Endovascular Repair of Left Ventricular Assist Device Outflow Tract Kink

Rohit Vyas, MD (PGY-2, UT Internal Medicine)

Mubbasher A. Syed, MD (PGY-5, UT Cardiology)

George Moukarbel, MD (Asst. Professor, UT Cardiology)
University of Toledo Medical Center

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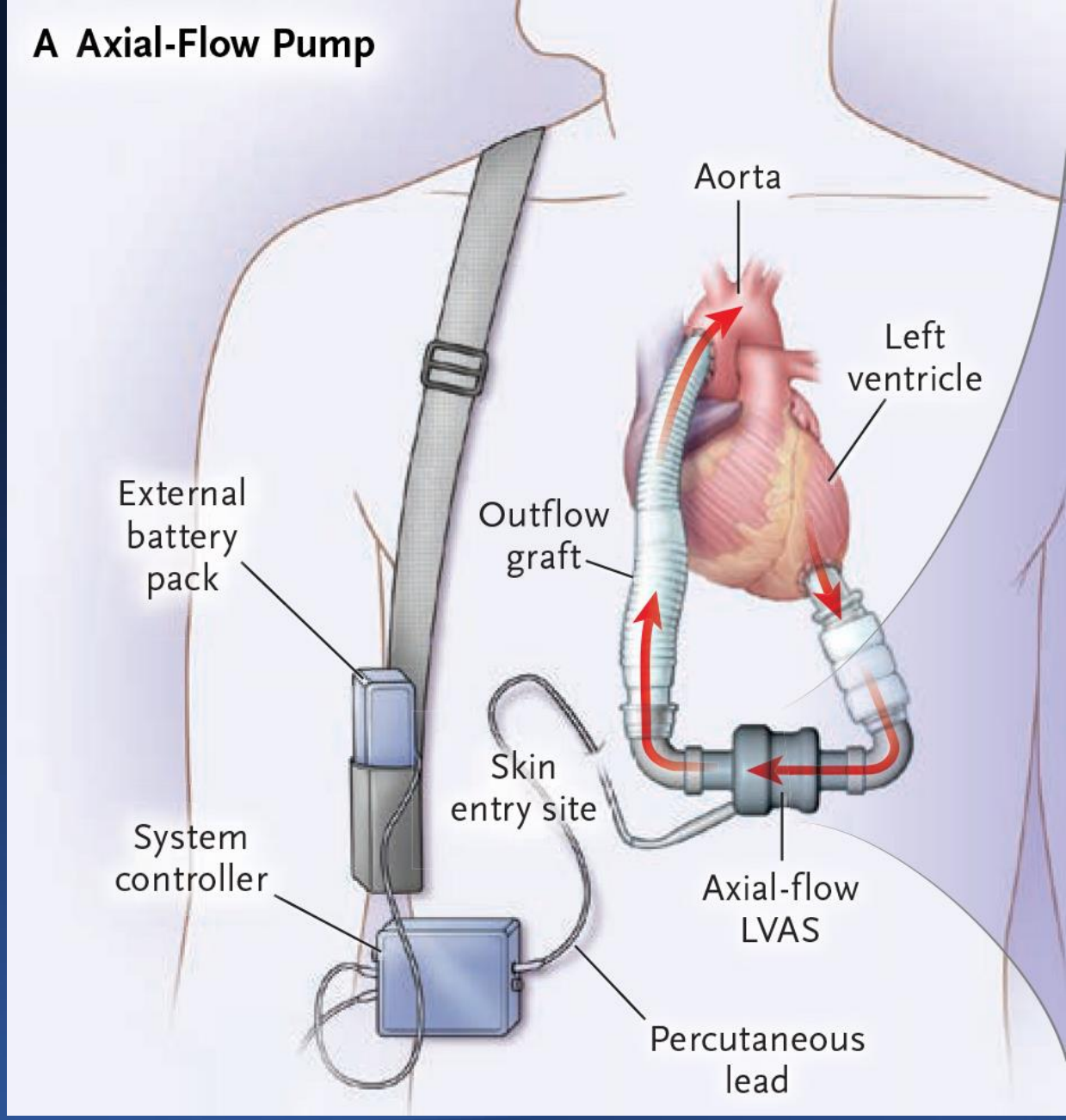
Disclosure Statement of Financial Interest

I, Rohit Vyas, DO NOT have a financial interest, arrangement, or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.

- LVADs continue to gain acceptance as **destination therapy**

- However they can be accompanied by a wide range of complications
  - Bleed events
  - Pump thrombosis
  - Infection
  - Mechanical complications can be classified as pre-, intra- **and post-pump**

