Surgical anteriorization of the left common iliac vein results in improved venous outflow and quality of life for May-Thurner syndrome

Khanjan Nagarsheth, MD,[a] Suzanna Fitzpatrick, DNP,[a] Lidia Castillo, BS,[b] Lena Abdulrahman, BS,[b] *and* Eleanor Dunlap, DNP,[a] *Baltimore, Maryland*

ABSTRACT

May-Thurner syndrome or left iliac vein compression occurs when the left common iliac vein is compressed by the right common iliac artery, leading to venous outflow obstruction. This obstruction can cause venous hypertension, resulting in lower extremity swelling, discoloration, pelvic congestion, and venous ulcerations. The standard surgical treatment of May-Thurner syndrome is endovascular venous stent placement. In a small, single-center sample, surgical anteriorization of the left common iliac vein was used to treat symptomatic left common iliac vein compression in younger patients, alleviating their symptoms, and can be considered an alternative treatment. (J Vasc Surg Cases Innov Tech 2024;10:101495.)

Keywords: Left iliac vein compression; May Thurner Syndrome; Surgical anteriorization iliac vein

May-Thurner syndrome (MTS) refers to compression of the left common iliac vein (LIV) by the right common iliac artery against the vertebral body. The anatomical variation of LIV compression was first described by May and Thurner[1] in 1957, who noted that >20% of cadavers examined exhibited an anatomical variant within the LIV with localized intraluminal fibrous bands, referred to as spurs, on the LIV. Collateral veins develop in the pelvis due to the increased pressure and allow for the off-loading of the increased venous pressure; therefore, some individuals remain asymptomatic. Some patients become symptomatic with pain or lower extremity edema and heaviness. Some can develop venous thrombosis from stagnant venous flow.[2]

The diagnosis of MTS is based on the clinical examination findings and diagnostic test results. Duplex ultrasound (Fig 1), computed tomography, and magnetic resonance imaging allows for evaluation of the central venous system; however, venography with intravascular ultrasound (IVUS) is the gold standard for diagnosing MTS[3] (Fig 2). Venography with IVUS allows for accurate real-time information about the LIV, including measurements, degree of compression, and thrombus presence.[3] Endovascular stenting has been the standard treatment of LIV compression.[4] Before stent deployment, IVUS allows for accurate sizing and visualization of the iliac vein confluence, assists in stent placement, and reduces the risk of contralateral iliac obstruction.[5]

Endovascular stent patency after treating symptomatic LIV compression has been cited as 91% at 36 months for primary patency in patients with longstanding leg pain and swelling, regardless of thrombus history.[4] The degree of compression of the LIV, or severity of the stenosis, has yet to be shown to affect stent patency,[6] and few data are available regarding the stent patency rates beyond 20 years.

In a small, single-center sample, seven younger (age, 17-43 years) patients with symptomatic MTS were identified. They underwent surgical anteriorization of the LIV to treat their LIV compression due to concerns of the patient outliving the effectiveness of the stent. The patients in this case series agreed to have their de-identified information reported, and the institutional review board approved the study.

CASE REPORT

A retrospective medical record review at a single center of seven patients with symptomatic MTS treated with LIV anteriorization between July 2022 and January 2023 was performed. The baseline demographics, age, medical history, presenting symptoms, operative details, and postoperative outcomes were collected. Chronic Venous Insufficiency Quality of Life Questionnaire (CIVIQ-20) scores were recorded preoperatively and postoperatively at the most recent follow-up. The results are listed in Tables I and II. The CIVIQ-20 scores were compared using paired *t* test analysis. Preoperatively, the group had a mean score of 81.7 and postoperatively, a score of 28.7. The difference was statistically significant at $P < .0001$.

