



Case Report

Abdominal debranching: a surgical approach that remains relevant

Debranching *abdominal*: una cirugía que se mantiene vigente

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Abstract

Introduction: the treatment alternatives for thoracoabdominal aneurysms are open surgery, complete endovascular treatment and hybrid surgery.

Case report: it is presented a 56-year-old man, with a history of TEVAR for type B aortic dissection in 2015, presented with a thoracoabdominal aneurysm. Hybrid treatment was performed with abdominal debranching of four visceral branches and exclusion of the aneurysm endovascularly in stages.

Discussion: hybrid repair is associated with lower morbidity and mortality than open surgery and offers a treatment option for patients with challenging anatomies not appropriate for total endovascular management, with good patency results. However, this alternative is not without complications. More long-term data are needed to establish treatment guidelines for these patients.

Resumen

Introducción: las alternativas de tratamiento de los aneurismas abdominotorácicos son la cirugía abierta, el tratamiento endovascular completo y la cirugía híbrida.

Caso clínico: hombre de 56 años, con antecedente de TEVAR por disección aórtica de tipo B en el 2015 que se presenta con aneurisma abdominotorácico. Se realiza tratamiento híbrido con *debranching* abdominal de cuatro ramas viscerales y exclusión del aneurisma por vía endovascular.

Discusión: la reparación híbrida se asocia a menor morbimortalidad que la cirugía abierta y ofrece una opción por etapas. Es el tratamiento para pacientes con anatomías desafiantes no apropiados para el manejo endovascular total, con buenos resultados de permeabilidad. Sin embargo, esta alternativa no está exenta de complicaciones. Se necesitan más datos a largo plazo para establecer pautas de tratamiento para estos pacientes.

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INTRODUCTION

The main modalities for the treatment of thoracoabdominal aortic aneurysms are open surgery with aortic replacement and reimplantation of visceral branches, endovascular repair with fenestrated, branched, parallel, or physician-modified devices, and hybrid surgery (1). Open repair involves extensive physiologic trauma with a high risk of mortality (2). A fully endovascular approach carries high costs and requires long device-manufacturing times.

The hybrid procedure was first described by Quiñones-Baldrich et al in 1999 (3). It consists of visceral aortic debranching with revascularization of the visceral arteries and exclusion of the aortic aneurysm by means of endografts.

CASE REPORT

A 56-year-old man with a past medical history of hypertension, stage III chronic kidney disease, and stroke resulting in left lower-limb paresis, as well as type B aortic dissection previously treated with thoracic endovascular aortic repair (TEVAR) in 2015 at another institution.

He presented to our center with 3-day history of hypogastric pain, melena, and severe anemia (hemoglobin 6.7 g/dL) but without hemodynamic compromise. He underwent transfusion, and upper endoscopy revealed mild erosive gastropathy without active or recent bleeding. Further evaluation with CCTA (Fig. 1) demonstrated a thoracic endograft with proximal landing in zone 2 and distal landing at T10, with a chronic dissection flap distal to the endograft extending to the right common iliac artery and the left external iliac artery. Findings included a true lumen diameter of 19 mm, a patent false lumen, and aneurysmal dilatation of the thoracoabdominal aorta involving the visceral segment and the left common iliac artery, without signs of acute complication or active GI bleeding. Because of persistent abdominal pain and the patient's history of GI bleeding, colonoscopy was performed, revealing an obstructive sigmoid colon tumor. Biopsy confirmed adenocarcinoma. The patient showed no evidence of intestinal obstruction or further bleeding. The case was evaluated with the col-

