.

Our approach consisted of a midline resternotomy after establishment of a surgical safety net in case of an aneurysm rupture. This approach may seem more venturesome at first sight but reduces surgical trauma to the lungs. The two main considerations in preparation for this case were to guarantee a sufficient perfusion to the brain and to provide the visceral organs and spinal chord with a safe period of at least 60–90 min for completion of the open distal anastomosis by avoiding deep hypothermic circulatory arrest. Dissecting and cannulating the right carotid artery through a side Dacron branch as described by Urbanski or dissecting and directly cannulating both carotid arteries and the femoral vessels as described by Bachet and co-workers should be mentioned as valuable alternative strategies with which to be well prepared for a safe mediastinal re-entry [4, 5]. We previously described in detail our surgical management for aortic arch surgery with selective ACP and mild systemic hypothermia and have encountered good results in patients with up to 90 min of selective antegrade cerebral perfusion [3]. This was the 23rd consecutive patient in whom we successfully extended our institutional protocol to those with prior aortic arch surgery.

Conflict of interest: none declared.

REFERENCES