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# Successful left gonadal vein to inferior vena cava bypass for symptomatic May-Thurner syndrome

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## ABSTRACT

We report the management of symptomatic May-Thurner syndrome refractory to endovascular techniques with left gonadal vein to inferior vena cava bypass. The patient's presentation was exceptional—a young individual with end-stage renal disease status post four failed kidney transplants, dwindling options for dialysis access, and an unusable left thigh arteriovenous graft owing to severe lower extremity edema secondary to common iliac vein compression. Post-operatively, swelling was markedly alleviated and the thigh graft was functional. Discussed are endovascular and venous bypass techniques for management of May-Thurner-associated lesions, as well as approaches to end-stage hemodialysis access salvage. (*J Vasc Surg Cases and Innovative Techniques* 2019;5:549-52.)

**Keywords:** May-Thurner syndrome; Hemodialysis access salvage; Venous bypass; Iliac venous system

## CASE REPORT

The patient was a 32-year-old woman with end-stage renal disease since the age of 4 owing to IgA nephropathy status post four kidney transplants, which all failed secondary to antibody-mediated rejection. Multiple avenues for hemodialysis access had also failed. All upper central veins were either significantly stenosed or totally occluded. About 2.5 months preoperatively, the patient underwent creation of a left superficial femoral artery to femoral vein loop graft at an outside institution. The patient experienced marked left lower extremity swelling, precluding use of the graft. Venography revealed May-Thurner syndrome, with occlusion of the left common iliac vein (CIV) with flow through collaterals rendered inadequate by the arteriovenous graft (AVG), in addition to a significantly enlarged left gonadal vein (LGV; [Fig 1](#)). Axial imaging showed notable dilation of the left renal vein just distal to its narrowed ostium into the inferior vena cava (IVC), indicating likely stenosis at this level.

Interventional radiology unsuccessfully attempted to manage the left CIV occlusion endovascularly. The patient was unable to use the left thigh graft, instead forced to use a temporary right femoral vein hemodialysis line. Given the patient's young

age, dwindling access options, and multiple failed transplants, it was decided to operatively intervene on the patient's May-Thurner syndrome to preserve the left leg AVG and decrease left leg swelling. The planned procedure was left external iliac vein to IVC bypass, but owing to inadequate flow upon intraoperative evaluation, the LGV was selected for inflow, also bypassing the possible left renal vein stenosis.

The patient was taken to the operating room, her preexisting midline laparotomy reopened, and the small bowel and colon mobilized to achieve adequate exposure of the IVC at the level of the common iliac bifurcation. Correct localization of the IVC in this reoperative abdomen was further confirmed via palpation of the patient's already present right femoral vein dialysis catheter. The IVC was circumferentially dissected, but the left CIV was significantly obscured by dense adhesions, likely secondary to two of the patient's previous transplants having been anastomosed to the left iliac system. The LGV, along with other smaller pelvic collaterals, was markedly engorged and less affected by adhesive disease. After extensive lysis of adhesions, the left CIV and the confluence of the external and hypogastric branches were identified. It was noted at this point that the LGV was larger in diameter than the visible portion of the external iliac. Further dissection down the length of the external iliac vein was attempted, but was rendered unsafe by marked adhesions and engorged yet fragile collaterals with potential for difficult control of significant bleeding, which is why dissection from the inguinal ligament cranially was also not attempted. Therefore, the decision was made to anastomose the graft distally to the CIV at the level of the confluence of the external and hypogastric veins.

The patient was anticoagulated with heparin, and activated clotting time was maintained above 275. An 8-mm ringed polytetrafluoroethylene graft was anastomosed proximally to the IVC and distally to the CIV, tunneled under the sigmoid colon mesentery without appreciable compression or kinking. Upon completion of the distal anastomosis, engorgement of collaterals, including the LGV, was only somewhat decreased. A diagnostic venogram was performed via sheath placed just proximal to the

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Author conflict of interest: none.