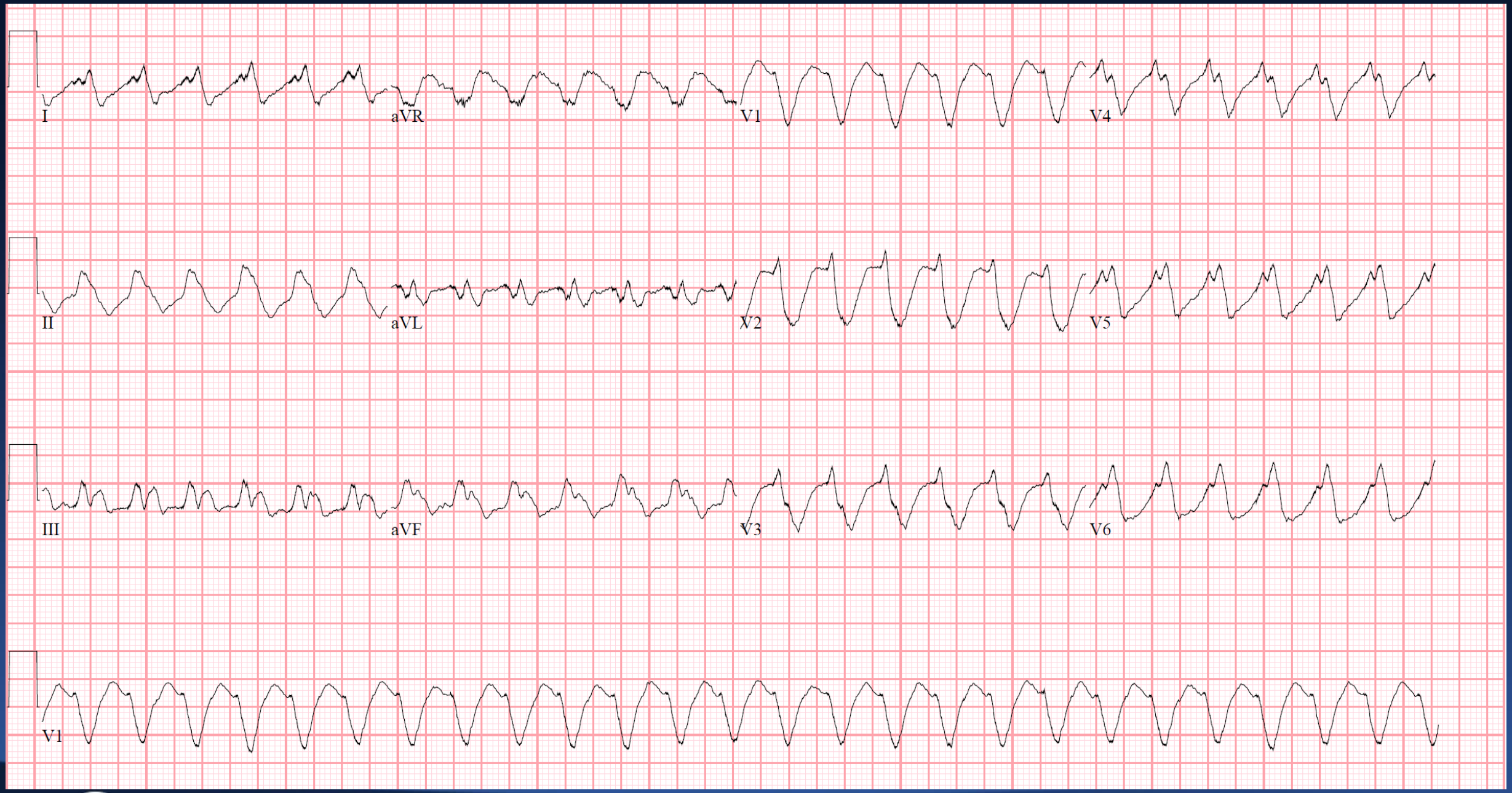
- Of interest is the management of post-pump complications



Case history

- 65 year old male
- HeartMate II implantation in 2012
- Post-operatively developed aortic insufficiency, underwent surgical repair

- **Presented to ED having received multiple shocks via AICD, worsening HF symptoms**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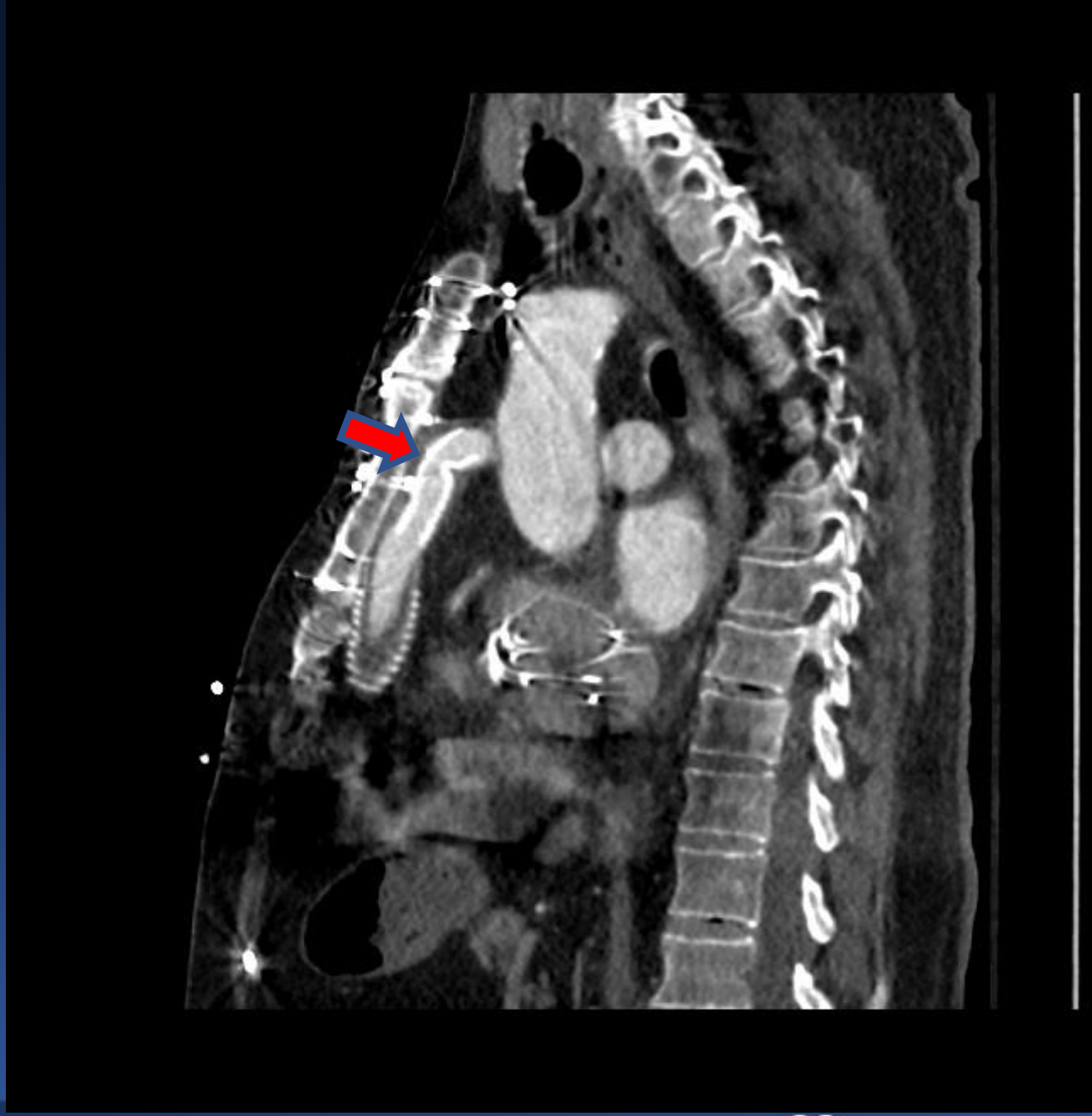
Case history (cont'd)

