# Blood Finds a Way:
# Extremely Rare Mesenteric Collaterals Salvage the Kidney

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## Background

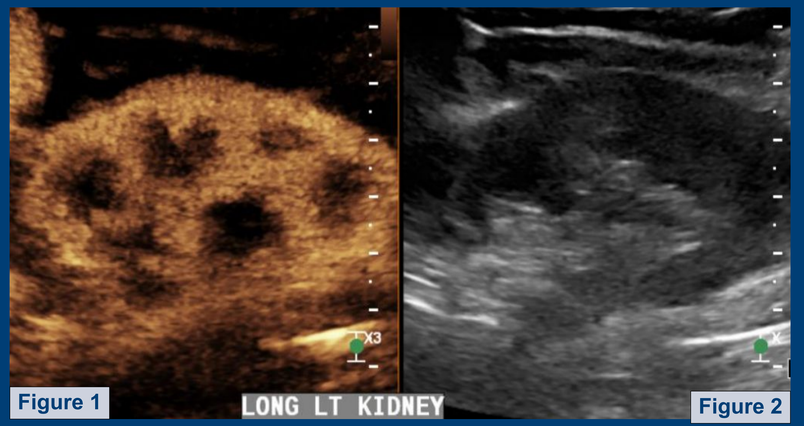
A 75 year old male former smoker with history of chronic kidney disease Stage III underwent a percutaneous aortic endovascular aneurysm repair (EVAR) for an enlarging 5.1 cm fusiform infrarenal abdominal aortic aneurysm (AAA). At the start of the procedure, the patient was noted to have diminished flow to the left main renal artery as well as a large segment of calcified plaque at its origin. His anatomy was challenging, with a 0.7cm aortic neck; intra-operative treatment of a Type 1 endoleak was performed with a Coda balloon and Palmaz stent. After resolution of the endoleak, it was noted that the left main renal flow had diminished and wire access could not be gained into this artery.

Post-procedure his creatinine elevated to a peak of 2.1 before stabilizing at 1.8 prior to discharge. He continued to make adequate urine. Upon follow-up with a contrast-enhanced ultrasound for post-EVAR monitoring for endoleak, it was noted that his left kidney was somehow still being perfused. Upon closer inspection, a collateral from the celiac axis was noted to be fortuitously supplying blood flow to the left kidney.

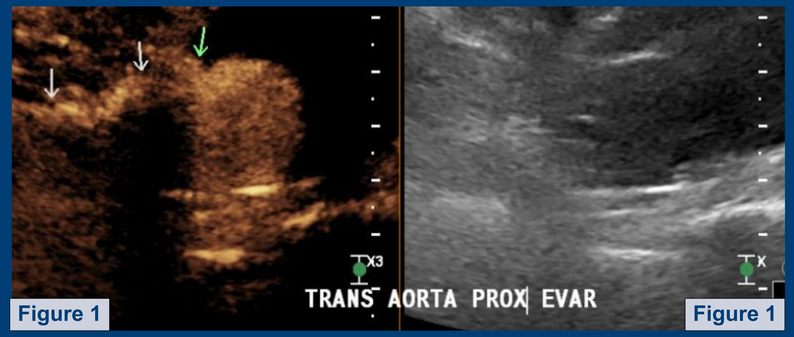
## References

1. Hietala SO, Kunz R. Collateral circulation in stenosis or occlusion of the renal artery. Cardiovasc Radiol. 1979;2(4):249-255. doi:10.1007/BF02552071
2. Afarideh M, Zhang X, Ferguson CM, et al. Peristenotic Collateral Circulation in Atherosclerotic Renovascular Disease: Association With Kidney Function and Response to Treatment. Hypertension. 2020;76(2):497-505. doi:10.1161/HYPERTENSIONAHA.120.15057

## Imaging




Contrast enhanced ultrasound (CEUS) performed after aortic endovascular abdominal repair (EVAR) demonstrating normal enhancement of the left kidney **(Figure 1)**, despite jailing of the left main renal artery during the procedure. This enhancement is not visible on non-enhanced ultrasound (**Figure 2**) due to the lack of contrast. Moreover, the patient had diminished renal function that precluded the iodinated contrast for a CT scan.




CEUS utilized after EVAR in a patient who would have been unable to obtain CT without contrast due to persistently inadequate renal function, despite rehydration (**Figure 1**). The use of ultrasound contrast allowed to diagnosis of endoleak (**arrows**) that is not visible on non-contrast ultrasound (**Figure 2**).

## Discussion

Renal artery collateralization has been seen in prior studies done on patients with atherosclerotic renovascular disease (ARVD), a common cause of renal artery stenosis. Formation of collateral circulation can be seen in approximately 40% of ARVD cases. **[1]** Renal collateral circulation has been documented to arise from many different origins, including the lumbar arteries, IMA, inferior phrenic arteries, inferior adrenal arteries, testicular/ovarian arteries, and ureteric arteries. Circulation arising from the lumbar or adrenal arteries is the most common. However, no documented cases were discovered where collateralization is mentioned to arise from the celiac artery.

There are improved post angioplasty outcomes in ARVD patients with developed collaterals than those who lack them. In particular, renal artery collateralization is associated with reduced hypoxia, increased GFR, decreased creatinine, and improved perfusion. **[2]** Imaging individual collateral renal circulation with a low risk imaging technique like contrast enhanced USG, before performing an intervention involving renal circulation may help clinicians plan an approach which takes into account the individual's anatomy. In some cases even sacrificing renal artery circulation may improve the overall efficacy and position of the EVAR graft if the collaterals are well-developed.

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