

Chronic Mesenteric Ischemia after a Type A Aortic Dissection Repair

Morgan Hardman, CISSP¹ Houssam Farres, MD² Santh Prakash Lanka, MBBS² Young Erben, MD²

¹ Mayo Clinic Alix School of Medicine, Mayo Clinic, Jacksonville, Florida

² Division of Vascular and Endovascular Surgery, Mayo Clinic, Jacksonville, Florida

Address for correspondence Young Erben, MD, Division of Vascular and Endovascular Surgery, Mayo Clinic, 4500 San Pablo Road, Jacksonville, FL 32224 (e-mail: Erben.Young@mayo.edu).

Aorta (Stamford) 2024;12:44–46.

Abstract

Keywords

- Type A dissection
- mesenteric ischemia
- limb ischemia

A 57-year-old male patient who underwent an open hemiarch repair with a femoral–femoral crossover bypass and right lower extremity fasciotomies for an acute Type A aortic dissection with limb ischemia presented 5 weeks' postrepair with a 20-pound weight loss due to intermittent hemodynamic collapse of the dissection flap over the origin of the superior mesenteric artery. This case highlights the challenges a dissection flap can cause after an urgent Type A aortic dissection repair.

Introduction

Acute Type A dissections can cause mesenteric malperfusion syndrome, which is usually associated with poor prognosis.¹ Delayed presentation of mesenteric ischemia after a Type A aortic dissection repair is uncommon. Our case demonstrates acute on chronic mesenteric ischemia (CMI) persisting after addressing the initial Type A aortic dissection. Our patient underwent a bypass from the right common iliac to the superior mesenteric and splenic arteries with a bifurcated Dacron graft.

Case Presentation

A 57-year-old male patient with a history of hypertension and intravenous drug abuse was transferred to our institution after having been evaluated at a rural emergency department (ED) with crushing chest pain and a cold and painful right lower extremity. The computed tomographic angiography (CTA) demonstrated a Type A aortic dissection with entry tear at the root of aorta. The arch vessels originated from the true lumen and were not dissected. The celiac, superior mesenteric, and right renal arteries originated from the true lumen and the left renal and inferior mesenteric

arteries originated from the false lumen. Distally, the dissection involved both common iliac arteries.

After prompt admission to our hospital, the patient was immediately taken to the operating room, where he underwent emergent open hemiarch repair under circulatory arrest of 22 minutes. In addition, he underwent a simultaneous creation of a left-to-right femoral–femoral crossover bypass and right leg four compartment fasciotomies. His hospitalization was uneventful. He was extubated on postoperative day (POD)1, and the fasciotomies were closed on POD5. He was able to be discharged to home on POD9. He re-presented to his local ED after 5 weeks with acute abdominal pain of 5-day duration and inability to tolerate oral intake, manifesting a 20-lb weight loss since his previous hospital discharge.

CTA of the abdomen and pelvis demonstrated signs of pneumatosis, concerning for acute small bowel ischemia. In addition, there was demonstrable significant narrowing of the true lumen of the aorta at the level of the celiac and superior mesenteric arteries (► Fig. 1).

Multidisciplinary discussions resulted in recommending the patient undergo an open surgical bypass from the right common iliac artery to the superior mesenteric and splenic arteries (► Fig. 2).

received

May 8, 2023

accepted after revision

September 1, 2024

article published online

November 26, 2024

DOI <https://doi.org/10.1055/s-0044-1795146>.

ISSN 2325-4637.

© 2024. The Author(s).

This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

Thieme Medical Publishers, Inc., 333 Seventh Avenue, 18th Floor, New York, NY 10001, USA

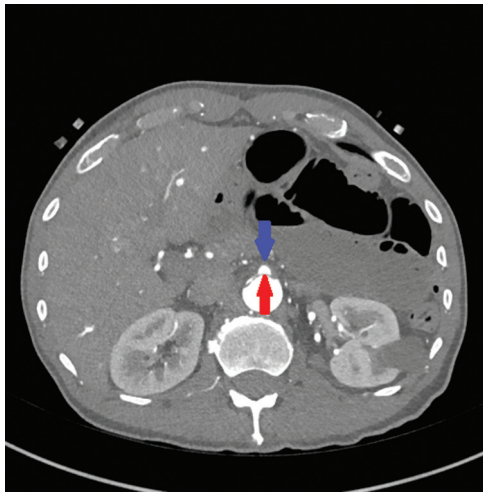


Fig. 1 Axial cut image from computed tomography angiography at the level of the origin of the superior mesenteric artery (blue arrow) demonstrating the very small true lumen allowing for dynamic flow restriction from the aortic dissection flap (red arrow) into this vessel and symptoms of acute on chronic mesenteric ischemia.