- Underwent TTE: EF 5-10%, right and left atrial enlargement
- Doppler flow through the inflow cannula 0.8 m/sec; **flow through outflow cannula elevated at 2.6 m/sec**
- Noted moderate aortic insufficiency

Chest CTA

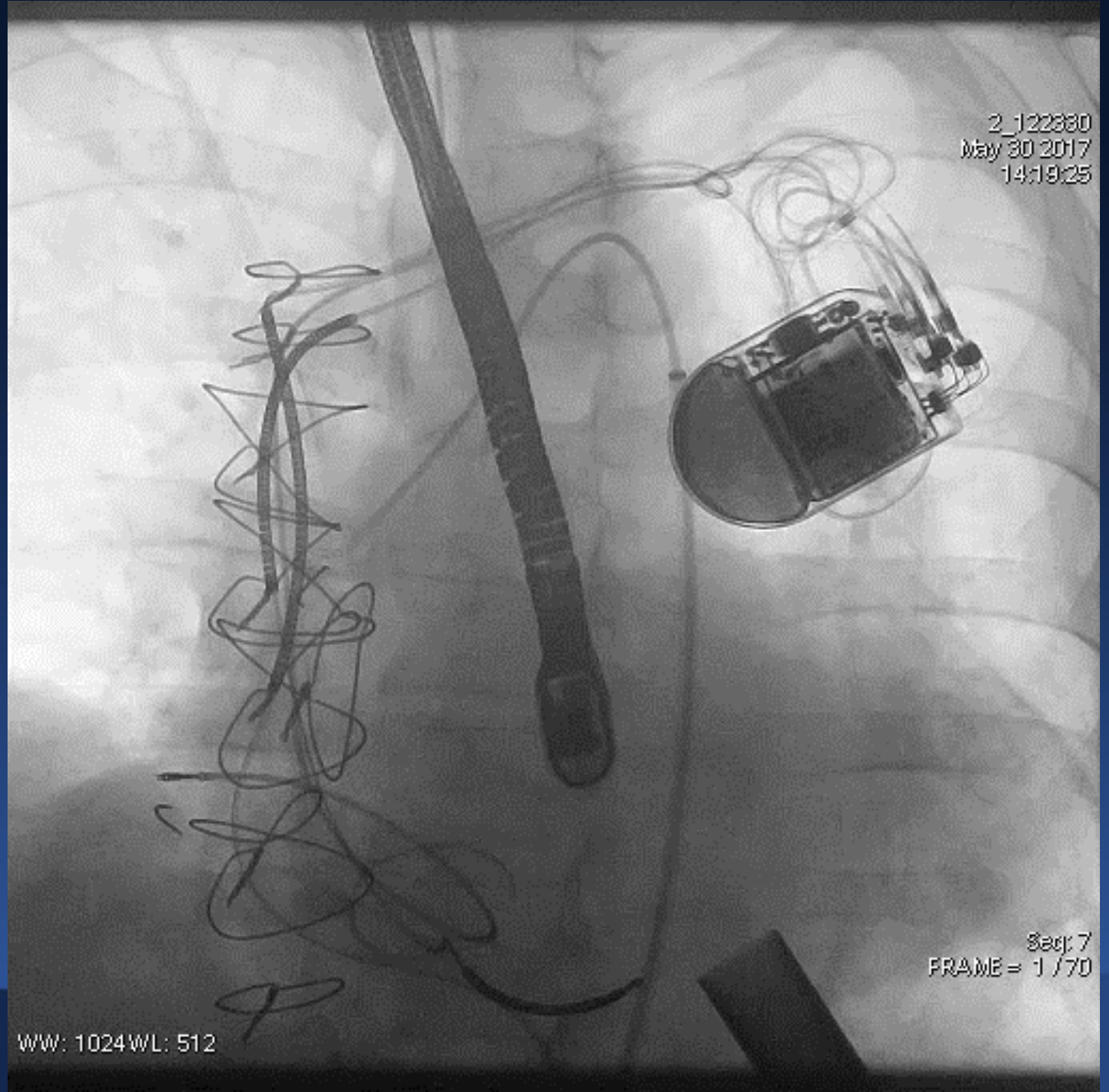
- Kink at **distal aspect** of LVAD outflow tract
- Noted smooth intimal hyperplasia at kink



