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Iliac venous stenting as adjunct in the management of symptomatic orthostatic hypotension in iliac vein compression

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ABSTRACT

Orthostatic hypotension (OH) is a common cardiovascular disorder with high prevalence in the elderly. Concomitant venous return impairment may worsen the autonomic response and accentuate the symptoms. We detailed a patient with severe OH, prominent varicosities, and hemosiderin deposition in lower limbs. After excluding autonomic and neurological etiology, a computed tomography venography revealed significant common iliac vein compression. The patient was deemed to benefit from venous stenting. At a 2-year follow-up, the patient reported symptom improvement with adequate stent patency. Venous stenting may aid in the treatment of patients with severe OH symptoms without clear etiology and impairment of venous return. (J Vasc Surg Cases Innov Tech 2024;10:101483.)

Keywords: Iliac stenting; Iliac vein compression; Orthostatic hypotension; Postural orthostatic tachycardia syndrome

Orthostatic hypotension (OH) is defined as a reduction in systolic blood pressure (BP) of at least 20 mmHg after standing up.[1] OH results from an autonomic dysfunction of the adaptive cardiovascular mechanism to maintain BP while standing.[2] Occurrence is multifactorial; however, elderly (≥65 years) is the main predictor for OH with a prevalence between 30% and 55%.[1-4] Due to both sympathetic and autonomic impairment, other diseases have been related to OH, such as Parkinson's, multiple system atrophy, and postural orthostatic tachycardia syndrome (POTS).[5]

The etiology of OH includes drugs, endocrine disorders, and impaired venous return.[6,7] The venous system stores two-thirds of the blood volume and is an important hemodynamic factor.[8] Current literature regarding the impact of vein stenting and improvement of OH symptoms is scarce. Vein stenting has been performed in patients with Nutcracker syndrome and OH, providing symptom relief.[9] Similarly, vein stenting has shown symptom improvement in patients with nonthrombotic iliac vein compression (NIVL) and POTS; however, its relationship with OH has not been fully elucidated.[10] The emerging evidence that OH increases morbidity and mortality highlights the importance of prompt treatment of OH etiologies.[11] We present a case of NIVL and symptomatic OH that significantly improved after common iliac vein (CIV) stenting.

CASE REPORT

A 67-year-old man presented with a 3-year history of unbalance, weakness, and shakiness upon standing with associated loss of consciousness. Comorbidities included coronary artery disease, atrial fibrillation, hypertension, sick sinus syndrome (SSS) with pacemaker, and carotid endarterectomy with ultrasound revealing antegrade flow to vertebral arteries. Medications included midodrine, rivaroxaban, rosuvastatin, aspirin, and metformin.

BP was 162/94 mmHg with a fall between 40 and 60 mmHg upon standing without changes in heart rate (HR), 70 bpm. During the cardiology consultation, medication was adjusted, and electrocardiogram, echocardiogram, pacemaker interrogation, and Holter monitoring were normal. Additional blood laboratories including chemistries, hematology, liver function, and thyroid function tests were all within normal limits. Patient was referred to vascular surgery for varicosities and hemosiderin staining of the lower extremity (LE) and unclear etiology OH symptoms. Physical examination was notable for chronic venous disease demonstrating C4 in the left LE without associated leg swelling, pain, or asymmetry. Deep venous thrombosis history was negative. Computer tomography venography was performed to assess outflow obstruction.

The computer tomography venography revealed a 50% reduction (2-3 cm pancaking) of the left CIV diameter (Fig 1), and the patient was planned for venous stenting. Venography revealed

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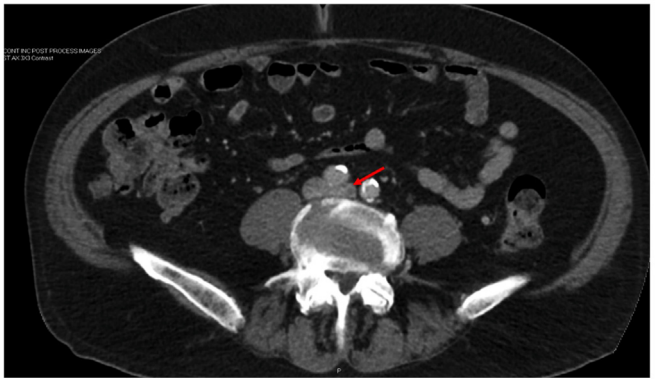

Fig 1. Compression of the left common iliac vein (CIV) by the right common iliac artery (CIA) (*red arrow*).

