International Surgery Journal
Khabaz K et al. Int Surg J. 2023 May;10(5):922-925
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20231391

Case Report

A novel approach to the treatment of type B aortic dissection and common iliac artery aneurysms in a patient necessitating redo renal transplantation

Kameel Khabaz, Tanvi Subramanian, Ross Milner*

Department of Surgery, University of Chicago, Chicago IL, United States

Received: 07 March 2023
Revised: 10 April 2023
Accepted: 11 April 2023

***Correspondence:**
Dr. Ross Milner,
E-mail: rmilner@bsd.uchicago.edu

ABSTRACT

In patients with end-stage renal disease (ESRD), treatment of common iliac artery (CIA) aneurysm disease necessitates safe operative repair while simultaneously maintaining candidacy for future renal transplant. We present the case of a patient with a type B aortic dissection and aorto-biiliac aneurysmal degeneration who has a previously failed right kidney transplant. Initial operative planning was approached with three goals: 1) endovascular repair as possible; 2) minimize paraplegia risk; 3) maintain renal transplant candidacy. As such, a three-stage operation was planned. Endovascular repair of the R CIA aneurysm was followed by thoracic endovascular aortic repair (TEVAR). The third stage, repair of AAA and left CIA aneurysm, was performed open using an aorto-biiliac graft with a surgically modified prosthetic bypass to preserve the left internal iliac artery to reduce paraplegia risk and the left external iliac artery (EIA) for future kidney transplantation. This novel technique successfully allowed for surgical repair of the Type B aortic dissection and the CIA aneurysms, while maintaining the patient's future redo transplant candidacy with minimal paraplegia risk.

Keywords: ESRD, Iliac artery aneurysm, Kidney transplant, Endovascular, TEVAR

INTRODUCTION

Aneurysmal degeneration of the CIA in the setting of ESRD poses a technical treatment challenge. Endovascular repair of CIA aneurysms (CIAA) is widely accepted but may require occlusion of the ipsilateral or even both internal iliac arteries (IIA), with concomitant increase in the risk of complications, such as paraplegia, when additional aortic treatment is needed.[1] Endovascular iliac branch devices[1] and external-to-internal iliac artery endografts are currently used to preserve hypogastric blood flow during endovascular aortic repair (EVAR) of abdominal aortic aneurysms (AAA).[2] Challenges arise in patients with ESRD, especially those with complex CIA anatomy, because future kidney transplantation would necessitate the creation of an anastomosis to the EIA.[3] For this reason, endovascular approaches are less preferable to open repair due to the necessity to land an endograft distally in the EIA, which would impact utility of this vessel for transplant. We present a case of a patient with a complex aorto-biiliac aneurysmal degeneration and type B aortic dissection who underwent a combination of endovascular and open aorto-biiliac grafting with a surgically modified bypass graft to preserve left IIA perfusion and left EIA length in anticipation of future renal transplantation.

CASE REPORT

The patient is a 44-year-old male who initially presented with a type B aortic dissection (TBAD) associated with aorto-biiliac aneurysmal degeneration. He has a history of ESRD complicated by previously failed R kidney transplantation, now requiring hemodialysis via L upper extremity arteriovenous graft. Notable history includes

aortic insufficiency requiring aortic valve replacement. The patient underwent serial computed tomography angiography (CTA) scans over a nine-month interval and was found to have an enlarging R CIAA (3.7 to 4.8 cm), a stable L CIAA (3.3 cm to 3.5 cm), and a stable AAA (3.7 cm), in addition to the stable TBAD.

A staged operation was initially planned in accordance with three goals: 1) endovascular repair as possible; 2) minimize paraplegia risk; 3) maintain renal transplant candidacy. As such, a three-stage operation was planned to treat the R CIAA, TBAD, and L CIAA, in that order.