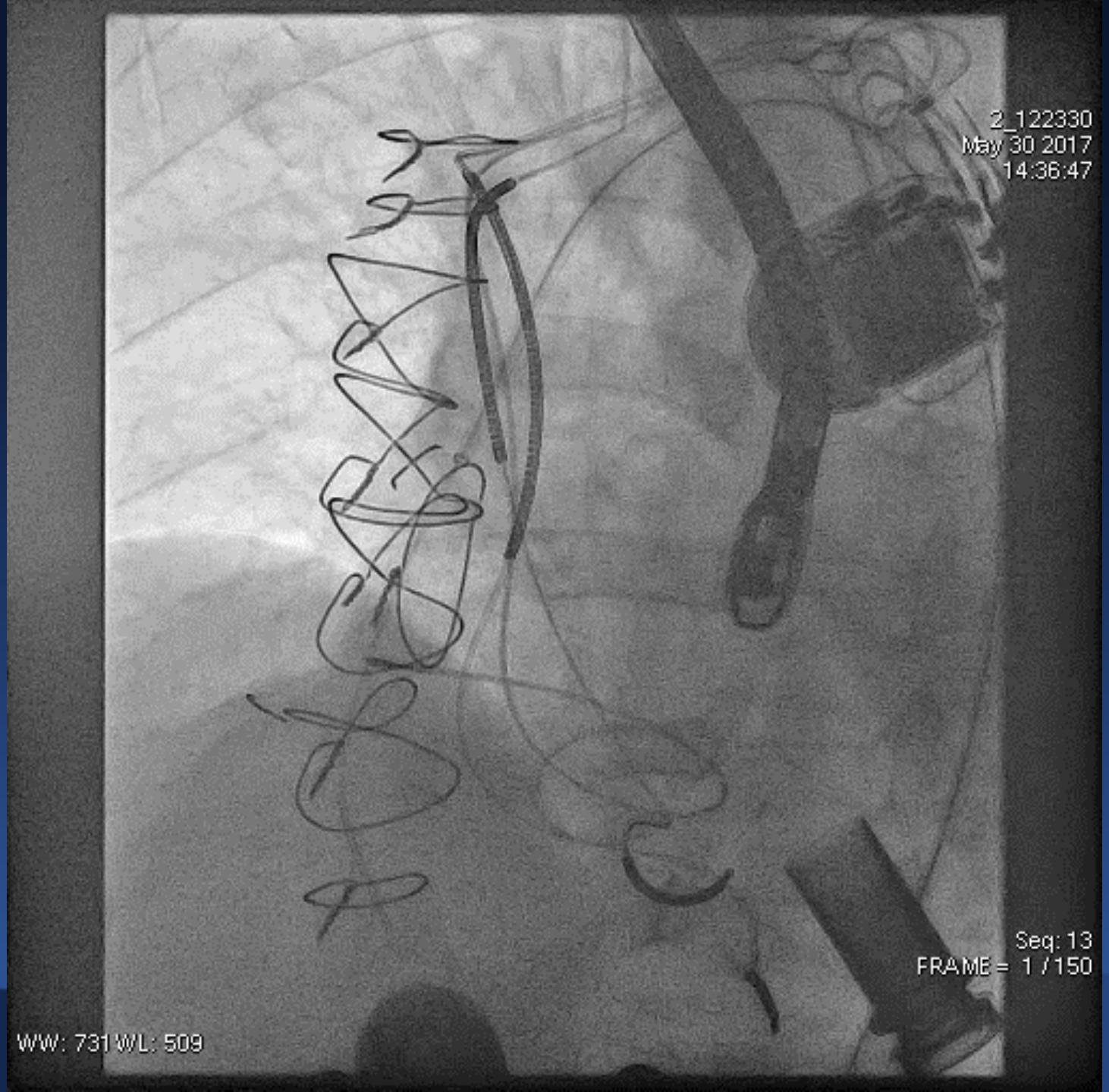
- Patient was a poor candidate for operative repair of outflow tract kink