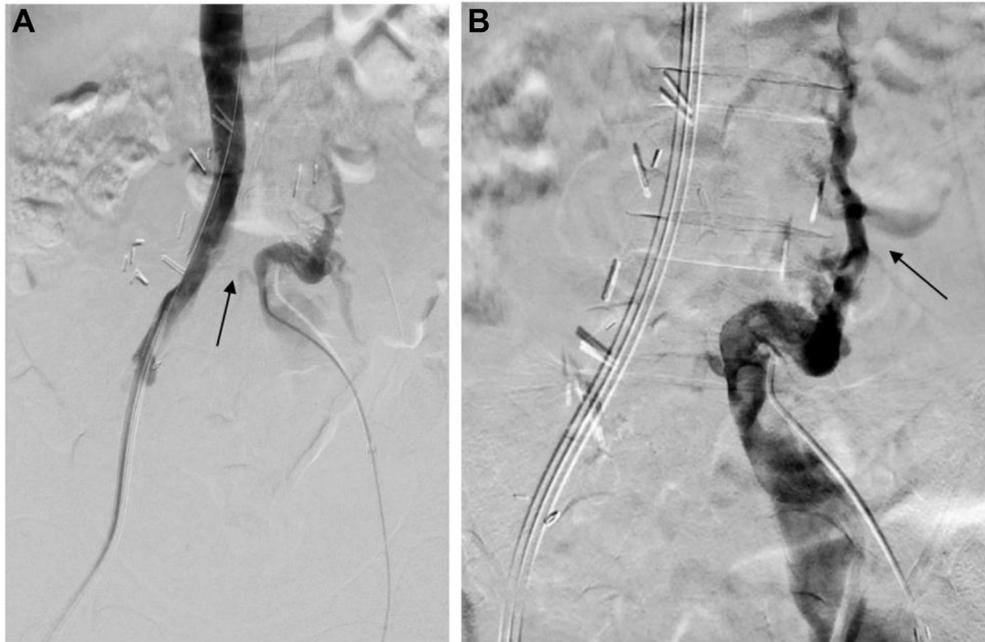
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**Fig 1.** Intraoperative fluoroscopic image of attempted interventional radiology left common iliac vein (CIV) stenting. **A,** Occlusion of left CIV. **B,** Marked enlargement of left gonadal vein (LGV).

CIV anastomosis. This showed robust and immediate opacification of collaterals, particularly the LGV, with only weak and delayed opacification of the graft. Given this, there was concern that the graft would not be therapeutic, and furthermore that it might occlude given this low-flow state. The distal aspect of the graft was well filled whereas the proximal aspect was not; therefore, it was posited that the proximal graft landing site required revision.

Once the CIV anastomosis was removed and the venotomy closed, the distal graft was anastomosed to the LGV. Upon completion of the new anastomosis, the remaining collaterals seemed to be decompressed. A diagnostic venogram via the LGV showed brisk and robust graft opacification without significant concurrent flow through other collaterals. Anticoagulation was reversed with protamine, hemostasis ensured, and fascia and skin closed in the usual fashion.