The initial operation addressed the R CIAA, as it was rapidly enlarging on CTA imaging (1.1 cm growth over 9 months). An endovascular operation was performed to reduce overall risk. A 23×10 cm iliac branch device main body (GORE EXCLUDER; W. L. Gore and associates, Flagstaff, AZ) was deployed near the aortic bifurcation. Three self-expanding 10×10 cm Viabahn stent-grafts (W. L. Gore and associates, Flagstaff, AZ) were deployed sequentially through the aneurysmal portion of the R IIA. Completion angiography demonstrated patency of the R EIA and R IIA.

The second stage of the operation was performed three months later to address the patient's TBAD. The dissection originated in the proximal descending aorta with the dissection flap extending into the celiac and superior mesenteric arteries. Endoprosthesis coverage extended from the ostium of the L subclavian artery to the celiac artery. Extending from the L subclavian, the first three devices were Gore TAG devices, the fourth device was a Valiant Navion stent graft (Medtronic, Minneapolis, MN), and the final device was a Gore TAG stent graft (W. L. Gore and associates, Flagstaff, AZ); device selection was based on availability.

Surveillance imaging subsequently demonstrated persistent aneurysmal dilation of the L CIA. A third stage of the operation was therefore performed nine months after the second stage (Figure 2 A). To preserve options for redo renal transplantation on the left side, the operative plan was altered from an endovascular approach to open AAA repair with concurrent CIAA repair. The rationale of this change was to maintain patency of the left internal iliac artery to reduce paraplegia risk, and the left EIA for access for transplant. A lumbar spinal drain was placed by the anesthesiology team prior to the operation. A midline laparotomy was performed for transperitoneal exposure of the AAA and L iliac vessels. Percutaneous access of the R common femoral artery was achieved using a 6Fr sheath that was later exchanged for a 12Fr sheath for proximal control of the iliac branch device with a Coda balloon. An 18×9 mm bifurcated Dacron graft was sutured proximally to the abdominal aorta and distally to the R CIA and the very proximal L EIA. To preserve blood flow to the L IIA, an additional 9 mm bypass graft was sutured to the R limb of the aorto-biiliac graft prior to placing the open surgical graft (Figure 2 B). Post-operative CTA findings are shown in Figure 3. The spinal drain was removed on post-operative day 2 with no neurologic deficits throughout his stay. The patient was discharged home on post-operative day 5. He is currently undergoing workup for renal transplantation.

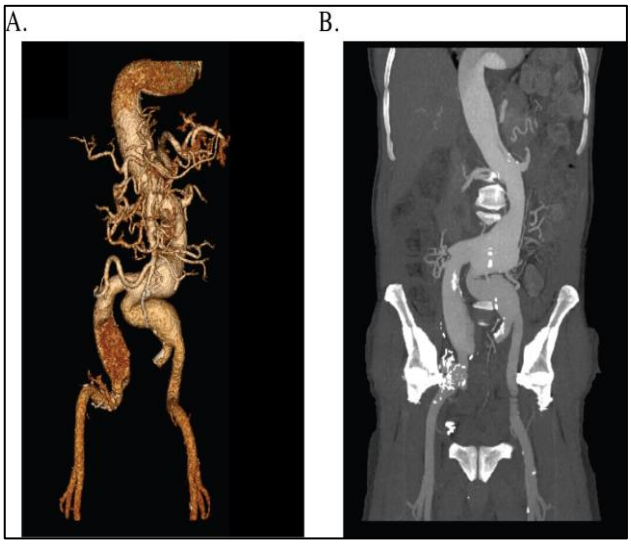

Figure 1 (A and B): Pre-operative imaging demonstrates an enlarging R CIA aneurysm (3.7 to 4.8 cm), a stable L CIA aneurysm (3.3 cm to 3.5 cm), and an initially stable abdominal aortic aneurysm of 3.7 cm.