- Underwent selective angiography of outflow tract via right femoral access

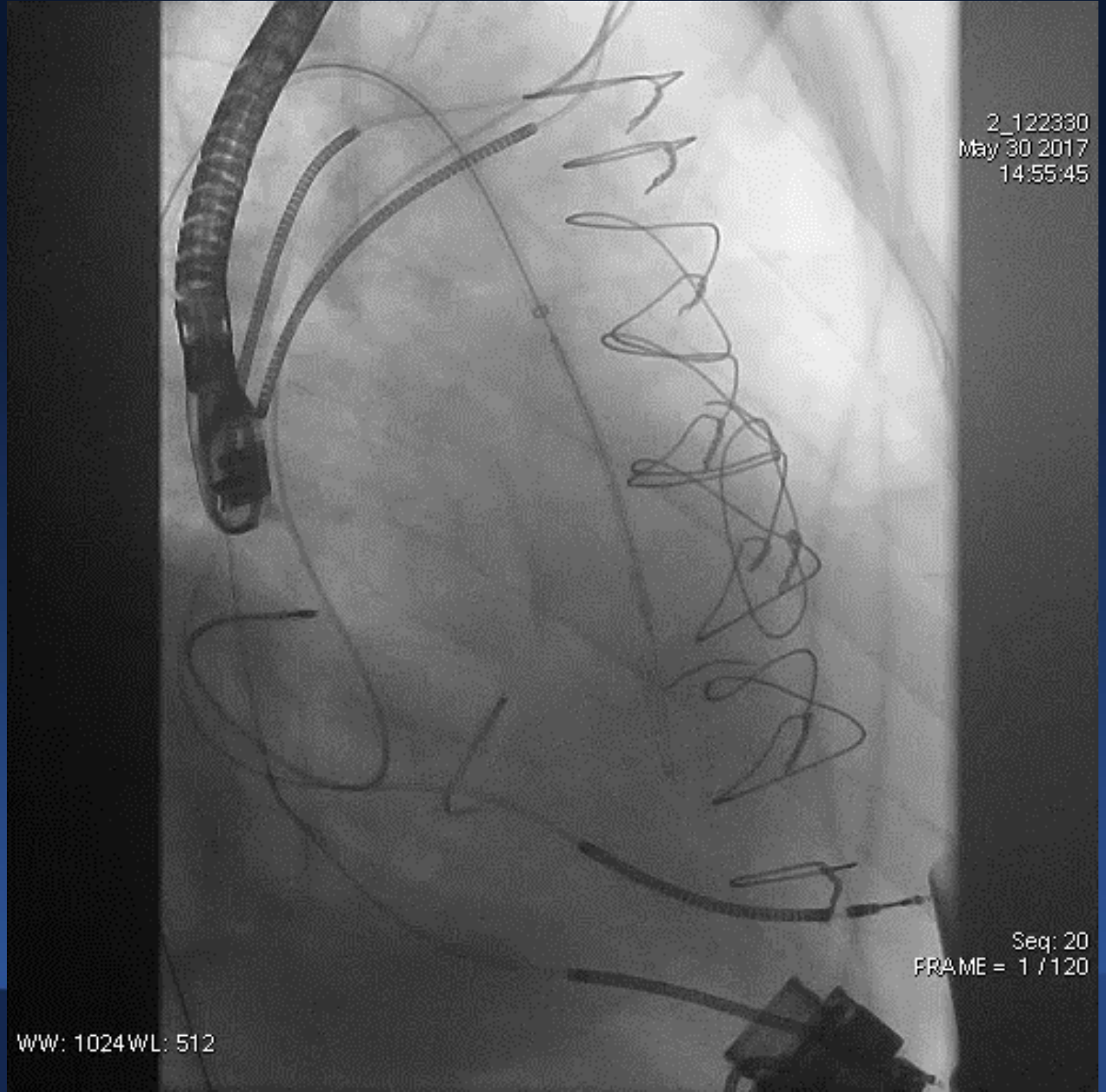
- Access to outflow tract



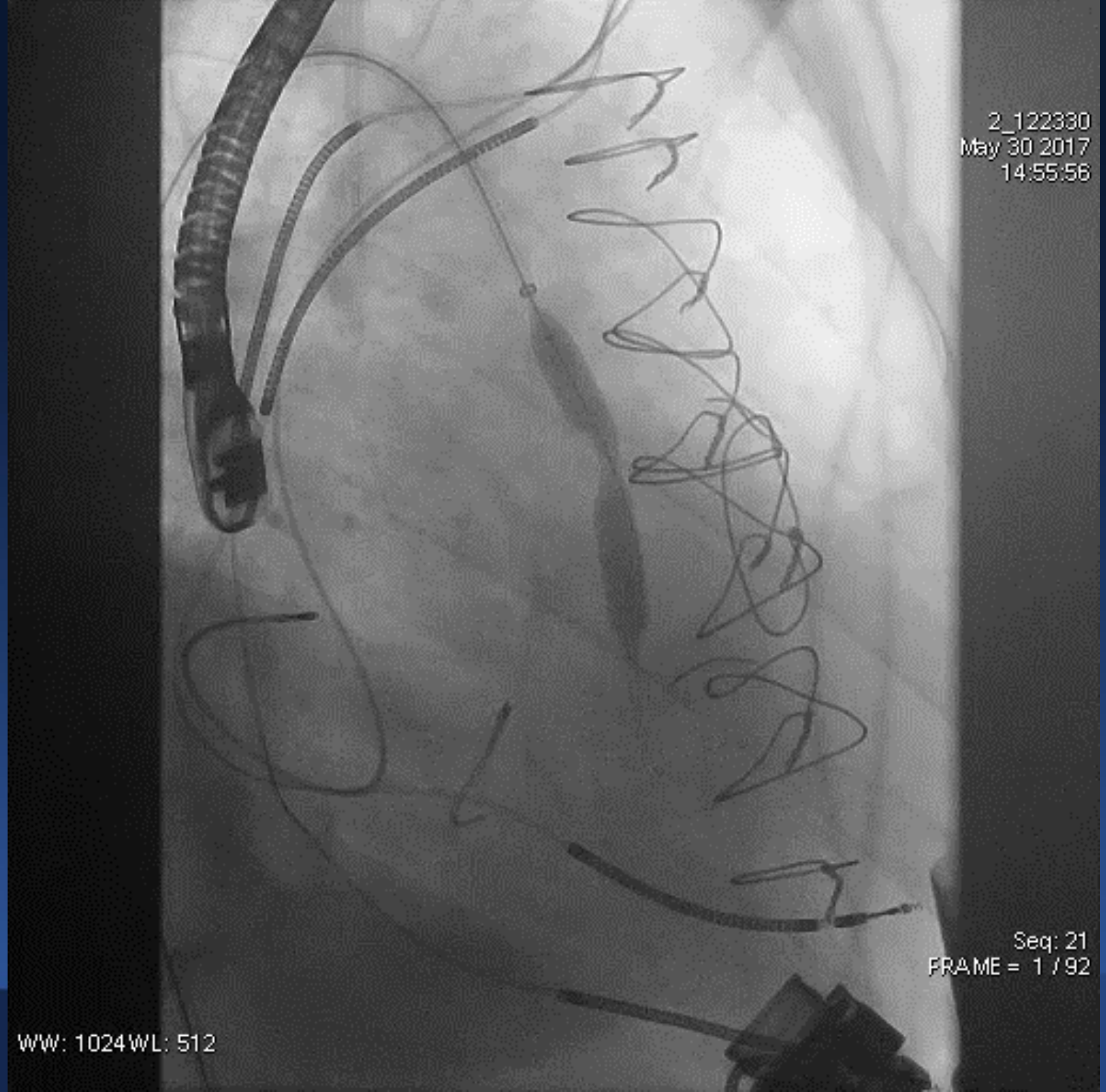