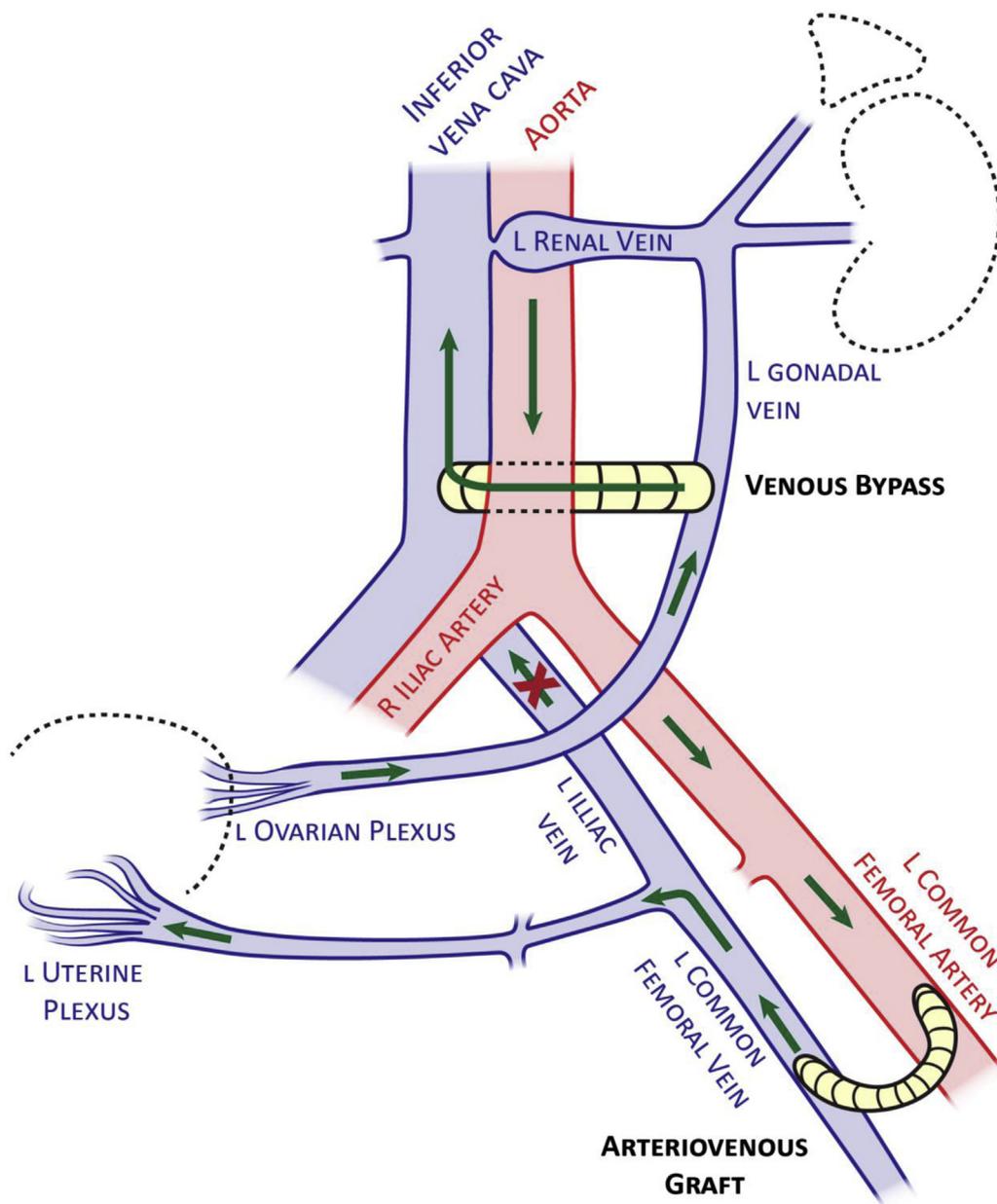
In the immediate postoperative period, the patient's left lower extremity edema was notably improved, and by postoperative day 8 the left thigh AVG was used for hemodialysis with good flows (Figs 2 and 3). After 1 year of follow-up, the patient has noted near total reduction of leg swelling and is successfully using the AVG at home. Graft patency is maintained on warfarin and low-dose aspirin. The patient consented to publication of case details and included images.

## DISCUSSION

Symptomatic May-Thurner syndrome is uncommon and infrequently managed surgically. In a systematic review of English literature between 1967 and 2014, Kaltenmeier et al<sup>1</sup> found just 254 patients with sufficient data to review, of whom the overwhelming majority (86.2%) underwent endovascular intervention,

with only 6.8% undergoing open surgery, with most of the latter category occurring before 2000. A majority of endovascular repairs (61.5%) were performed in the setting of thrombosis associated with iliac vein compression. Venous bypass was performed in nine patients, using saphenous vein in six and graft in three; seven patients were found to have had significant adhesions around the iliac vein requiring lysis. Jacob et al<sup>2</sup> described a patient whose May-Thurner syndrome only became symptomatic in the setting of creation of an ipsilateral arteriovenous fistula, which was successfully treated with an ilio caval bypass graft.