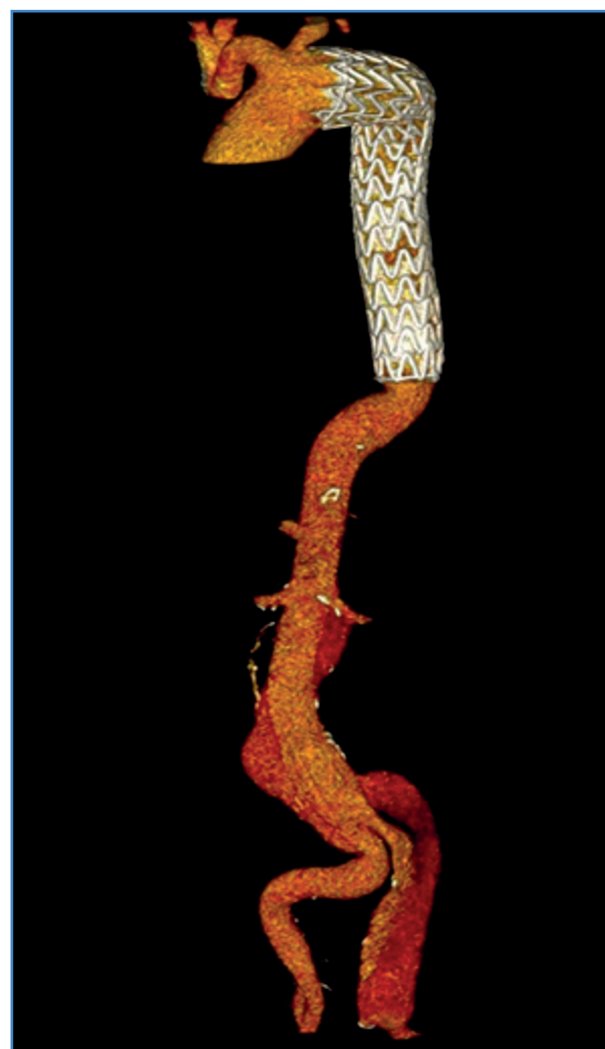


Figure 1. 3D reconstruction of admission CCTA. Aneurysmal dilatation of the thoracoabdominal aorta distal to the thoracic endograft is shown (occluding the origin of the left subclavian artery, not represented), along with a patent false lumen.

orectal surgery team, and given oncologic urgency, it was decided to first address the aortic disease while staging continued.

Owing to comorbidities, the patient was considered ineligible for open repair. In addition, given the need for timely oncologic therapy, the suboptimal true lumen diameter, and the presence of a chronic dissection flap, fenestrated or branched endovascular repair (F/BEVAR) was excluded. A 2-stage hybrid approach was therefore chosen.

The first stage involved complete abdominal debranching with prosthetic bypass to all 4 visceral arteries (Fig. 2). A transperitoneal approach was used, with the right common iliac artery proximal to its bifurcation as inflow for the visceral branches.

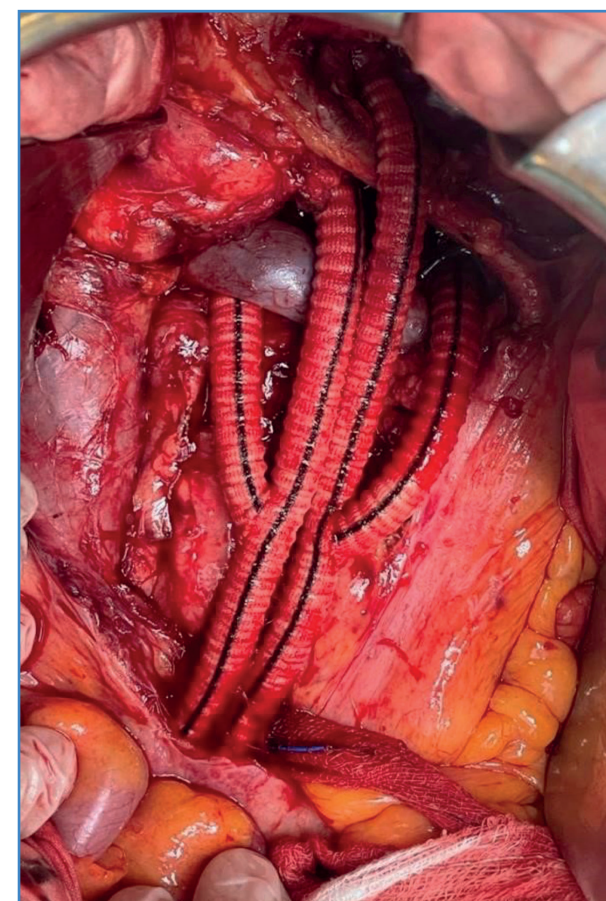


Figure 2. Abdominal debranching from the right common iliac artery to (from left to right) the right renal artery, superior mesenteric artery, celiac trunk, and left renal artery.

Dacron grafts (6 mm) were used. All visceral artery origins were ligated with silk except for the celiac trunk due to limited access. Because extensive aortic coverage, exclusion of the left hypogastric artery, and prior TEVAR in zone 2 without left subclavian revascularization raised concern for spinal cord ischemia, the left hypogastric artery was revascularized using a bypass from the left external iliac artery to the left internal iliac artery with PTFE graft, with proximal ligation of the hypogastric artery.

The patient was admitted to the ICU requiring low-dose vasopressors that were quickly withdrawn. He was later transferred to a step-down unit, where he developed transient renal dysfunction not requiring dialysis.