- Stent placement at kink site



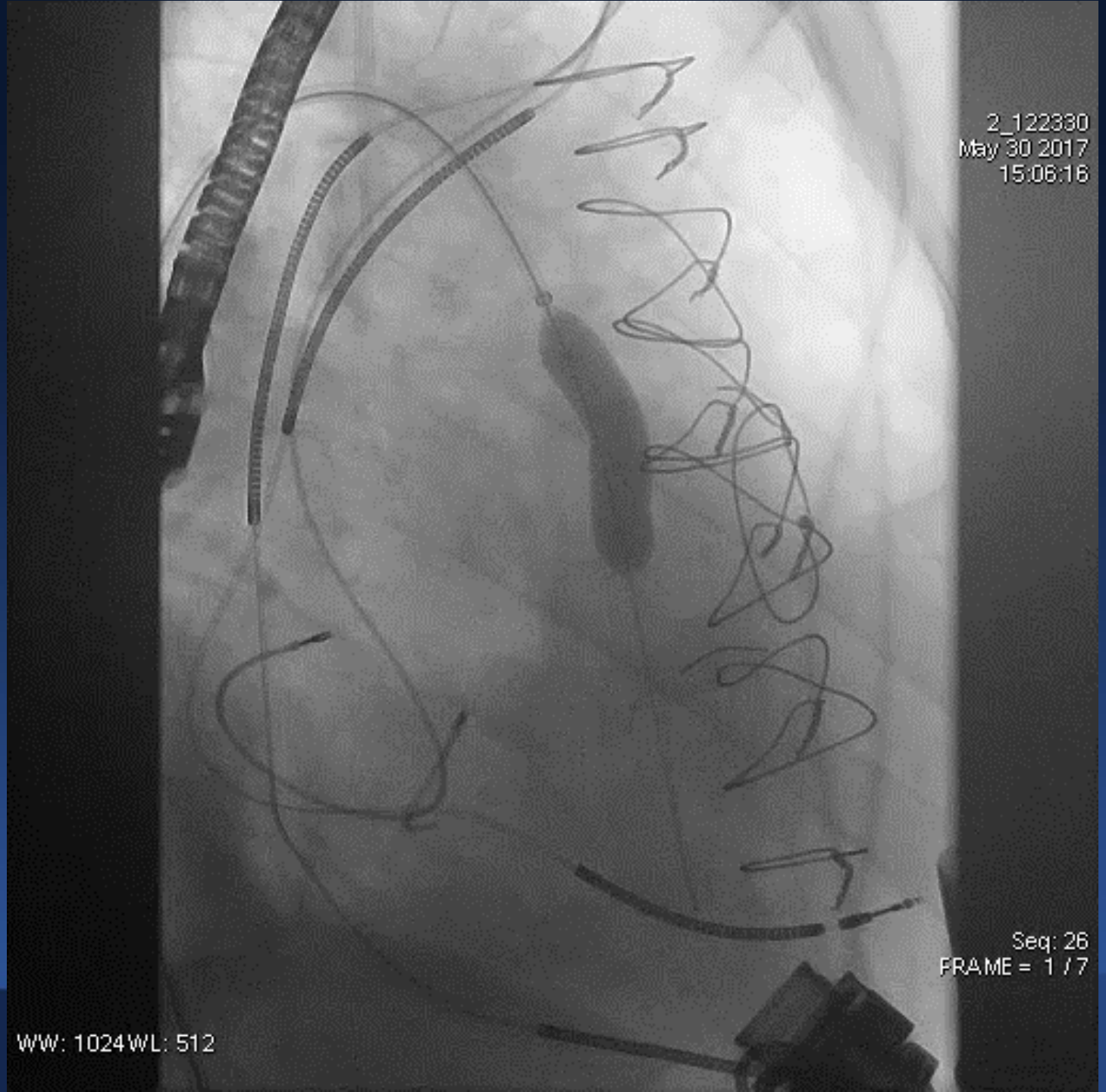
- Stenting of the outflow graft
- Device deployed: iCAST Atrium 9 x 59 mm covered stent