Invasive open surgical venous bypass has been used as an access salvage technique by multiple groups when patients with end-stage renal disease have reached what could be described as the end stage of hemodialysis access, that is, when these patients have already exhausted most or all of the standard options. Selvanathan et al<sup>3</sup> published their experience with venous bypasses in the setting of preexisting ipsilateral arteriovenous fistulae, describing extra-anatomically tunneled polytetrafluoroethylene axillary to iliac or axillary to femoral venous bypass grafts, and resulting improvement in ipsilateral facial and upper arm swelling and fistula function. Other groups have described venous bypass for upper extremity dialysis access salvage, such as the case report from Babadjanov et al<sup>4</sup> of one patient whose upper extremity AVG was salvaged after failed attempts at endovascular management of central venous stenosis via axillary to innominate venous bypass through a median sternotomy.

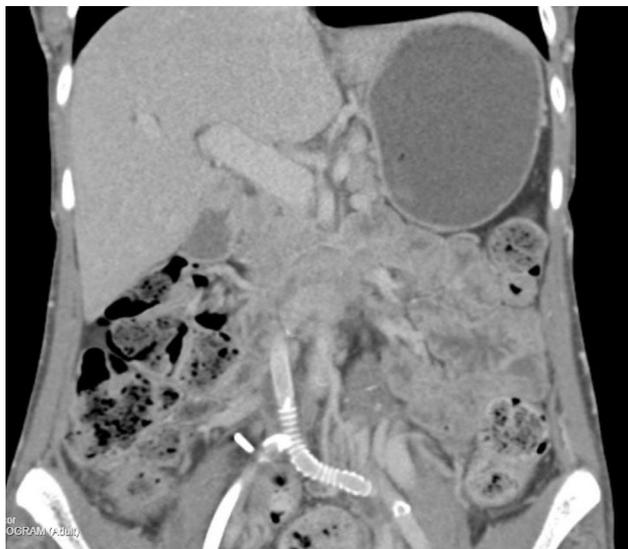


**Fig 2.** Anatomic diagram of postoperative anatomy after left gonadal vein (LGV) to inferior vena cava (IVC) bypass. Postoperative path of venous return indicated by green arrows, with obstructed flow through left common iliac vein (CIV). L, Left; R, right.

Patients with end-stage renal disease requiring reoperative vascular surgery are by definition poor surgical candidates, particularly for large, invasive procedures such as laparotomy or sternotomy. The patient described here has bilateral upper central venous stenosis, so a less invasive extra-anatomical bypass was not an option, although had it been, it may still not have been the best choice. The long distance between the upper and lower inflow systems significantly decreases durability; Selvanathan et al<sup>3</sup> reported a 50% patency rate at

1 year. A femoral-femoral vein bypass was not used to preserve the contralateral venous system for further potential access needs and because the patient's small caliber greater saphenous vein was an inadequate conduit. Likewise, a contralateral AVG was not created so as to leave that option open for future needs.

Finally, although autologous vein is a better conduit than synthetic graft, there is obvious reticence to use additional vein in someone with such an already limited venous system.<sup>5</sup>



**Fig 3.** Single coronal cross-sectional image from post-operative computed tomography scan showing left gonadal vein (LGV) to inferior vena cava (IVC) bypass graft.

### CONCLUSIONS

For patients with limited remaining hemodialysis access options, salvage of existing access is critical, forcing surgeons to devise unique ways of overcoming suboptimal anatomy. In this instance, we were able to successfully take advantage of the route the patient's

body had already created to circumnavigate her May-Thurner syndrome by using a nearby engorged collateral. Indeed, use of aberrant pathways may be the best option for treatment of abnormal anatomical obstructions, particularly in the setting of a reoperative or densely adhered field.

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