One week later, endovascular repair was performed, including placement of a cerebrospinal fluid drain (CSF) to reduce the risk of spinal cord ischemia. Bilateral open femoral access was obtained. Aortogra-

phy demonstrated adequate patency of the 4 abdominal debranching grafts and the left iliac bypass. For the abdominal aorta, a 28 mm × 180 mm Excluder endograft (Gore) was deployed at the level of the celiac trunk, achieving a distal landing zone with ipsilateral limb extension to the right common iliac artery proximal to the debranching anastomosis. The contralateral limb (left) was constructed with 16 mm × 120 mm, 16 mm × 140 mm, and 16 mm × 100 mm extensions to land at the proximal left external iliac artery above the iliac bypass origin. On the right, a 16 mm × 100 mm limb landed over the bypass origin. A 34-34 mm × 200 mm CTAG endograft (Gore) was deployed at the proximal Excluder flow divider to complete connection with the previous TEVAR. Final angiography demonstrated no endoleak from the celiac trunk (not ligated in the first stage) or any other source, with preserved patency of the debranching and iliac bypass (Fig. 3).

Postoperatively, the patient was admitted to the step-down ICU. On postoperative day 6, he developed abdominal pain and fever. Abdominal MRI and CCTA showed a focal hepatic segment IV lesion suggestive of metastasis, and a small (38 mm × 17 mm) fluid collection around the proximal debranching anastomosis, as well as a type II endoleak from lumbar arteries (Fig. 4). The patient was treated with ceftriaxone and metronidazole per infectious disease recommendations, with symptom relief.

Oncologic management included planned ablation of the hepatic metastasis and colonic stent placement. While awaiting these procedures, the patient was readmitted 25 days after discharge for bowel obstruction. Emergency Hartmann procedure was performed, excluding colonic perforation intraoperatively. During this period, he received antibiotic therapy with ertapenem and linezolid. Follow-up CCTA at 3 months demonstrated persistence of the type II endoleak from lumbar arteries, with minimal sac growth, and continued surveillance was recommended.

DISCUSSION

Compared with open repair, hybrid repair is associated with lower morbidity and mortality,⁴ avoiding



Figure 3. A. Aortography demonstrating patency of the 4 abdominal debranching branches. A1, right renal artery branch; A2, superior mesenteric artery branch; A3, celiac trunk branch; A4, left renal artery branch. B. Final aortography showing patency of the debranching grafts. No endoleak is observed. The aortic endograft is in situ.

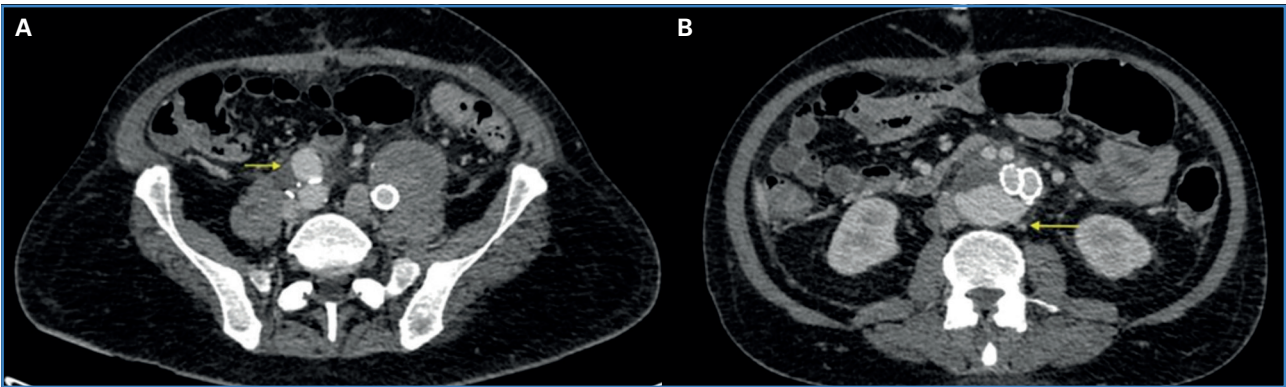


Figure 4. A. CCTA showing a fluid collection surrounding the proximal debranching anastomosis (arrow). B. CCTA showing a type II endoleak originating from a lumbar artery (arrow).

aortic cross-clamping, thoracotomy, and prolonged ischemia. In anatomically challenging cases requiring rapid intervention, abdominal debranching offers a fast and safe solution,⁵ although published primary and secondary patency rates are 90 % and 93 %, respectively.⁶ Complications may still occur, as in our patient. In a meta-analysis of 19 studies including 507 patients, 30-day mortality after hybrid repair was 12 %, permanent paraplegia 4.5 %, and renal failure 8.8 %. Mean follow-up was 34 months, with endoleak and reintervention rates of 23 % and 27 %, respectively (7).

At presentation, our patient was diagnosed with colon cancer without evidence of metastasis, but subsequent postoperative imaging revealed metastatic disease, altering both prognosis and treatment planning.

Despite such complexities, additional long-term, multicenter data are required to establish treatment guidelines for patients with comorbidities and challenging aortic anatomy.

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