

Open Repair of Thoracoabdominal Aortic Aneurysm

in a 46-Year-Old Man with Pleural Adhesions
and Aberrant Right Subclavian Artery

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Endovascular aortic treatment is being performed more often and offers some advantages over open surgery. Nevertheless, open repair of thoracoabdominal aortic aneurysms is still relevant in complex cases, including combined chronic aortic dissection, congenital aortic abnormalities such as aberrant right subclavian artery, and dense pleural adhesions after a previous thoracotomy. We describe our successful use of open repair in a 46-year-old man who had these multiple abnormalities. (Tex Heart Inst J 2018;45(3):179-81)

Open repair of thoracoabdominal aortic aneurysms (TAAA) can be challenging in association with chronic aortic dissection, combined congenital aortic abnormalities such as aberrant right subclavian artery (ARSA), and dense pleural adhesions after a previous thoracotomy. Few reports have been published about open TAAA repair in patients with ARSA. We discuss our experience with open repair in a patient who had ARSA and pleural adhesions.

Case Report

Key words: Aorta, thoracic abnormalities/surgery; aortic aneurysm, thoracic/surgery; diverticulum/complications; risk assessment; subclavian artery/abnormalities/surgery; treatment outcome; vascular malformations/complications/diagnosis/surgery

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A 46-year-old man with hypertension was admitted to our hospital in August 2014 because of intermittent chest pain. In 2007, he had undergone ascending aortic and hemiarch replacement for DeBakey type I aortic dissection at our hospital. At that time, an ARSA was detected (Fig. 1). At another hospital in 2009, he had undergone surgical wrapping of the mid descending aorta to treat an aneurysm. At his presentation in 2014, computed tomograms (CT) revealed a Crawford extent II TAAA with a maximal diameter of 53 mm at the proximal descending aorta just above the previous wrapping (Fig. 2). Chest radiographs and CT showed narrowing under the patient's previous thoracotomy site at the 5th intercostal space, raising suspicion of dense adhesions. The rapid growth of the aneurysm in this relatively young patient convinced us to perform open repair.

Because of the challenges posed by the ARSA, we planned a 2-stage procedure. First, we performed right common carotid-to-right subclavian artery bypass surgery with use of a 7-mm GORE-TEX® graft (W. L. Gore & Associates, Inc.), along with ARSA proximal ligation. Two days later, we performed open TAAA repair.

We made a left thoracotomy through the 6th intercostal space; we avoided the thoracotomy adhesions that we found intraoperatively at the 5th space. At the aortic wrapping site, we encountered severe adhesion between the left lung and descending aorta. Making barely enough space to perform a longitudinal aortotomy avoided the risk of additional adhesiolysis and possible lung injury. Then, cardiopulmonary bypass (CPB) was started through the left femoral artery and femoral vein. We initiated total circulatory arrest when the patient's nasopharyngeal temperature reached 22 °C. After establishing bilateral antegrade selective cerebral perfusion, we performed a proximal anastomosis of the main graft and then a left subclavian artery bypass. We used a 26-mm Gelweave™ thoracoabdominal graft (Vascutek Ltd., a subsidiary of Terumo Corporation) for the main graft, and an 8-mm Gelweave graft for the left subclavian bypass. Circulatory arrest was stopped after 47 min, and CPB was resumed. The patient's intercostal arteries were too small to reattach. After we clamped the infrarenal aorta, we inserted separate catheters into the ostia of the celiac artery



Fig. 1 Computed tomogram shows the aberrant right subclavian artery (arrow) behind the esophagus (arrowhead).



Fig. 2 Preoperative computed tomogram (3-dimensional reconstruction) shows the previous ascending aortic graft (asterisk), the previously wrapped descending aortic area (arrow), and the dissected thoracoabdominal aortic aneurysm.

and superior mesenteric artery for continuous perfusion with oxygenated blood, and into both renal arteries for intermittent perfusion of cold (4 °C) crystalloid solution. We then performed sequential distal anastomoses of the main graft and the mesenteric arteries.

We anastomosed the superior mesenteric artery, celiac trunk, and right renal artery to the side of the main graft as an island patch. We performed a separate anastomosis of the left renal artery to the side branch of the main graft (Fig. 3). The patient was then weaned from CPB (total time, 253 min).

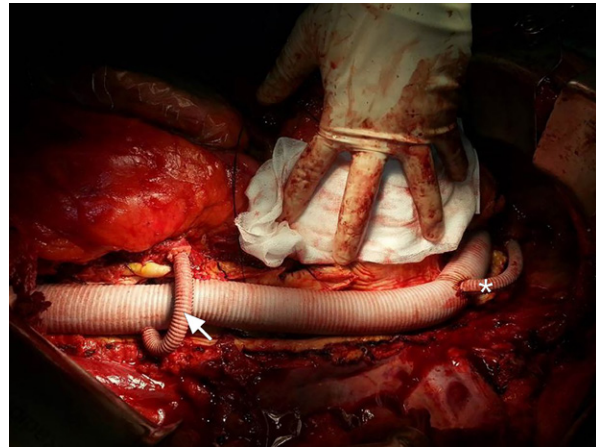


Fig. 3 Intraoperative photograph shows the new thoracoabdominal aortic graft with side branches for the left subclavian artery (asterisk) and left renal artery (arrow).

The patient was extubated on postoperative day 4. After treatment for a left inguinal lymphocele at the femoral cannulation site, he was discharged from the hospital on postoperative day 19. At his 28-month follow-up appointment, he was doing well.

Discussion

Aberrant right subclavian artery is a relatively prevalent vascular anomaly (incidence, 0.5%).¹ Treatment is recommended if the patient is symptomatic, has a Kommerell diverticulum >3 cm in diameter, a symptomatic descending aortic aneurysm, or aneurysmal rupture.²

Repair of ARSA is transitioning from open surgery to endovascular or hybrid approaches. In a systematic review of the literature, early outcomes for endovascular repair of ARSA were favorable.³ However, for TAAA and chronic dissection combined with ARSA, endovascular treatment is technically more demanding or contraindicated. In addition, despite favorable short-term results, endovascular treatment of TAAA is associated with significant rates of endoleak and repeat intervention, high late mortality rates (aorta- or non-aorta-related), and lack of long-term data.⁴

When surgeons complete subclavian-to-carotid transposition or bypass before beginning the thoracic approach, the subclavian distribution is revascularized without increasing potential morbidity or the complexity of the intrathoracic procedure.² Repair of in situ ARSA during TAAA repair may lengthen hypothermic circulatory arrest time or aortic cross-clamp time; and, later, aneurysmal change of the ARSA may cause compression symptoms or rupture.

The results of open TAAA repair have improved substantially because of refined surgical techniques and better intra- and postoperative management.⁵ Dense

pleural adhesions after previous thoracotomy increase surgical difficulty and seem to be regarded as a contraindication to open repair of the descending aorta or of TAAA, so endovascular treatment is preferred. However, inoperable adhesions are rare and are apparent to the surgeon only during reentry. In our patient, we overcame the severe adhesions by means of careful entry and minimal adhesiolysis.

This case illustrates that open repair of TAAA can be useful in complex surgery involving dense pleural adhesions, extensive TAAA, and ARSA.

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