

## VASCULAR MEDICINE

### IMAGING VIGNETTE: CLINICAL VIGNETTE

# High Output Heart Failure Due to Iatrogenic Iliac Arteriovenous Fistula Complication of Spine Surgery



Irena Ivanac Vranešić, MD, PhD,<sup>a</sup> Petra Grubić Rotkvić, MD, PhD,<sup>a</sup> Ivana Jurca, MD,<sup>b</sup> Dražen Perkov, MD, PhD,<sup>b,c</sup> Majda Vrkić Kirhmajer, MD, PhD<sup>a,c</sup>

#### ABSTRACT

This case shows the risk of severe cardiovascular complications following lumbar spine surgery, with progressive high output heart failure caused by an iatrogenic iliac arteriovenous fistula. Careful history taking and thorough physical examination are essential in guiding the diagnosis. Endovascular repair can provide excellent short- and long-term outcomes. (J Am Coll Cardiol Case Rep 2024;29:102260) © 2024 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

A 52-year-old woman presented to our emergency department with markedly symptomatic heart failure (HF) with NYHA functional status IV. Three months before her presentation, she underwent lumbar disc surgery (LDS). Postoperatively, the patient developed progressive dyspnea that was falsely attributed to a small subsegmental pulmonary embolism diagnosed in a regional hospital with no clinical improvement on anticoagulant therapy. Upon admission, physical examination revealed a pulsatile, distended right jugular vein (Video 1), pitting leg edema, hepatomegaly, ascites, and systolic-diastolic murmur heard on the chest, abdomen, and back with punctum maximum at left lumbar region. The chest X-ray showed cardiomegaly, pulmonary congestion, and bilateral pleural effusions. Transthoracic echocardiogram (TTE) revealed a dilated, volume-overloaded right ventricle (RV) with severe functional tricuspid regurgitation (TR) and mild pericardial effusion (Figures 1A and 1B, Videos 2 and 3). Mean pulmonary artery pressure was estimated at 40 mm Hg. There were no signs of intracardiac shunt or left-sided heart disease. The inferior vena cava was severely dilated at 30 mm. Past surgical history, lumbar bruit, and signs of high-output HF raised suspicion for iatrogenic pelvic arteriovenous fistula (AVF). A computed tomography angiography confirmed the presence of left common iliac artery to vein fistula with adjacent pseudoaneurysm (Figure 1C).

The patient underwent successful endovascular treatment with a balloon-expandable stent-graft closure of both AVF and pseudoaneurysm, and no periprocedural complications (Figure 1D, Videos 4 and 5). An immediate improvement in the patient's dyspnea was noticed and clinical signs of HF resolved after a few days of

From the <sup>a</sup>Department of Cardiovascular Diseases, University Hospital Centre Zagreb, Zagreb, Croatia; <sup>b</sup>Department of Diagnostic and Interventional Radiology, University Hospital Centre Zagreb, Zagreb, Croatia; and the <sup>c</sup>University of Zagreb School of Medicine, Zagreb, Croatia.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

Manuscript received November 1, 2023; revised manuscript received December 14, 2023, accepted December 18, 2023.

**ABBREVIATIONS  
AND ACRONYMS****AVF** = arteriovenous fistula**CT** = computed tomography**HF** = heart failure**LDS** = lumbar disc surgery**RV** = right ventricle**TR** = tricuspid regurgitation**TTE** = transthoracic  
echocardiogram

diuretic treatment. A week after the procedure, TTE showed normal RV size and function, with no signs of RV volume overload and only a trace of TR (**Figure 1E**, **Videos 2 and 3**). The patient was discharged with antiplatelet therapy. After 5 years of follow-up, she is event-free and in excellent clinical condition.

AVF is congenital or acquired pretricuspid shunt lesion which can have significant hemodynamic consequences leading to high-output HF. Iliac AVF has been described as a rare complication following LDS or uterine surgeries, including cesarean section and hysterectomy.<sup>1</sup> The uterus is adjacent to the iliac vessels, so iliac vascular injury during hysterectomy is possible. The mechanism of injury during LDS is probably direct force from the sharp instrument which passed through the anterior longitudinal ligament at the L4-5 or L5-S1 level, causing the fistula between the common iliac artery and vein.<sup>2</sup>