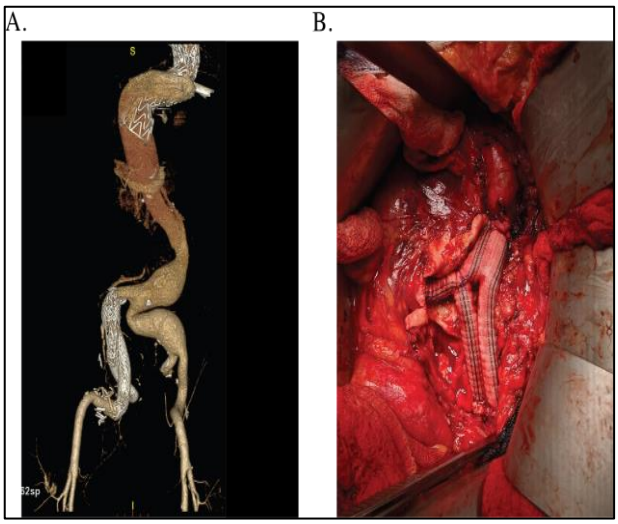

Figure 2 (A and B): Repair of AAA and L CIA with preservation of L IIA. Indications for the third stage of the operation show a 4.4 cm infrarenal aneurysm with a 3.7 cm L common iliac aneurysm. Repair of the AAA and L CIA with preservation of the L IIA is achieved using an open aorto-biiliac graft (proximally sutured to the descending abdominal aorta and distally sutured to the R CIA and L EIA) utilized in conjunction with a bypass graft from the R limb of the aorto-biiliac graft to the L IIA.

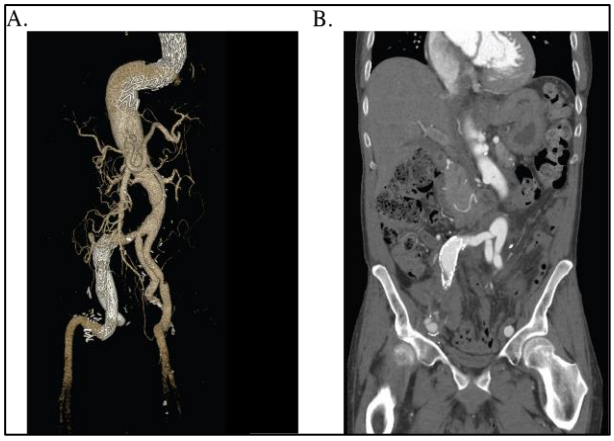

Figure 3 (A and B): Post-operative CTA findings 2 months after open AAA repair. CTA reconstruction demonstrates resolution of the L CIA aneurysm and the bypass from the R limb of the aorto-biiliac graft to the L IIA. Coronal slice on CTA shows the bypass graft.

DISCUSSION

Nearly 40% of patients with AAAs have aneurysmal iliac arteries, and coverage or embolization of the IIA vessels can result in future complications.[4,5] While several endovascular techniques have been developed for IIA preservation,[6] both open and endovascular techniques demonstrate good long-term patency.[7] This is especially important in the setting of ESRD with potential renal transplantation, necessitating preservation of the EIA as a recipient site for renal allograft anastomosis.

In this case, the patient suffered from aorto-biiliac aneurysmal degeneration in the setting of a previous failed R renal transplant. Therefore, key considerations for an effective repair include preservation of the L IIA and EIA in anticipation of future L-sided redo renal transplantation and reduction of paraplegia risk. The R CIA was addressed first, given that it was rapidly enlarging. We were able to successfully complete the first two portions (R CIA, TBAD) of his staged operative plan endovascularly, but the third stage (L CIA) necessitated an open repair to ensure preserved flow to the L EIA, with concern that an endograft would not achieve the same result.

IIA revascularization has previously been achieved using a femoro-femoral crossover bypass in conjunction with an aorto-uniiliac stent graft.[8] In this case, the patient has a history of failed R renal transplant, so it was of utmost importance to preserve the L-sided vessels for future re-transplantation. As such, we demonstrated the use of a surgeon-constructed aorto-biiliac graft to preserve as much native EIA as possible. This technique successfully addressed the patient's aneurysmal aorta without sacrificing L iliac vessel patency, thus allowing him to pursue future L-sided redo renal transplantation.

