Royal Australasian College of Surgeons

Extensive abdominal vascular collateralization patterns in a patient with no native mesenteric flow

A 56-year-old female with treatment resistant hypertension secondary to right renal artery stenosis was referred to vascular surgery for consideration of angioplasty. However, incidentally during workup, significant collateralization of her intra-abdominal vasculature was found. Her other known medical background includes hypercholesterolarmia, Stage IIIb chronic kidney disease, and an atrophied left kidney. She is also a current smoker with an extensive smoking history.

The computed-tomography angiographic images obtained during her workup demonstrate occlusion of all the three mesenteric vessels; the coeliac axis, superior mesenteric artery (SMA) and the inferior mesenteric artery (IMA), at their origins, along with occlusion of the left renal artery secondary to severe aortic disease (Figs. 1 and 2). The remaining right renal artery has a critical stenosis (Fig. 2).

Additionally, the entire enteric circulation is preserved by a large meandering collateral arising out of the left internal iliac artery, which courses through the Arc of Riolan and re-enters the SMA approximately 10 cm distal to its occluded origin (Figs. 2 and 3). The collaterals from the SMA then refill the foregut arteries (Fig. 3).

The radiological features described in this case are an excellent example of the capabilities of the mesenteric circulation to develop extensive collateralization despite occlusions at the origins of all three mesenteric arteries. The well-described Arc of Riolan, or the 'meandering mesenteric artery', is a variable artery that forms a

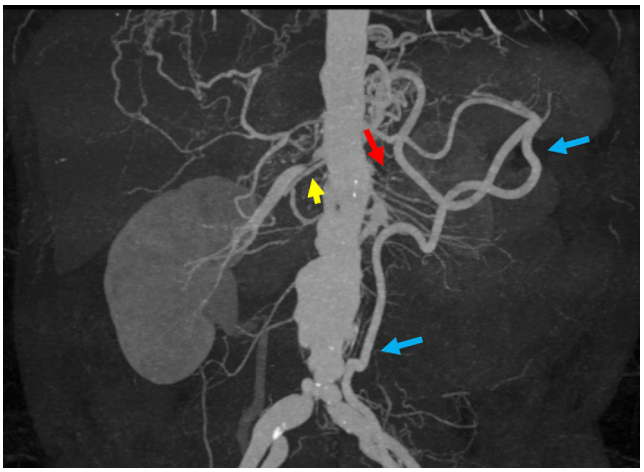

Fig. 2. 3D-reconstruction of computed-tomography-angiogram demonstrating the prominent Arc of Riolan arising from the left internal iliac artery (blue arrows). Diffuse ectasia of the abdominal aorta and enlarged right kidney with significant right renal artery stenosis (yellow arrow) and occlusion of the left renal artery (red arrow) is also seen.

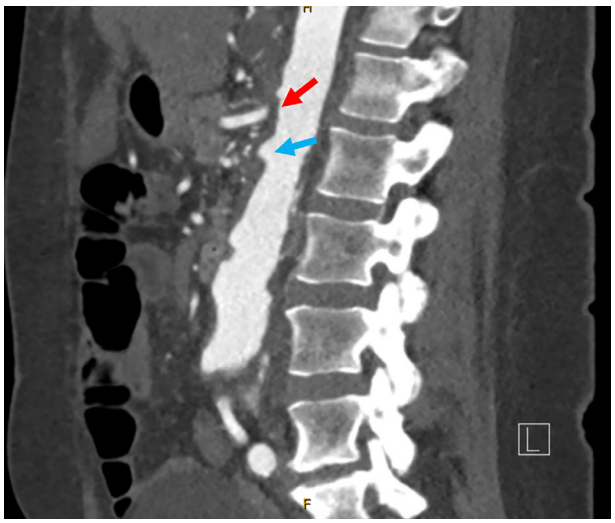

Fig. 1. Sagittal reformatting of computed-tomography angiogram abdomen demonstrating occlusion of the Coeliac Trunk (red arrow) and SMA (blue arrow) at their origins.

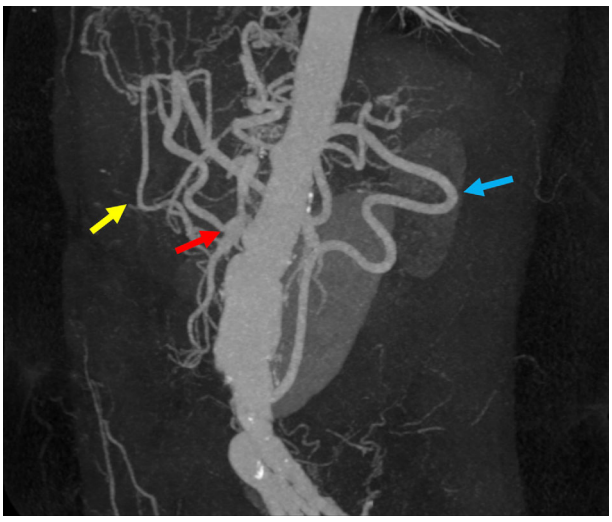

Fig. 3. Sagittal view of 3D-computed-tomography-angiogram reconstruction demonstrating extensive collaterals (yellow arrow) from the Arc of Riolan (blue arrow), which joins and fills the SMA (red arrow).

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connection between the SMA or its middle colic branch, and proximal IMA or left colic artery, usually in cases of occlusion or stenosis.[1]

This case serves as a reminder of the value of the left internal iliac artery, the left colic artery, the marginal artery of Drummond and the Arc of Riolan in providing routes for arterial collateralization in such situations.

The value of preserving the left internal iliac artery and treating any stenotic lesions that may develop in the left common iliac artery and the left internal iliac artery in this patient cannot be overstated.

- Mesenteric vasculature is capable of developing an extensive collateral network.
- The well described axis of the left internal iliac artery – left colic artery – Arc of Riolan is a key source of collateral supply for the SMA and should be preserved.

Author contributions

Matthew Corbitt: Conceptualization; data curation; writing – original draft; writing – review and editing. **Maseelan Naidoo:** Conceptualization; supervision; writing – review and editing. **Sherab Bhutia:** Conceptualization; supervision; writing – review and editing.

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Matthew Corbitt,*† BBiomolSc., MD, MSurg
Maseelan Naidoo,* MBBS, FRACS
Sherab Bhutia,* MBBS, MS, DNB, FRCS, FRACS
**Department of Surgery, Cairns and Hinterland Hospital and Health Service, Cairns, Queensland, Australia and †School of Medicine & Dentistry, Griffith University, Gold Coast, Queensland, Australia*

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