Chronic venous insufficiency (CVI) has various clinical presentations, including telangiectasia, varicose veins or reticular veins, edema, skin changes (pigmentation, eczema, lipodermatosclerosis), healed venous leg ulceration, and active venous leg ulceration.1-3 Its severity can be classified based on CEAP (Clinical-Etiology-Anatomy-Pathophysiology) score. CVI can be caused by nonthrombotic or thrombotic venous insufficiency, which may present as venous reflux or obstruction.1 Iliocaval venous obstruction is one of the most common causes of CVI. Obstruction occurring at the iliac vein where it crosses the right iliac artery is known as May-Thurner syndrome.4

Although compression therapy is the first-line therapy for CVI, interventional therapy with endovascular stenting has also been shown to be beneficial.5 Revascularization with endovascular stenting has recently revolutionized the treatment approach for chronic venous obstruction, especially in the femoropopliteal system.6,7 Furthermore, patients with CEAP class 3 and above, including edema, skin changes, and venous ulceration (healed or active), have been shown to benefit from revascularization based on 2014 CIRSE standards of practice guidelines on iliofemoral stenting.1 This treatment approach has been described as safe and effective for chronic venous obstruction, but there have been various complications reported, including stent thrombosis, venous perforation, and stent migration.9-11

A 55-year-old woman with past medical history of chronic venous insufficiency manifesting as varicose veins presented to our emergency department with sudden onset chest pain and an altered mental status. The morning before the day of presentation, she underwent bilateral common iliac vein and suprarenal inferior vena cava stenting for the management of varicose veins, without any reported complications. The patient was discharged home on the same day without any issues. However, hours after discharge, she developed severe chest pain, prompting the family to call emergency medical services. Upon arrival to the emergency department (ED), the patient was minimally responsive and was hypotensive with systolic blood pressure in the 60s. She was intubated preemptively for airway protection, and vasopressors were initiated for hemodynamic support. An electrocardiogram (ECG) showed right bundle branch block with left anterior fascicular block. Cardiology was consulted, and an urgent bedside echocardiogram was performed, which showed a foreign object in the right atrium consistent with a stent. Computed tomography angiogram confirmed findings of a stent extending from the inferior vena cava into the right atrium.

At that time, cardiothoracic surgery was consulted for emergent retrieval of a migrated intracardiac stent in the setting of cardiogenic shock. During evaluation, the patient continued to deteriorate and became pulseless. Cardiopulmonary resuscitation and advanced...
cardiac life support were performed but failed to achieve return of spontaneous circulation. Approximately 24 hours after having an elective bilateral common iliac vein stenting, the patient was pronounced dead due to cardiac rupture associated with intracardiac migration of one of the venous stents.

CASE 2

A 37-year-old male-to-female transgender patient with past medical history of chronic venous insufficiency manifesting as varicose veins presented to our ED with chest pain and syncope. Three days prior to admission, the patient underwent an elective left common iliac vein stent placement for management of varicose veins without any complications reported.

One day after the procedure, the patient had sudden onset of chest pain and an episode of syncope while walking up the stairs. Chest pain was described as right-sided, intermittent, radiating to the back and neck, and worsened by upper body movement. Upon arrival to the ED, the patient was found to be hemodynamically stable, alert, and oriented. A transthoracic echocardiogram was performed, which showed a tubular foreign body in the right atrium. The foreign body was approximately 6 cm in length and crossed the tricuspid leaflet with impingement into the right ventricular septum (Figure 1). Given the patient’s history and imaging findings, migration of a left common iliac vein stent was suspected.

Endovascular rather than surgical approach was considered for stent removal. Due to the location of the stent and its entanglement in the tricuspid leaflet and chordae, the interventionalist deemed endovascular retrieval to be at higher risk for structural damage to the tricuspid valve. Therefore, surgery was consulted for retrieval. The patient underwent a complex surgical repair, which included retrieval of the nitinol stent located in the right atrial free wall (Figure 2), atrial free wall repair, tricuspid valve repair, and drainage of hemorrhagic pericardial effusion. Postoperative course was uncomplicated, and the patient was discharged home.

CONCLUSION

In this report, we have presented 2 cases in which patients underwent an elective left common iliac vein stent placement for management of CVI. One of the cases had a fatal outcome due to stent migration into the right heart.

Venous stent migration into the cardiopulmonary system is a lifethreatening complication, given its risk of pulmonary infarction, tricuspid regurgitation, and potential right-sided heart failure. Fortunately, it is a rare complication with only a 3% incidence rate.