An important consideration for extensive aortic surgery is the risk of paraplegia. There is a well-known risk of spinal cord ischemia (SCI) following thoracic or abdominal aortic aneurysm repair, which can lead to serious neurological deficits.[9,10] Continuous cerebrospinal fluid (CSF) drainage via lumbar spinal drain placement is a prophylactic measure that has been shown to decrease SCI risk for endovascular repair, but much debate remains concerning its usefulness for open surgery.[10] In this case, spinal drainage was utilized for the open abdominal aortic aneurysm repair (the third stage of the operation). The patient exhibited no neurologic complications throughout his lengthy operative course involving extensive aortic surgery. Performing his repair in a staged manner allowed him to recover appropriately between cases in the setting of his numerous co-morbidities, further reducing the risk of paraplegia.[10] His outcome from all three surgeries has been excellent thus far, and he is currently undergoing workup for redo renal transplantation.

CONCLUSION

We present the case of a complex patient, with respect to both comorbidities and anatomy, requiring repair of his extensive aneurysmal disease. We utilized a novel technique that successfully allowed for surgical repair of the type B aortic dissection and the CIA aneurysms, while maintaining the patient's future redo transplant candidacy with minimal paraplegia risk.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Giosdekos A, Antonopoulos CN, Sfyroeras GS. The use of iliac branch devices for preservation of flow in internal iliac artery during endovascular aortic aneurysm repair. J Vasc Surg. 2020;71(6):2133-44.
2. Bergamini TM, Rachel ES, Kinney EV, Jung MT, Kaebnick HW, Mitchell RA. External iliac artery-to-internal iliac artery endograft: a novel approach to preserve pelvic inflow in aortoiliac stent grafting. J Vasc Surg. 2002;35(1):120-24.
3. Joh JH, Nam DH, Park HC. Endovascular abdominal aortic aneurysm repair in patients with renal transplant. J Korean Surg Soc. 2013;84(3):189-93.
4. Richards T, Dharmadasa A, Davies R, Murphy M, Perera R, Walton J. Natural history of the common iliac artery in the presence of an abdominal aortic aneurysm. J Vasc Surg. 2009;49(4):881-5.
5. Rayt HS, Bown MJ, Lambert KV. Buttock Claudication and Erectile Dysfunction After Internal Iliac Artery Embolization in Patients Prior to Endovascular Aortic Aneurysm Repair. Cardiovasc Intervent Radiol. 2008;31(4):728-34.
6. Bekdache K, Dietzek AM, Cha A, Neychev V. Endovascular Hypogastric Artery Preservation

During Endovascular Aneurysm Repair: A Review of Current Techniques and Devices. Ann Vasc Surg. 2015;29(2):367-76.
7. Rana MA, Kalra M, Oderich GS. Outcomes of open and endovascular repair for ruptured and nonruptured internal iliac artery aneurysms. J Vasc Surg. 2014;59(3):634-44.
8. Gaudric J, Tresson P, Derycke L. Surgical internal iliac artery preservation associated with endovascular repair of infrarenal aortoiliac aneurysms to avoid buttock claudication and distal type I endoleaks. J Vasc Surg. 2018;68(6):1736-43.
9. Scott DA, Denton MJ. Spinal cord protection in aortic endovascular surgery. BJA Br J Anaesth. 2016;117(2):ii26-31.
10. Lyden SP, Ahmed A, Steenberge S. Spinal drainage complications after aortic surgery. J Vasc Surg. 2021;74(5):1440-46.

Cite this article as: Khabaz K, Subramanian T, Milner R. A novel approach to the treatment of type B aortic dissection and common iliac artery aneurysms in a patient necessitating redo renal transplantation. Int Surg J 2023;10:922-5.