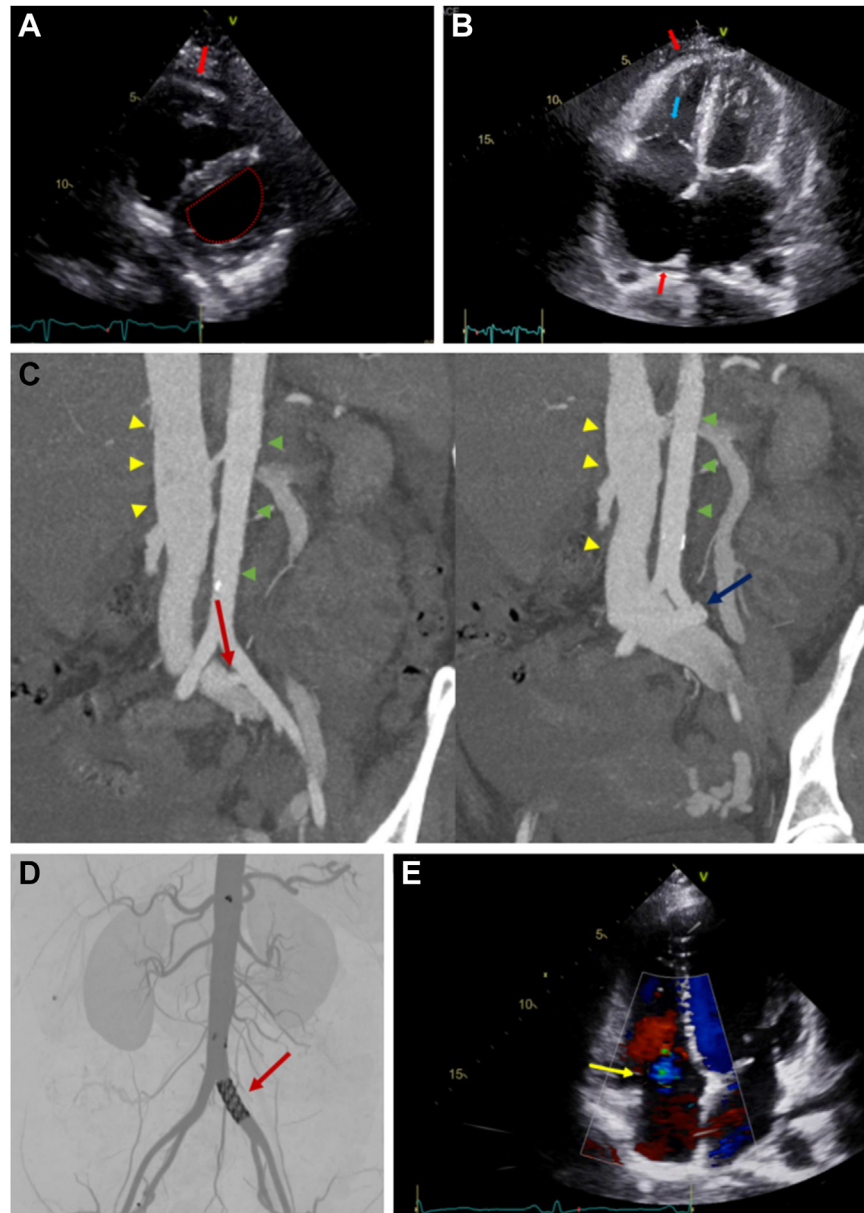
Consequently, high-output HF is often developed during the period from 1 month to 1 year following LDS; therefore, careful history taking and physical examination, including auscultation over the suspicious area, are mandatory. When iliac AVF is suspected, computed tomography or magnetic resonance angiography is performed to confirm the diagnosis and to evaluate its location and size as well as associated complications (eg, pseudoaneurysm). Traditional surgical repair of iliac AVF is difficult and is often complicated with significant intraoperative bleeding due to dilated vasculature, the deep pelvic location of AVF, and robust collaterals. In recent years, endovascular treatment has become an effective alternative to surgical management, providing fewer complications and lower mortality.<sup>3</sup>

**FUNDING SUPPORT AND AUTHOR DISCLOSURES**

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

**ADDRESS FOR CORRESPONDENCE:** Dr Majda Vrkić Kirhmajer, University Hospital Centre Zagreb, Kišpatičeva 12, 10 000 Zagreb, Croatia. E-mail: [majda\\_vrkic@yahoo.com](mailto:majda_vrkic@yahoo.com).

**FIGURE 1** Multimodality Imaging



(A) Transthoracic echocardiography (TTE) parasternal short-axis view. D-shaped left ventricle in diastole (red dotted line) indicating volume overloaded right ventricle (RV). The red arrow indicates a small pericardial effusion. (B) TTE apical 4-chamber view in systole. A large tricuspid valve coaptation gap is shown (blue arrow) as a cause of severe functional tricuspid regurgitation. A small pericardial effusion (red arrows) and dilated right atrium are also shown. (C) Multidetector computed tomographic (MDCT) angiography shows oblique projection, arterial phase, and simultaneous opacification of the lumen of the abdominal aorta (green arrowheads) with the iliac arteries and the lumen of the inferior vena cava (yellow arrowheads) due to an iatrogenic arteriovenous fistula (AVF) (red arrow) with a formed pseudoaneurysm of the left common iliac artery (CIA) (blue arrow). (D) MDCT angiography shows coronal projection, arterial phase: postintervention properly positioned stent graft in the left CIA (red arrow) without signs of AVF or pseudoaneurysm. (E) TTE shows trace of tricuspid regurgitation (yellow arrow) with normal size RV and right atrium after AVF closure.

---


**REFERENCES**

1. Ji L, Gu G, Liu Z, et al. Clinical features and endovascular management of iliac arteriovenous fistulas: a 10-year single center experience. *Front Surg*. 2022;9:873665.
2. Kosum P, Chattranukulchai P, Theerasuwipakorn N, et al. An unusual cause of high-output heart failure from the iliac arteriovenous fistula after lumbar discectomy: a case report. *Radiol Case Rep*. 2023;18(6):2140-2144.
3. Yan GW, Li HW, Yang GQ, et al. Iatrogenic arteriovenous fistula of the iliac artery after lumbar discectomy surgery: a systematic review of the last 18 years. *Quant Imaging Med Surg*. 2019;9(6):1163-1175.

---

**KEY WORDS** high output heart failure, iatrogenic arteriovenous fistula, lumbar spine surgery

---

 **APPENDIX** For supplemental videos, please see the online version of this paper.