A midline laparotomy incision was made, and the abdomen was explored. The small bowel was viable. The transverse colon was retracted superiorly and the entire small bowel laterally to the patient's right. The retroperitoneum was entered, and the right common iliac artery was dissected and exposed. The patient was then fully heparinized to obtain an activated clotting time of >225 seconds. The inflow was taken from the right common iliac artery, and using a 12×6 mm bifurcated graft, the first limb was anastomosed to the superior mesenteric artery (SMA) in an end-to-side fashion. The second limb was tunneled in retropancreatic fashion and anastomosed to the splenic artery in an end-to-side fashion, since the common hepatic artery was found to be too small in caliber to be used. A bovine pericardium sheet was used to cover the entire graft to avoid any future aortoenteric fistula. The postoperative course was uneventful, and the patient was started on a diet on POD2. On POD5, we obtained a CTA of the abdomen and pelvis, which disclosed occlusion of the splenic limb without splenic infarction.



Fig. 2 Intraoperative images demonstrating the right common iliac (blue arrow) to superior mesenteric and splenic (white arrow) arteries bypass.

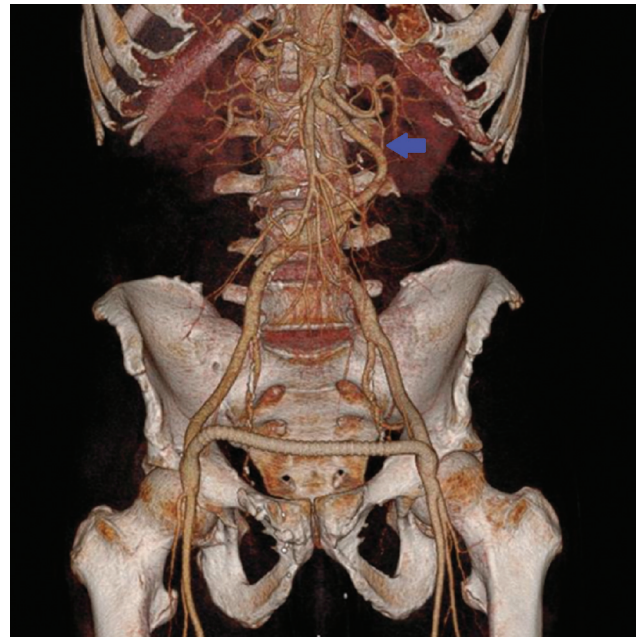


Fig. 3 Three-dimensional reconstruction of the right common iliac to superior mesenteric artery bypass (blue arrow).

tion. The SMA limb was patent (**Fig. 3**). He was discharged home on POD6. He has been followed for 18 months and he has fully regained his weight back and continues to be surveilled for his aortic dissection.

Discussion

We highlight in this case the occurrence of acute on CMI following an emergent Type A aortic dissection repair. The working hypothesis behind the mesenteric ischemia diagnosis was the small true lumen and putative intermittent hemodynamic collapse of the dissection flap over the origin of the SMA restricting flow to this vessel, as demonstrated in **Fig. 1**. We believe this assessment explains the patient's symptoms of being able to consume only small amounts of food, to avoid abdominal pain and bloating.

Although both endovascular and open surgical options were discussed prior to operative repair to address the mesenteric ischemia, the open surgical approach was chosen due to presumed future inability to assure compliance with medications and follow-up visits, as the patient was homeless. Although it is uncommon to have an interval presentation with CMI after Type A aortic dissection repair.