Intraoperatively, through a transabdominal approach, the retroperitoneum is opened over the aortic bifurcation. The right common iliac artery is dissected free circumferentially. The LIV

From the Division of Vascular Surgery, Department of Surgery, University of Maryland Medical Center[a]; and the University of Maryland School of Medicine.[b]

Correspondence: Eleanor Dunlap, DNP, Division of Vascular Surgery, Department of Surgery, University of Maryland Medical Center, 22 S Greene St, Baltimore, MD 21201 (e-mail: edunlap@umm.edu).

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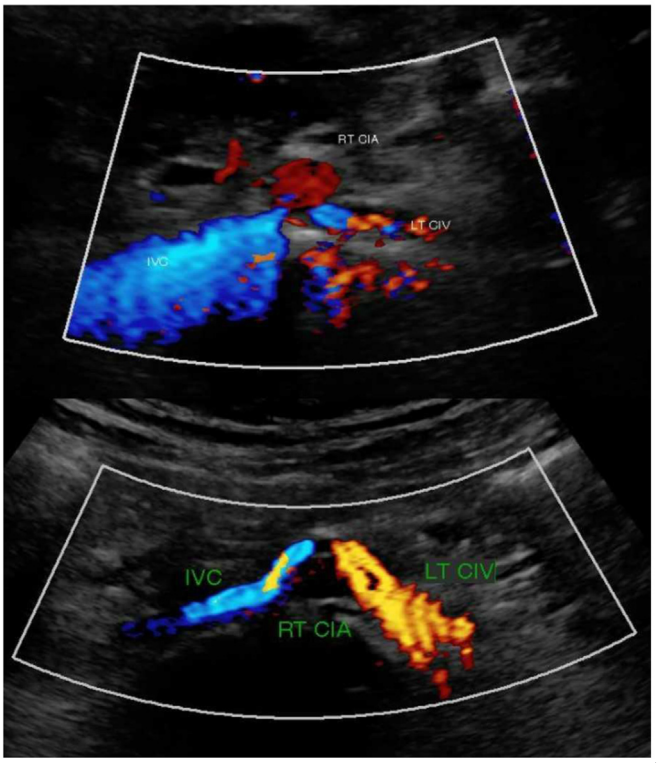

Fig 1. Duplex ultrasound scans before and after endovascular intervention of left common iliac vein (*LIV*) compression. *CIA*, Common iliac artery; *CIV*, common iliac vein; *IVC*, inferior vena cava; *Lt*, left; *Rt*, right.

is identified and dissected toward the external iliac vein. All dilated collateral veins are ligated and oversewn. The LIV is mobilized underneath the common iliac artery toward the confluence of the inferior vena cava and the external iliac vein using great care. Significant scarring and inflammation is typically encountered due to the longstanding compression, for which additional care is needed. The entire confluence of the vena cava is mobilized. All adhesions between the vein and artery are divided and ligated with proline suture. The LIV is transected and anteriorized in front of the common iliac artery. End-to-end anastomoses between both ends of the 2-cm × 9-cm bovine conduit, the shortest graft possible to ensure the possibility of epithelialization, to the proximal and distal extent of the transected vein is performed. After removing air, the anastomosis is completed, and perfusion restored through the venous system (Fig 3). The repair is assessed, and duplex ultrasound is performed to confirm flow through the LIV. Before this repair, the vein exhibits significant turgor. After anteriorization, the LIV is very soft and pliable. The retroperitoneum is closed over the repair, and the abdomen is closed in the usual manner.

There were no reported postoperative complications in these patients as related to the procedure. None of the patients were prescribed anticoagulation therapy postoperatively due to the short conduit and high venous flow; however, low-dose antiplatelet therapy was initiated to mitigate the effects of neointimal hyperplasia. Each patient underwent venous duplex ultrasound at 3 months after discharge, which demonstrated patency of the LIV repair. All seven patients reported satisfaction with the results of their surgery at follow-up. Also, by 3 months postoperatively, all preexisting symptoms related to MTS had resolved. Follow-up ranged from 10 to 16 months with 100% primary patency as noted by duplex ultrasound.