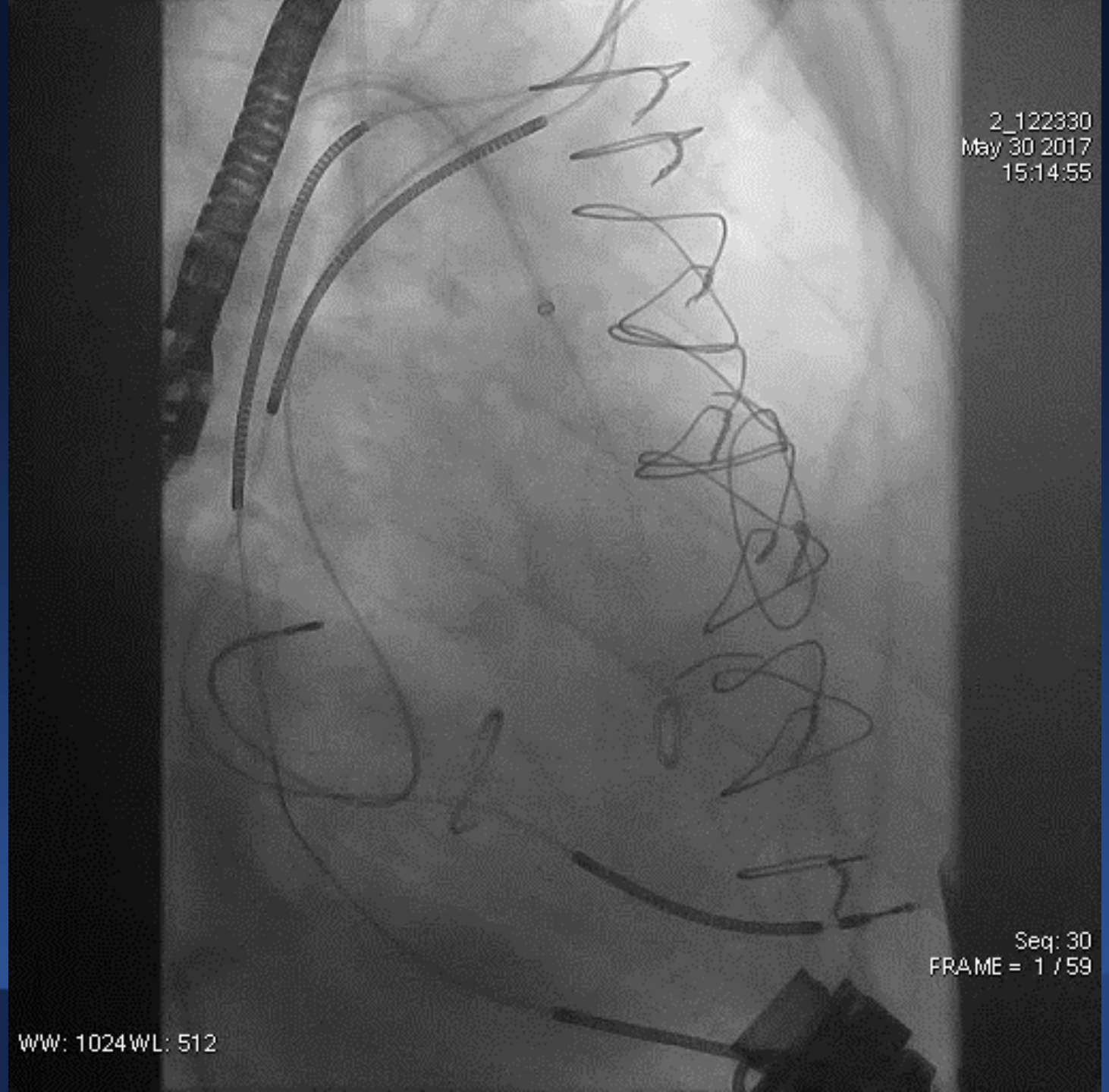
- Stent dilation

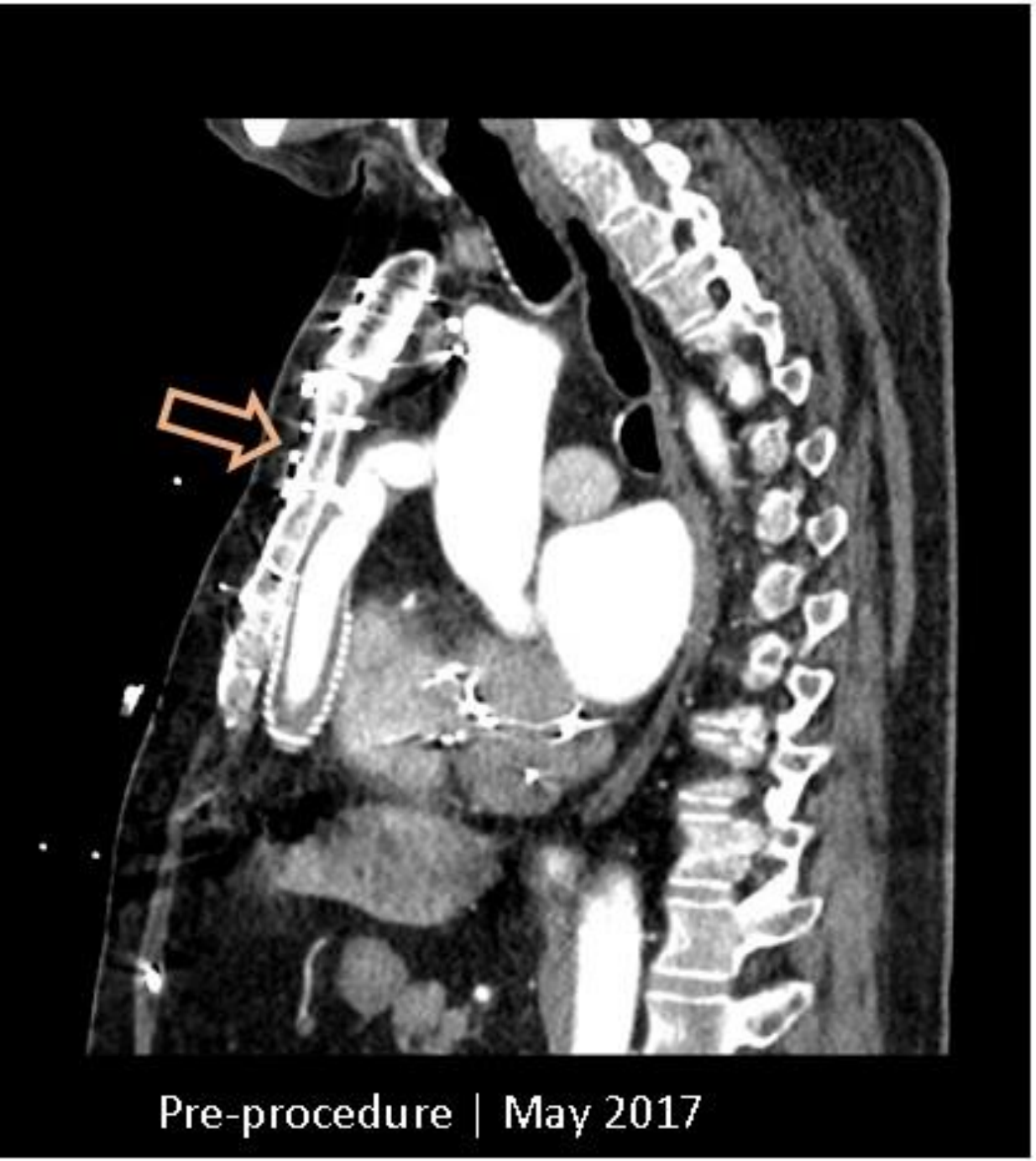


- Covered stent post-dilated to 12 atm



- Follow up TTE: doppler flows through outflow cannula **decreased to 1.3 m/sec**




Pre-procedure | May 2017


Post-procedure | Jan 2018

- iCAST atrium covered stent:
  - Typically used for peripheral interventions
  - Also FDA approved for treatment of tracheobronchial strictures

- Discharged in stable condition on 6 months of DAPT

Atrium iCAST™ balloon-mounted covered stent.
Courtesy of Atrium.

