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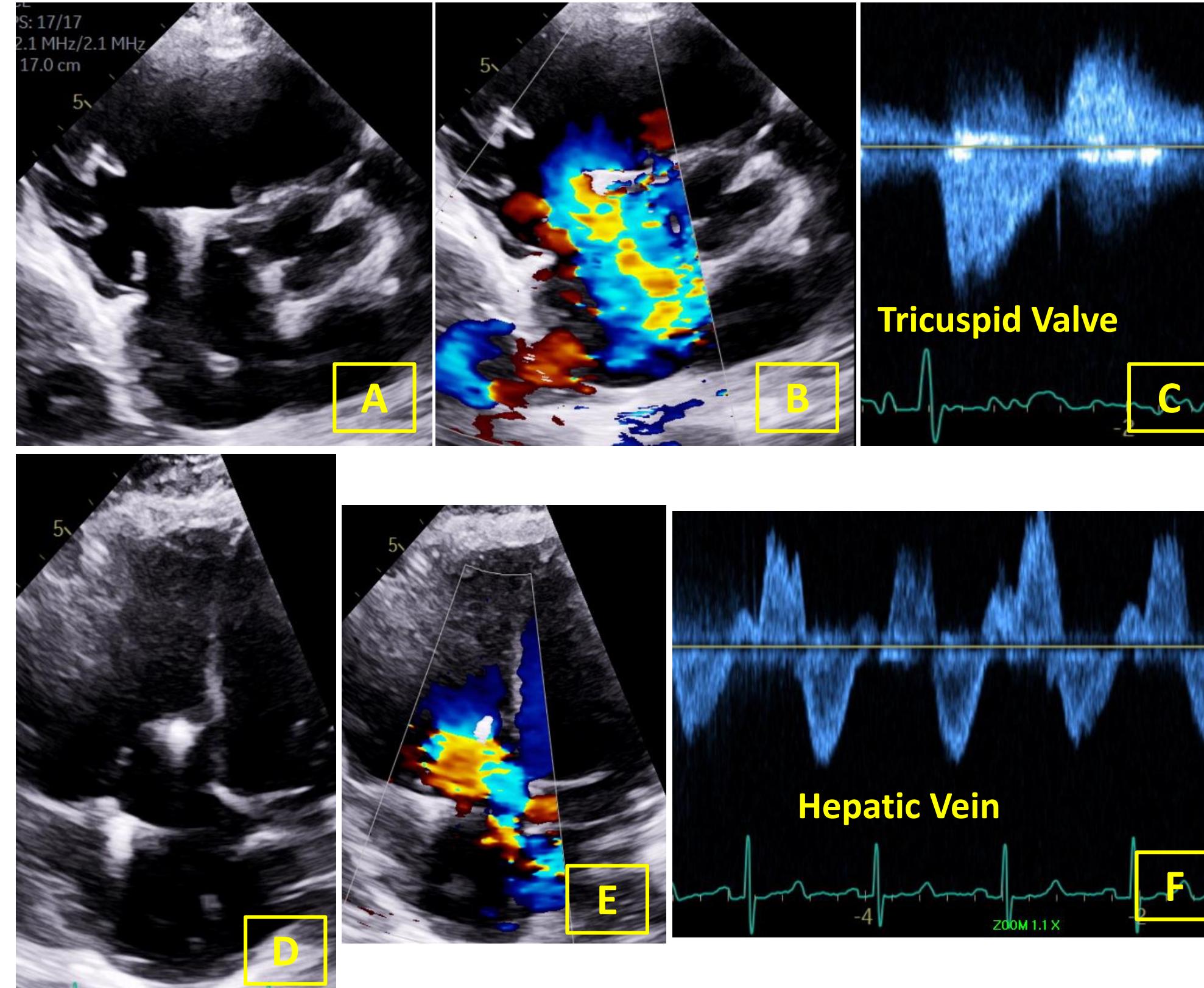
## BACKGROUND

- High-dose radiation therapy to the chest can cause a variety of cardiovascular (CV) complications, including coronary artery disease (CAD), cardiomyopathy, and arrhythmias.
- The optimal management strategy for radiation-induced heart disease is not known, particularly when different CV complications co-exist.