There have been several cases reported (Table 1) of stent migration causing significant structural damage and conduction abnormalities (eg, arrhythmias) that increase mortality risk. Stent migration usually occurs when stents are placed inappropriately as a result of inaccurate measurement of stent or vessel circumference, malapposition of the stent, or choice of lesion without significant degree of obstruction. In recent years, there have been pioneering interventional approaches that have emerged, given the high mortality rate of 24% to 60% in foreign body embolization.

These innovative approaches have addressed the need for timely intervention in order to prevent severe complication such as cardiac arrhythmias, valve injury, and/or myocardial perforation. There have been 2 interventional approaches described for migrated stent retrieval — endovascular and surgical retrieval. Based on recent literature, the endovascular approach has shown a clear superiority, with a 90% success rate compared with the surgical technique, which is associated with high mortality. In the case described above, the surgical approach was preferred since it offered better visualization and maneuverability in the complex stent location. This approach reduced potential cardiac or vascular injury.

It is of prime importance to follow appropriate indications and procedural technique in order to avoid potentially life-threatening complications. Given the growing rate of venous
stenting and associated life-threatening potential complications, updated guidelines with clear criteria for endovenous stenting are needed.

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Address for correspondence: Jenny Plácido-Disla, MD; Beth Israel Medical Center, Seymour J Phillips Library, New York, New York; Email: jedisla@mountsinai.org

Table 1. Demographics on Reported Cases of Stent Migration in Chronic Venous Insufficiency and Clinical Outcome.

<table>
<thead>
<tr>
<th>Author</th>
<th>Indication-Presentation</th>
<th>Migration to</th>
<th>Surgical vs Endovascular Removal</th>
<th>Outcome</th>
<th>Heart Injury</th>
<th>ECG Changes</th>
<th>Sex</th>
<th>Age</th>
<th>CEAP Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toyoda N et al</td>
<td>Chronic venous insufficiency Lower extremity edema, venous stasis dermatitis, and ulceration</td>
<td>Right ventricle</td>
<td>Surgical removal</td>
<td>Survived</td>
<td>None</td>
<td>Premature atrial contraction</td>
<td>M</td>
<td>33</td>
<td>5</td>
</tr>
<tr>
<td>Ashar RM et al</td>
<td>Right iliac vein stenosis, DVT Right lower extremity edema</td>
<td>Right ventricle and pulmonary artery</td>
<td>Endovascular removal</td>
<td>Survived</td>
<td>Not reported</td>
<td>Ventricular arrhythmia</td>
<td>M</td>
<td>32</td>
<td>3</td>
</tr>
<tr>
<td>El Feghaly M et al</td>
<td>May-Thurner syndrome Vulvar varicosities</td>
<td>Right ventricle</td>
<td>Endovascular removal</td>
<td>Survived</td>
<td>Moderate regurgitation of the tricuspid valve</td>
<td>Unknown</td>
<td>F</td>
<td>33</td>
<td>2</td>
</tr>
<tr>
<td>Ibrahim M et al</td>
<td>May-Thurner syndrome Left lower extremity edema</td>
<td>Right ventricle</td>
<td>Surgical removal</td>
<td>Survived</td>
<td>Tricuspid regurgitation, constrictive pericarditis, heart failure</td>
<td>Unknown</td>
<td>M</td>
<td>27</td>
<td>3</td>
</tr>
<tr>
<td>Hoffer E et al</td>
<td>Iliac vein stenosis secondary to radiation therapy Unknown presentation</td>
<td>Right ventricle</td>
<td>Surgical removal</td>
<td>Survived</td>
<td>Moderate regurgitation of the tricuspid valve</td>
<td>Nonsustained ventricular tachycardia</td>
<td>F</td>
<td>53</td>
<td>Unknown</td>
</tr>
<tr>
<td>Mullens W et al</td>
<td>May-Thurner syndrome Left lower extremity edema</td>
<td>Tricuspid valve, right ventricle</td>
<td>Surgical removal</td>
<td>Survived</td>
<td>Tricuspid regurgitation</td>
<td>Atrial fibrillation</td>
<td>F</td>
<td>55</td>
<td>3</td>
</tr>
<tr>
<td>Haskal Z et al</td>
<td>Left popliteal vein DVT Left lower extremity edema</td>
<td>Cephalic portion of the inferior vena cava and right atrium</td>
<td>Surgical removal</td>
<td>Survived</td>
<td>Not reported</td>
<td>Unknown</td>
<td>M</td>
<td>53</td>
<td>3</td>
</tr>
</tbody>
</table>

Abbreviations: CEAP, Clinical-Etiology-Anatomy-Pathophysiology; DVT, deep vein thrombosis; ECG, electrocardiogram.

REFERENCES


