

Explantation of an ALTO abdominal stent graft

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ABSTRACT

Explantation of traditional infrarenal aortic endografts has been previously described, and explanation of aortic endografts with standard suprarenal fixation at our center has been well defined. However, to the best of our knowledge, no cases have been reported on explantation of endografts with polymer rings present to facilitate the proximal seal. By obtaining full thoracoabdominal exposure with supraceliac clamping and opening the entire aorta along the graft, we were able to successfully explant the ALTO stent graft with polymer rings. (*J Vasc Surg* 2024;XX:XX-X.) (*J Vasc Surg Cases Innov Tech* 2024;10:101416.)

Keywords: Endoleak; Aortic graft explantation; Thoracoabdominal aneurysm

Endovascular repair of abdominal aortic aneurysms (AAAs) is a common procedure, and stent graft explantation is a technique with which vascular surgeons must be facile. Typically, explantation is required in the setting of an endoleak with unsuitable anatomy for an endovascular resolution, aortic graft–enteric fistula, or infection. Explantation of infrarenal aortic endografts has been previously described.¹⁻¹⁰ To the best of our knowledge, currently, no cases have been reported on the operative technique to explant aortic endografts designed with polymer rings to facilitate a proximal seal (ALTO Abdominal Stent Graft; Endologix). Explantation, because of the polymer ring, poses unique challenges compared with other devices with suprarenal fixation. The patient gave written informed consent for the report of her case details and imaging studies.

CASE REPORT

An 83-year-old woman presented with an enlarging juxtarenal AAA due to a type Ia endoleak after an infrarenal aneurysm repair with a 26-mm ALTO stent graft at a referring institution several months prior. At the index operation, a 10 × 29-mm Palmaz (Cordis Peripheral) bare metal balloon expandable stent was placed for the proximal type Ia endoleak. However, the leak did not resolve (Fig 1). The patient was subsequently referred to our institution, and we believed the proximal type Ia endoleak was the result of the Palmaz stent/ALTO endograft complex being levered off the back wall of the narrowed calcified aorta (Fig 2). After consideration of her advanced age and

excellent performance status, a plan was made for elective graft explantation with open extent IV thoracoabdominal aneurysm repair. The patient was discussed in our multidisciplinary aortic conference, and, given that the juxtarenal aorta was very narrow and calcified, no practical endovascular solution was available. The patient was admitted the night before surgery for lumbar drain placement, as per standard group practice.

The operative plan consisted of a thoracolumbar incision from the ninth rib to just below the umbilicus. The entire abdominal aorta was then mobilized, along with the bilateral common iliac arteries. Despite complete division of the diaphragmatic crura, we were unable to get above the previously placed stents for exposure, because they extended well above the celiac artery. Therefore, the incision was extended posteriorly along the ninth rib, and the diaphragm was partially divided, allowing for exposure of the descending thoracic aorta. The celiac artery, superior mesenteric artery, and left renal artery were all controlled with silastic loops (Fig 3, A). The right renal artery was not separately controlled, and the renal arteries were perfused with cold lactated Ringer's solution during the proximal anastomosis.

Following systemic anticoagulation with heparin, clamps were placed sequentially on the right and left common iliac arteries, left renal artery, superior mesenteric artery, and celiac artery and on the descending thoracic aorta above the suprarenal fixation stent. The aorta was then opened longitudinally. The aortic stent graft was clamped proximally and distally and transected. The common iliac artery stents were pulled out with the iliac clamps removed. The arteriotomy was extended up along the lateral side of the aorta just proximal to the left renal artery, which was removed from the aorta as a button. Next, the bare metal stents of the aortic endograft were cut with a wire cutter, and the endograft was removed. This resulted in removing the entire aortic stent graft and the previous Palmaz stent that had been placed inside (Fig 3, B). We were then able to completely remove the remaining suprarenal fixation struts piecemeal. A 20-mm Dacron graft was then used for standard open AAA repair, with an anastomosis beveled behind the right renal artery and superior mesenteric artery, with reimplantation of the left renal artery (Fig 3, C). The total supraceliac clamp time was 40 minutes.

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The editors and reviewers of this article have no relevant financial relationships to disclose per the JVS policy that requires reviewers to decline review of any manuscript for which they may have a conflict of interest.