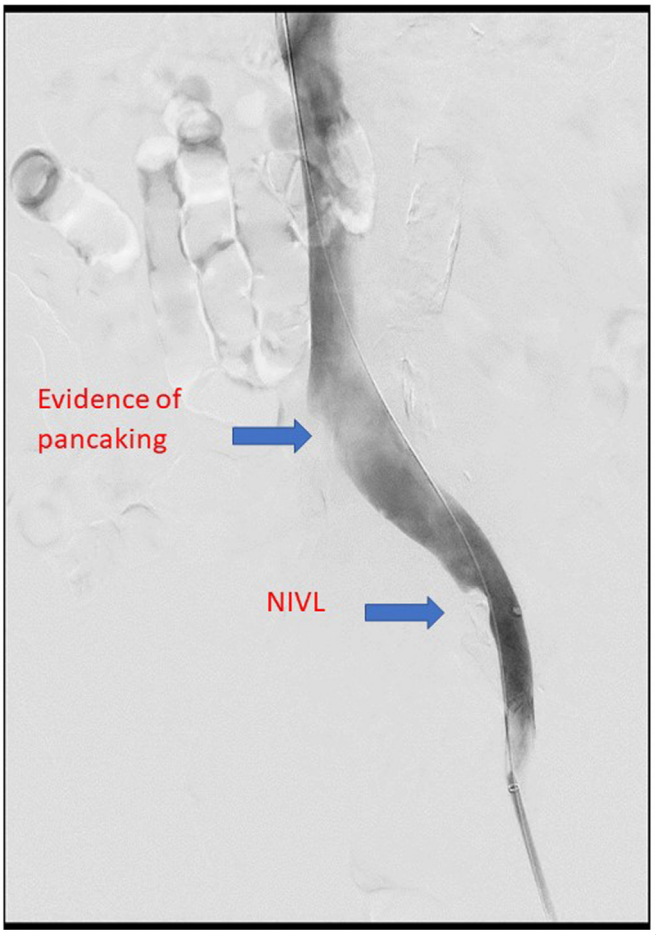

Fig 2. Intraoperative venography revealed a pancaking of the proximal left common femoral vein and distal non-thrombotic iliac venous lesion (*NIVL*).

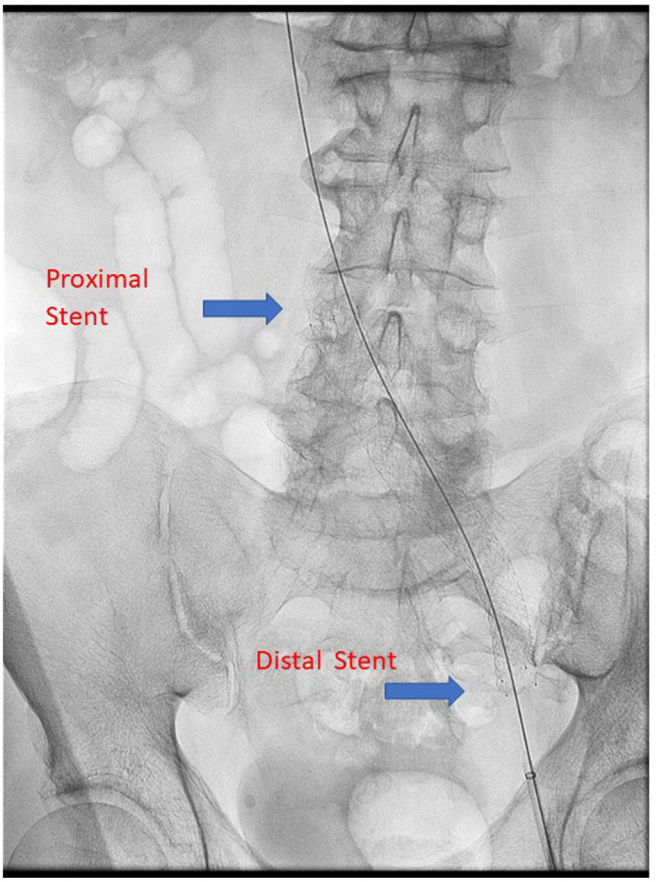

Fig 3. Left common femoral vein stenting under fluoroscopy visualization.