DISCUSSION

In 1957, May and Thurner[1] hypothesized that the spurs developed from chronic compression on the LIV by the right common iliac artery. This extrinsic compression is often located at the proximal LIV, where the right common iliac artery crosses over. This leads to narrowing of the anteroposterior diameter of the LIV while the transverse diameter widens.[3] The exact prevalence of MTS is unknown due to variability of symptoms. Minimally invasive treatment such as angioplasty or stenting of the venous compression relieves the outflow obstruction and provides symptom relief with good long-term patency rates.[7] For patients with deep vein thrombosis from MTS, reduction of the thrombus load and resolution of the outflow obstruction are cornerstones of surgical management.[8] For those with venous thrombosis, the rates of post-thrombotic syndrome are reduced with endovascular treatment of the LIV compression.

We identified a significant improvement in quality of life (QOL) for these patients using the CIVIQ-20. Shekarchian et al.[9] identified significant improvement in venous QOL after iliofemoral vein stenting for occlusive disease. Although their study was a randomized controlled trial to assess QOL after stenting, our series also found significant improvement after surgical anteriorization of the LIV.[9] The patients in our series had significantly decreased QOL due to venous outflow disease that improved dramatically by 3 months postoperatively. There is literature on iliac vein bypass related to the treatment of LIV compression; however, those studies are limited to reports of stent failure and case reports.[10] It is reasonable to offer LIV anteriorization to improve venous QOL for patients with MTS who might not be appropriate candidates for venous stent placement.

The decision to perform an open surgical procedure, especially for younger adults, when a viable endovascular treatment is available is uncommon. Iliac vein bypass is noted in the literature as a viable treatment of MTS after failed stenting.[11] None of our patients had a contraindication to endovascular treatment, such as a nickel allergy, or stenting, and none had experienced stenting failure in the past. In our experience, we have performed femoral–caval bypasses with polytetrafluoroethylene, which require creation of an arteriovenous fistula for patency, and these bypasses tend to thrombose despite the use of anticoagulation. The Palma procedure using the great saphenous vein as a conduit also requires an arteriovenous fistula to remain patent. In our single-center experience, anteriorization of the LIV has shown