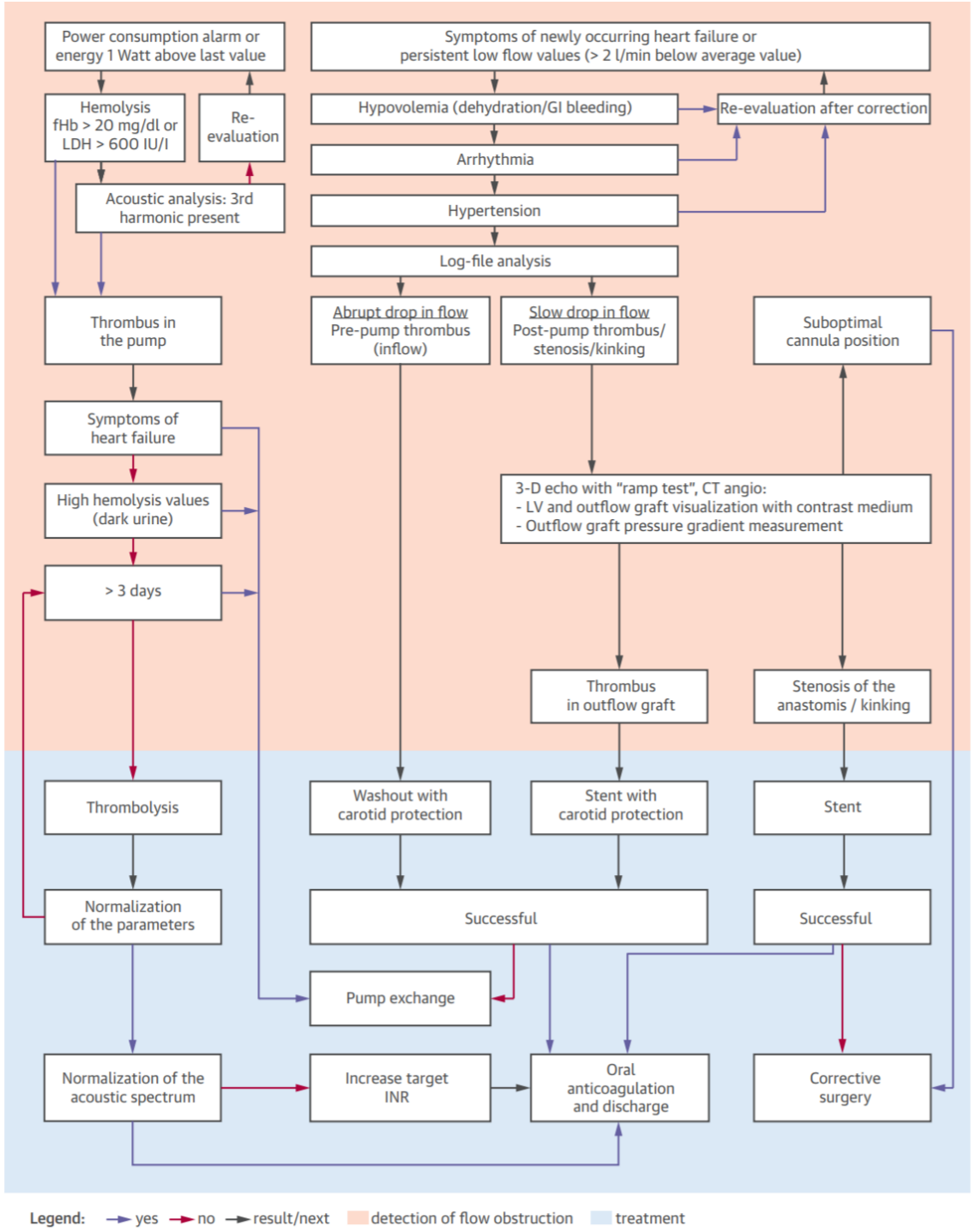
- Our case highlights the importance of a thorough, imaging-based diagnostic approach in the evaluation of LVAD patients presenting with worsening HF symptoms

- This includes echocardiography, computed tomography and angiography

- Workup begins with analysis of hemolysis parameters (LDH, haptoglobin)
- TTE and TEE have been the traditional modalities used in assessment of LVADs in terms of structural and hemodynamic parameters
- Further verification of tract abnormalities/stenosis is warranted using CT
- Angiography can further confirm the diagnosis

- Increasing frequency LVADs are used for destination therapy in high-risk surgical patients
- Endovascular approach **may be a safer alternative**
- **More long-term data will be needed** to compare the safety and efficacy of surgical versus percutaneous approaches

Intervention	Study
Atrium iCAST stent	Retzer et al 2015
14mm x 4cm Opta-Pro balloon angioplasty balloon	Cheng et al 2014
9x59mm Atrium stent + second overlapping stent deployed and post-dilated	Abraham et al 2014
20 x 55 mm WallStent self-expanding stent + post-dilation w/a Z-Med balloon.	Sabbagh et al 2016
Thrombus dilation w/2 mm balloon Armada 14 XT; Abbot); Gore Excluder contralateral leg endoprosthesis 16 x 11.5 mm; subsequent 14x40 mm PTA balloon angioplasty	Hubbert et al 2017
10 x 37mm balloon expandable stent	Pham et al 2015
Off-label use of Gore-Excluder iliac limb stent graft	Ganapathi et al 2013
10 mm stent was placed into the stenotic segment	Gultkein et al 2017
Dilatation and stenting using a bare metal stent (Omnilink, 10 x 39 mm)	Pieri et al 2017
Balloon-expandable stent (36x12 mm Covident Intrastent LD stent)	Carr et al 2017
10 x 38 mm covered stent successfully deployed and post-dilated	Ahmad et al 2016
Aortic stent (Atrium, Advanta V12 12 x 61 mm covered stent)	Hanke et al 2017



- Treatment algorithm proposed by Scandroglio et al in 2016
- "Diagnosis and Treatment Algorithm for Blood Flow Obstructions in Patients with Left Ventricular Assist Device"

Scandroglio et al Diagnosis and Treatment Algorithm for Blood Flow Obstructions in Patients with LVAD. *JACC.* 2016

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