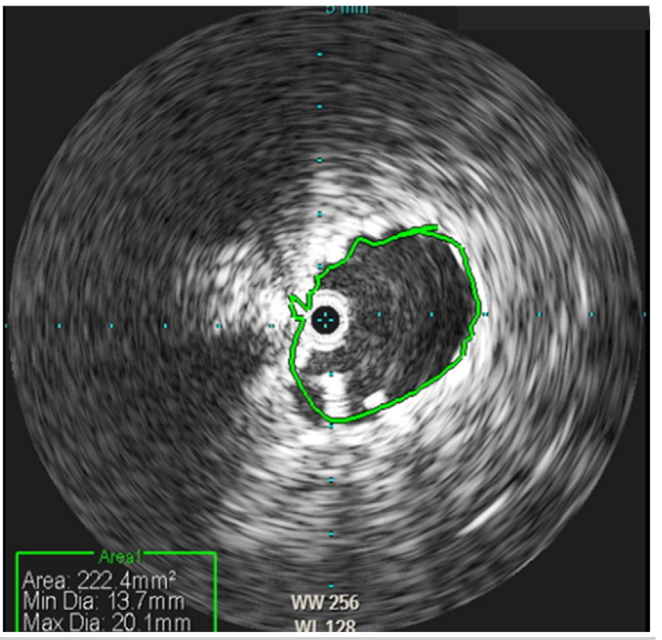

Fig 4. Intravascular ultrasound visualization showing an increase in the cross-sectional area of the left common iliac vein (CIV) (222 mm^2).

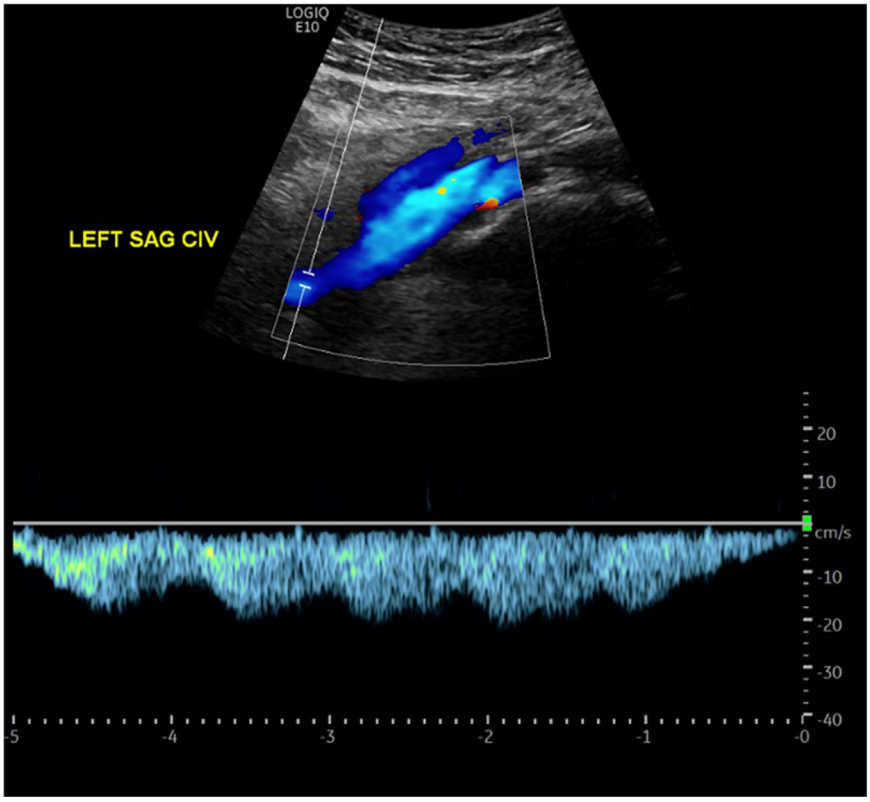

Fig 5. Patent common iliac vein (*CIV*) stent with the phasic flow, normal augmentation, and without reflux.