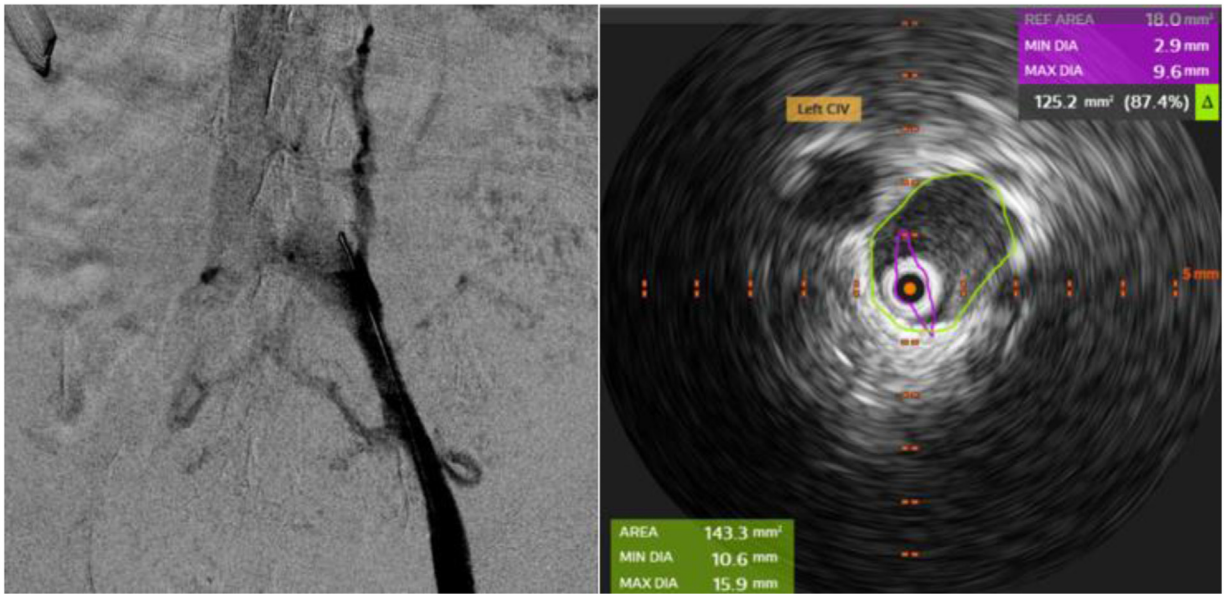

Fig 2. Venogram with intravascular ultrasound (*IVUS*) of left common iliac vein (LIV) compression. *CIV*, Common iliac vein; *DIA*, diameter; *MAX*, maximum; *MIN*, minimum.

Table I. Demographics and preoperative details

Demographics			Presenting pain				Preoperative details		
Pt. No.	Age, years	Gender	Abdomen	Pelvic	Back	Leg swelling or pain	CIVIQ-20 score	Hypermobility	POTS
1	17	Female	—	Yes	—	Yes	81	Yes	Yes
2	19	Female	Yes	—	—	Yes	72	Yes	Yes
3	25	Female	Yes	—	Yes	Yes	86	Yes	Yes
4	18	Female	—	Yes	Yes	Yes	69	Yes	Yes
5	23	Female	Yes	—	—	Yes	93	Yes	No
6	21	Female	Yes	—	—	Yes	83	Yes	Yes
7	43	Female	Yes	—	Yes	Yes	88	No	No

CIVIQ-20, Chronic Venous Insufficiency Quality of Life Questionnaire; *POTS*, postural orthostatic tachycardia syndrome; *Pt. No.*, patient number.

Table II. Intraoperative and postoperative details

Intraoperative details			Postoperative details			
Anesthesia	EBL, mL	Operative time, minutes	Length of stay, days	Complications	Most recent follow-up, months	CIVIQ-20 score at follow-up
GET	30	88	3	None	16	32
GET	70	94	5	None	14	26
GET	50	91	3	None	14	29
GET	100	128	3	None	12	31
GET	40	85	4	Urinary retention	12	36
GET	50	114	3	None	11	22
GET	75	79	5	Urinary retention	10	25

CIVIQ-20, Chronic Venous Insufficiency Quality of Life Questionnaire; *EBL*, estimated blood loss; *GET*, general endotracheal anesthesia.

