


# Venous Stent Migrating to the Right Heart Causing Severe Regurgitation

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## Abstract

Venous stent migration to the cardiopulmonary system is a rare but serious complication. Cardiopulmonary involvement has various presentations such as valvulopathy, acute heart failure, arrhythmias, endocarditis, and tamponade. The presenting symptoms depend on the eventual location of the stent in the heart or lungs, size of the stent, and valve involvement. Extracardiac dislodgement can be managed by catheter-directed extraction or proper deployment within the containing vessel or surgical extraction. Intracardiac stents may require open surgery to prevent life-threatening complications. We present an asymptomatic patient with stent migration that lead to severe tricuspid regurgitation and required tricuspid valve replacement

## Keywords

venous stent, right atrium, adhesion, echocardiogram

## Introduction

Venous stent migration to the cardiopulmonary system is an uncommon, nonetheless, serious complication. Stents tend to migrate in a proximal position in the venous system. However, they can migrate to the heart leading to valvulopathy, acute heart failure, arrhythmias, endocarditis, and tamponade.<sup>1</sup> Intracardiac stent migration has been reported in the right atrium, right ventricle, and pulmonary artery. The presenting symptoms depend on the final location of the migrated, size of the stent, and valvular involvement. Migrating stents have been reported to lead to right atrial perforation and pericardial effusion.<sup>2-4</sup> A case report noted dual stents migrating into the right atrium and to the left pulmonary artery.<sup>5</sup>

We present an asymptomatic patient with venous stent migration that lead to severe tricuspid regurgitation requiring tricuspid valve replacement.

## Case Presentation

A 49-year-old male presented to our clinic for establishment of care. He had a history of hypertension and diabetes mellitus. His examination was remarkable for a systolic murmur on the left lower sternal boarder and a healed left leg ulcer and trace lower extremity edema. Relevant history included chronic venous stasis with stent placement to the left iliac vein (Boston Scientific, Wallstent 16 × 60 mm) done in a different facility 10 months prior to presentation. Two days

after the procedure, he went to an outside hospital complaining of chest pain. Transesophageal echocardiography was performed at the other institution and showed an “unclear echo density in the right atrium, which was suspected to be an artifact.” A coronary angiogram showed nonobstructive coronary artery disease.

Based on the previous report, we ordered a transthoracic echocardiography that showed a foreign body in the right atrial cavity extending across the tricuspid valve (TV; Supplemental Videos 1 and 2).

A transesophageal echocardiography was performed, which showed a dislodged vascular stent in the right atrium measuring 5.5 × 1.6 cm (Supplemental Videos 3-5). The stent was impinging on the TV, causing severe tricuspid regurgitation. The patient was admitted to our cardiology service and placed on heparin for anticoagulation. Computed tomography of the chest reported a tubular radiopaque density, in the right atrium, partially extending into the right ventricle (Figure 1).

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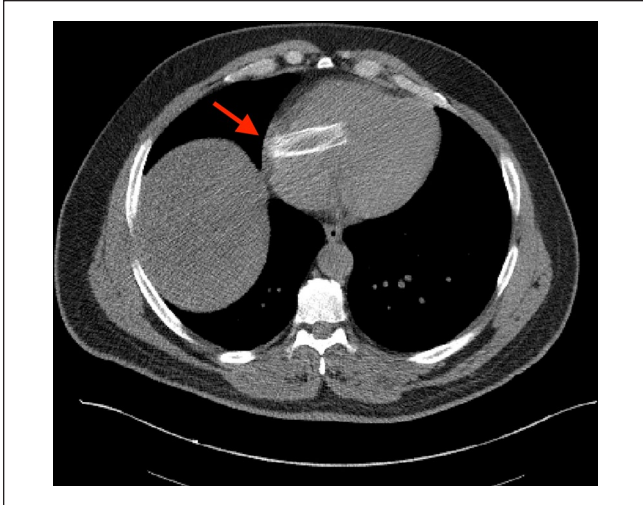
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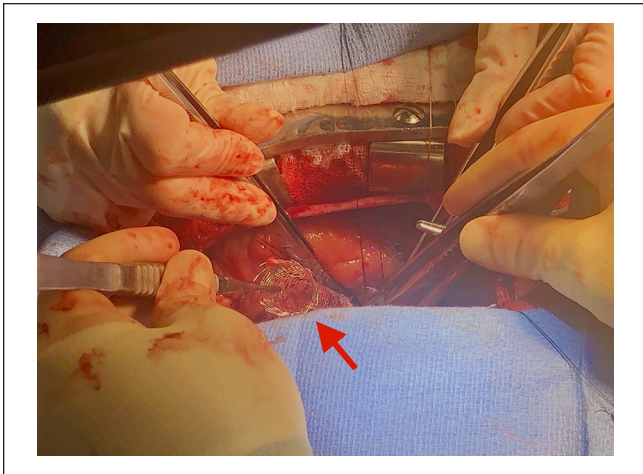
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**Figure 1.** Computed tomography of the chest, red arrow reveals a stent in the right atrium and into the right ventricle.