pancaking of the left CIV (Fig 2), and intravascular ultrasound revealed a left CIV diameter of 6 mm with a reduction in the cross-sectional area (CSA) of 100.8 mm^2 (50%).[12] The lesion was predilated with an Atlas 14- × 60-mm balloon, followed by the deployment of a self-expanding Zilver Vena stent 16 × 140 mm to obtain a left CIV diameter of 200 mm^2 (Cook Medical) (Fig 3).[13-15] The stent was post-dilated with an Atlas 14- × 60-mm balloon. Angioplasty intravascular ultrasound demonstrated an increase in the CSA to 190 to 220 mm^2 (Fig 4). Postoperatively, BP was 142/80 mmHg without episodes of OH at discharge. At 1-month follow-up, the patient reported improvement in the frequency and severity of unbalance, weakness, and shakiness. The patient reported a decrease in the duration of episodes of only 10 to 15 seconds instead of up to 5 minutes preoperatively. At 2-year follow-up, the patient continued reporting improvement in his symptoms and quality of life. Ultrasound visualization revealed no reflux and a patent stent with phasic flow (Fig 5). The patient agreed to publish his case details and images.

DISCUSSION

This case report revealed that in patients with NIVL and OH symptoms, iliac vein stenting may aid in improving OH with good mid-term results.[6] In our patient, notable findings included C4 in the left LE with normal metabolic function; therefore, uncommon etiologies of OH were evaluated. POTS is an autonomic disorder characterized by excessive reflex sympathetic excitation triggered by orthostatic stress. The pathophysiology remains elusive; however, central hypovolemia has been identified as the mechanism leading to venous pooling, hypovolemia, deconditioning, and hyperadrenergic state.[16,17] Knuttinen et al reported an association between left CIV stenosis and POTS,[18] with some patients with POTS demonstrating improvement in his symptoms after vein stenting.[19] The main difference between POTS and OH is that in POTS, increases in HR are the hallmark of symptoms; however, in OH, the hallmark is a marked decrease in BP.

SSS can be associated with POTS and inappropriate sinus tachycardia syndrome. This rare phenomenon presents persistent tachycardia due to POTS or inappropriate sinus tachycardia syndrome, followed by periods of bradycardia.[20] Kanjwal et al reported the resolution of autonomic symptoms after pacemaker implantation in patients with POTS and syncope.[21] In our case, the onset of the symptoms occurred after pacemaker placement, and OH symptoms persisted despite pacemaker implantation, reducing the probability of sinus dysfunction secondary to POTS. No increase in HR was recorded, which could be affected by the previous history of SSS. Nonetheless, even in patients with SSS, "tachy-brady syndrome" has been reported, highlighting that if POTS was present, tachycardia could be expected.

Given the stable HR and a marked decrease in BP, the suspicion of POTS decreases.[20,21]

NIVL can result from extrinsic compression of the left CIV by the right CIA.[22,23] Anatomic variations including compression of the left CIV by the left CIA and variations of the confluence of the right internal iliac vein into a compressed left CIV, have been reported, with a prevalence of 20% and 0.9% respectively.[24-28] Thrombotic events are the most severe complications; however, given the outflow track obstruction of the vein, orthostatic and chronic venous insufficiency may occur.[29] Few literature reports suggest NIVL as a contributor to OH symptoms.[2,30] Ormiston et al reported improvement in dysatonomic and venous congestive symptoms after left CIV stenting in patients with POTS and NIVL.[10] Nonetheless, the mid- and long-term outcomes after stenting in these patients remain unclear.

Dedicated venous stenting has been reported to be safe with a low complication rate, especially for non-thrombotic pathologies.[31] However, iliac vein stenting should be addressed carefully, given the associated cost and risk of this procedure. A detailed approach of the patient should be done before performing iliac vein stenting in patients with OH symptoms, given the multifactorial etiology of OH. Iliac vein stenting may not fully resolve the OH symptoms; however, in patients with venous return impairment and OH, the iliac vein stenting may aid in improving the symptoms with good results at mid-term follow-up, as revealed in our case report. This case highlights a rare and uncommon cause of OH, emphasizing the need for a high index of suspicion. Limitations of this case report include scarce replicable cases worldwide to truly determine the association between left CIV stenting and OH improvement, as well as the multifactorial etiologies of OH.

CONCLUSION

Orthostatic hypotension has a broad spectrum of etiologies. If left untreated, these symptoms can severely impact a patient's quality of life. Iliac vein stenting may aid in symptom relief in patients with OH and venous return impairment. However, a careful evaluation of metabolic and electrolyte disturbances should be performed before offering vein stenting in patients with OH without clear etiology.

DISCLOSURES

None.

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