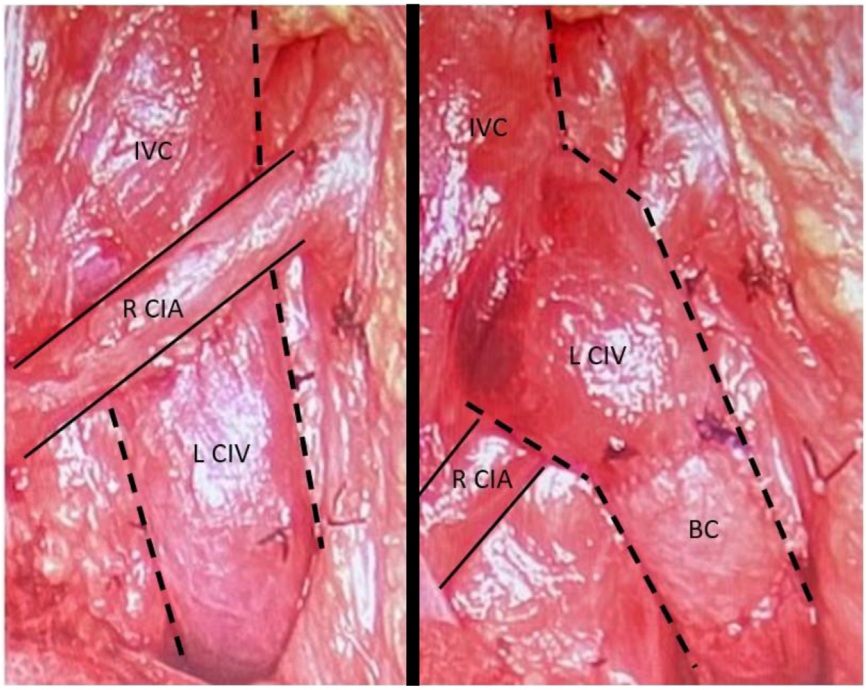

Fig 3. Pre- and post-operative left common iliac vein (LIV) anteriorization (*solid lines* indicate arteries; and *dotted lines* veins). *BC*, Bovine conduit; *CIA*, common iliac artery; *CIV*, common iliac vein; *IVC*, inferior vena cava; *L*, left; *R*, right.

the best patency without the requirement for a groin incision or creation of an arteriovenous fistula.

Each of the patients in this series had had prior abdominal surgery; thus, concern was present for extensive intra-abdominal adhesions. However, these were not noted intraoperatively. A retroperitoneal approach could be used if needed; however, there was concern about gaining control of the inferior vena cava during exposure of the LIV.

CONCLUSIONS

MTS is an anatomical condition that results from venous outflow obstruction due to extrinsic venous compression of the LIV by the right common iliac artery. Patients can present with symptoms of venous hypertension with leg swelling, heaviness, varicosities, and, in some cases, acute iliofemoral deep vein thrombosis. Minimally invasive treatment, such as angioplasty and stenting of the venous lesion, has been the mainstay of treatment; however, anteriorization of the LIV is a safe and effective surgical treatment for patients with symptomatic MTS. For patients with a contraindication to venous stenting, this procedure should be considered to help alleviate the symptoms of venous compression.

DISCLOSURES

None.

REFERENCES

1. May R, Thurner J. The cause of the predominantly sinistral occurrence of thrombosis of the pelvic veins. *Angiology*. 1957;8:419–427.
2. Dunlap E, Fitzpatrick S, Nagarsheth K. Back pain and right leg swelling: unusual presentations of may-thurner syndrome. *Cureus*. 2023;15:e35984.
3. Knuttinen MG, Naidu S, Oklu R, et al. May-Thurner: diagnosis and endovascular management. *Cardiovasc Diagn Ther*. 2017;7(Suppl 3): S159–S164.
4. Hager ES, Yuo T, Tahara R, et al. Outcomes of endovascular intervention for May-Thurner syndrome. *J Vasc Surg Venous Lymphat Disord*. 2013;1:270–275.
5. Forauer AR, Gemmete JJ, Dasika NL, Cho KJ, Williams DM. Intravascular ultrasound in the diagnosis and treatment of iliac vein compression (May-Thurner) syndrome. *J Vasc Interv Radiol*. 2002;13: 523–527.
6. Jayaraj A, Buck W, Knight A, Johns B, Raju S. Impact of degree of stenosis in May-Thurner syndrome on iliac vein stenting. *J Vasc Surg Venous Lymphat Disord*. 2019;7:195–202.
7. Ibrahim W, Al Safran Z, Hasan H, Zeid WA. Endovascular management of May-Thurner syndrome. *Ann Vasc Dis*. 2012;5:217–221.
8. Radaideh Q, Patel NM, Shammas NW. Iliac vein compression: epidemiology, diagnosis and treatment. *Vasc Health Risk Manag*. 2019;15:115–122.
9. Shekarchian S, Van Laanen J, Esmaeil Barbati M, et al. Editor's choice - quality of life after stenting for iliofemoral venous obstruction: a randomised controlled trial with one year follow up. *Eur J Vasc Endovasc Surg*. 2023;66:678–685.
10. Raju S. Best management options for chronic iliac vein stenosis and occlusion. *J Vasc Surg*. 2013;57:1163–1169.
11. Akers DI, Markowitz IM, Kerstein MD. Iliac vein bypass with autogenous saphenous vein for iliac vein compression. *Am Surg*. 1987;53: 675–678.

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