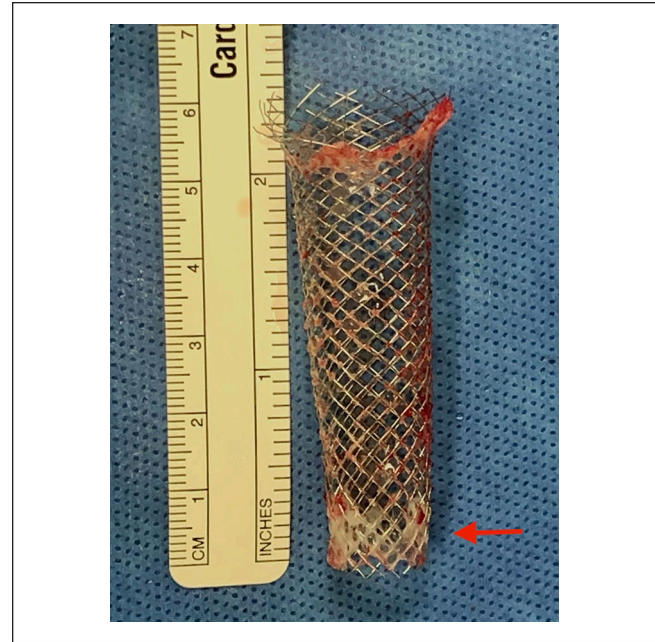


**Figure 2.** The red arrow marks the stent being extracted from the patient right atrium via open thoracotomy.

Following a multidisciplinary meeting involving interventional cardiology, vascular surgery, and cardiothoracic surgery, percutaneous extraction of the stent was attempted under transesophageal echocardiography guidance; however, it was firmly adhered to the TV and opposing the right atrial wall. Consequently, the patient underwent open stent extraction, during which the stent was found to be adherent to the TV and the right atrial wall (Figures 2 and 3). He required TV replacement and was discharged in a stable condition.

## Discussion

Studies have attempted to explain the cause of stent migration. Respiratory variation in the vein diameter added to the stents' expansible tendency can lead to a significant reduction in length. This occurs as the stents tend to expand more



**Figure 3.** The extracted stent measuring 6 cm in length. The white tissue at the bottoms (red arrow) of the stent is part of the tricuspid valve endothelium.

when the vessel is dilated and hence by the progressive increase in the diameter shortening. This change is postulated to play a role in stent migration.<sup>6</sup> Other cases were described in the setting of compression from malignancy or intraoperative manipulations.<sup>4,7</sup> Iliac stent migration is a rare occurrence with an incidence rate of 1.5% to 3.5%.<sup>8,9</sup> A report reviewing stent migration literature identified 3 cases of stent migration: 3 patients with stent migration to the heart (out of 11 cases of stent migration), 2 requiring open-heart surgery and 1 had uncomplicated percutaneous retrieval.<sup>10</sup>

Perioperative complications are common when the stents dislodge to the cardiopulmonary system with stroke, tamponade, leaflet damage, and atrial fibrillation.<sup>1,8,11</sup> Our patient suffered from leaflet damage that required valve replacement. Stent extraction is often performed via open surgery due to the location of the stent or valvular damage requiring repair or replacement. Percutaneous endovascular extraction, using a snare, can be attempted; however, multiple studies have reported failed attempts and eventually proceeding to open-heart surgery.<sup>5,12</sup> In one case, attempted percutaneous extraction lead to stent fracture that required urgent surgery.<sup>1</sup> There was no mortalities reported in the cases reviewed. The use of self-expanding bare metal stents has been suggested to help avoid stent migration as it provides better opposition against the vessel wall.<sup>8</sup>

## Conclusion

Stent migration into the cardiopulmonary system is a rare but serious occurrence. Percutaneous retrieval can be attempted

after considering the potential complication and assessing the risks. When valvular involvement occurs, open-heart surgery with valve replacement is needed.

### Declaration of Conflicting Interests

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### Ethics Approval

Our institution does not require ethical approval for reporting individual cases or case series.

### Informed Consent

Verbal informed consent was obtained from the patient for their anonymized information to be published in this article.

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### Supplemental Material

Supplemental material for this article is available online.

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