2468-4287

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<https://doi.org/10.1016/j.jvscit.2023.101416>

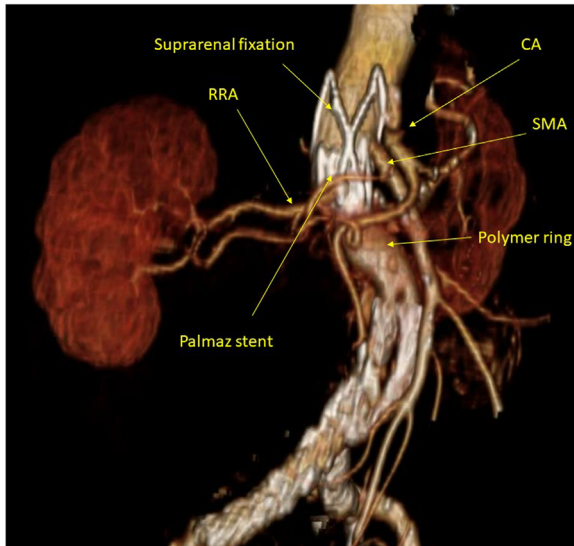


Fig 1. Three-dimensional reconstruction of preoperative imaging. CA, Celiac artery; RRA, right renal artery; SMA, superior mesenteric artery.



Fig 2. Preoperative sagittal image of the aorta with arrows indicating the narrow native aorta compressing the Palmaz stent and ALTO endograft.

The patient tolerated the operation with no complications and was discharged home, independent with self-care, on postoperative day (POD) 11. She presented for outpatient follow-up on POD 23 and again on POD 93. At both follow-up times, she was doing well and living independently in the community. At her last visit, she was discharged from the clinic.

DISCUSSION

Explantation of aortic stent grafts is an important technique in vascular surgery. At our center, this is often performed for conventional devices with suprarenal fixation through an anterior transabdominal approach with supraceliac and bilateral common iliac clamping, respectively, and using a cut 20-mL syringe to extract the device by advancing it along the device to release the suprarenal fixation stent. However, the polymer rings on the ALTO device inhibit the ability to slide the device through the syringe to release the suprarenal fixation; therefore, a thoracolumbar incision was necessary to remove the entire graft. Extracting this device has not been previously described and, considering that these devices continue to be implanted, description of a successful technique for removal could be of benefit. The

specific technical changes for removal of this graft entailed obtaining full thoracoabdominal exposure of the aorta with supraceliac clamping and opening the entire aorta along the graft to extract the device. This technique was successful and will continue to be used at our center for future similar cases. In select cases, a type Ia endoleak can be addressed with graft preservation, including external wraps and/or felt cuffs. However, for our patient, this would not have been feasible because the proximal endoleak was due to the extremely narrow infrarenal aorta and levering of the graft off the back wall.

DISCLOSURES

None.

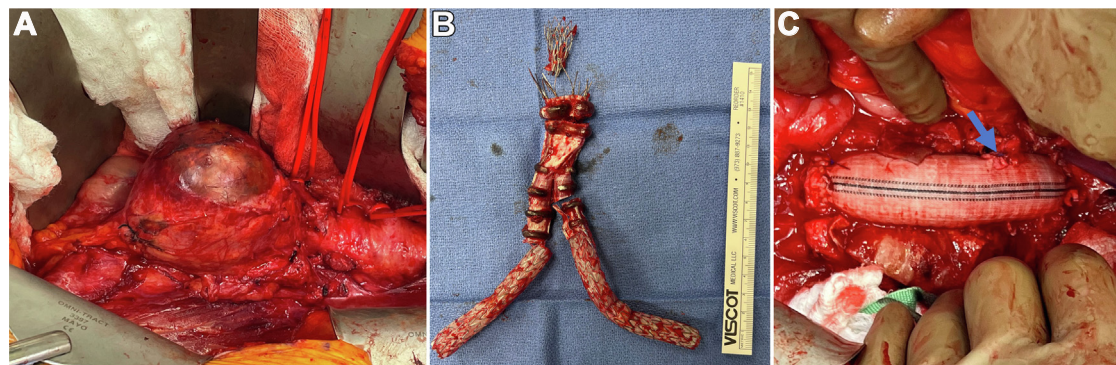


Fig 3. **A**, Before explantation with loops around the celiac artery, superior mesenteric artery, and left renal artery. **B**, Explanted device pieces. **C**, After explantation with arrow indicating left renal artery.

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Submitted Sep 25, 2023; accepted Dec 26, 2023.