Our review of the literature revealed that after an acute Type A aortic dissection, three cases of mesenteric ischemia were reported following initial aortic repair (**Table 1**). There were none who presented with acute on CMI symptoms beyond 30 days.²⁻⁴ All other patients presenting with mesenteric ischemia and malperfusion manifested ischemia concomitant with the acute Type A aortic dissection. Charlton-Ouw et al⁵ reviewed all aortic dissections cared for in a single center and found six patients with acute mesenteric ischemia. Patients who present with lower limb ischemia needing revascularization had a higher chance of developing

Table 1 Review of the literature specifically for mesenteric ischemia following Type A aortic dissection repair

Year	Author	Extent of initial dissection	Malperfusion type at initial acute presentation	Day of development of mesenteric malperfusion
2022	Thet et al ⁴	No information	None	During the postoperative course
2021	Geana et al ²	Left common iliac artery	Limb ischemia	9
2015	Morisaki et al ³	Superior mesenteric artery	None	12

mesenteric malperfusion compared with patients who did not present with lower limb malperfusion (odds ratio: 2.3, 95% confidence interval [CI]: 1.1–4.7, $p = 0.037$). In addition, initial extension of the dissection flap into the celiac artery and SMA are predictors of future abdominal interventions for suspected visceral malperfusion (risk ratio: 4.2, 95% CI: 1.2–14.9, $p = 0.03$).

Careful dissection flap fenestration could have prevented this dynamic intermittent flow restriction of the SMA causing symptoms of mesenteric ischemia. The traditional approach to Type A dissection management consists in initially saving the patient from the life-threatening aortic emergency by replacement of the ascending aorta, with or without hemiarch repair. However, more recent literature suggests that a more extensive repair of the aorta with the frozen elephant trunk technique during the first operation may improve outcomes in these patients.⁶ Antegrade thoracic endovascular aortic repair (TEVAR) at the time of Type A dissection, including the aortic arch, has shown to better improve aortic remodelling by increasing the true lumen diameter in the descending thoracic aorta compared with patients who underwent exclusively an ascending aortic repair.⁷ The persistence of false lumen has been correlated with increased mortality and complications on long-term follow-up.⁸

Our report highlights a case of extensive Type A dissection with malperfusion. The patient underwent ascending and hemiarch repair with a femoral-to-femoral crossover bypass. After short follow-up, he re-presented with symptoms of acute on CMI raising consideration of potential advantages of more extensive initial repair of the aorta, as suggested by Di Marco et al⁶ or even straight forward fenestration of the dissection flap and/or TEVAR at the time of the initial repair.

Conflict of Interest
None declared.

Acknowledgment
None.

References

- 1 Yang B, Norton EL, Rosati CM, et al. Managing patients with acute type A aortic dissection and mesenteric malperfusion syndrome: a 20-year experience. *J Thorac Cardiovasc Surg* 2019;158(03): 675–687.e4
- 2 Geana RC, Pavel P, Nayyerani R, et al. Successfully superior mesenteric artery stenting in operated type A aortic dissection complicated with delayed mesenteric malperfusion. *SAGE Open Med Case Rep* 2021;9:2050313–X211021184
- 3 Morisaki A, Kato Y, Motoki M, Takahashi Y, Nishimura S, Shibata T. Delayed intestinal ischemia after surgery for type A acute aortic dissection. *Ann Vasc Dis* 2015;8(03):255–257
- 4 Thet MST, Balmforth D, Lopez-Marco A, Ye Oo A. Resternotomy aortic root and arch replacement following previous complex type A aortic dissection requiring endovascular repair for malperfusion. *Multimed Man Cardiothorac Surg* 2022. Doi: 10.1510/mmcts.2022.042
- 5 Charlton-Ouw KM, Sandhu HK, Leake SS, et al. Need for limb revascularization in patients with acute aortic dissection is associated with mesenteric ischemia. *Ann Vasc Surg* 2016;36:112–120
- 6 Di Marco L, Leone A, Murana G, et al. Acute type A aortic dissection: rationale and outcomes of extensive repair of the arch and distal aorta. *Int J Cardiol* 2018;267:145–149
- 7 Sultan I, Wallen TJ, Habertheuer A, et al. Concomitant antegrade stent grafting of the descending thoracic aorta during transverse hemiarch reconstruction for acute DeBakey I aortic dissection repair improves aortic remodeling. *J Card Surg* 2017;32(09):581–592
- 8 Evangelista A, Pineda V, Guala A, et al. False lumen flow assessment by magnetic resonance imaging and long-term outcomes in uncomplicated aortic dissection. *J Am Coll Cardiol* 2022;79(24): 2415–2427