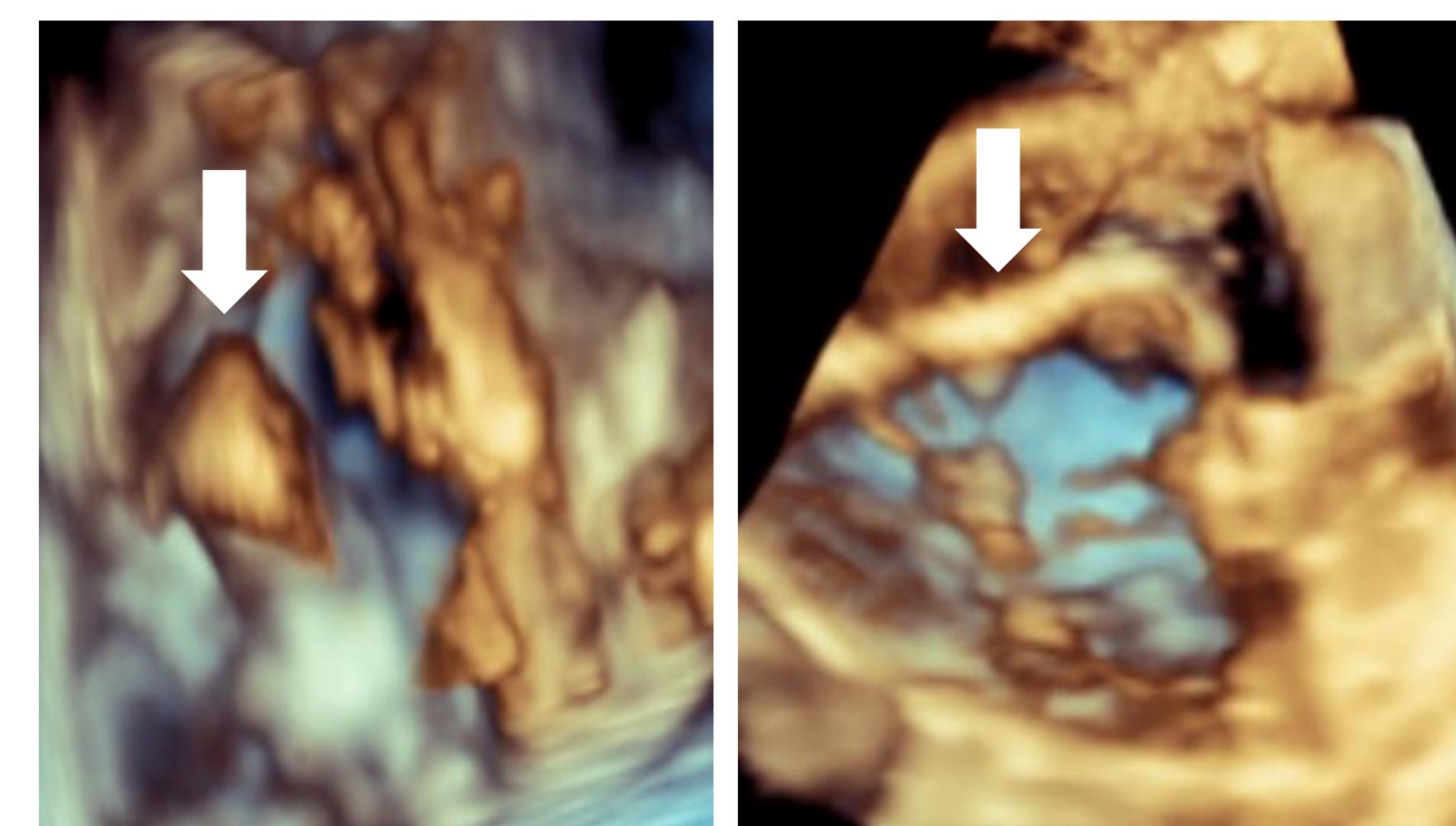
## CASE – A 50-YEAR-OLD WOMAN

Diagnosis	Non-Hodgkin lymphoma of the chest diagnosed in 1988 with recurrence in left lung in 1990
Cancer Treatment	<ul style="list-style-type: none"> <li>Mantle radiation to the chest</li> <li>Anthracycline-containing chemotherapy</li> <li>Splenectomy</li> <li>Left lung surgery</li> </ul>
CV Complications & Interventions	<p><b>2009</b></p> <ul style="list-style-type: none"> <li>Syncope concerning for cardiac arrhythmia</li> <li>Extensive CAD requiring coronary artery bypass grafting (CABG)</li> <li>Severe bilateral carotid artery disease requiring bilateral endarterectomy</li> <li>Placement of an automatic implantable cardioverter defibrillator (AICD) for secondary prevention</li> </ul> <p><b>2014</b></p> <ul style="list-style-type: none"> <li>Multiple AICD shocks for ventricular fibrillation (VF)</li> <li>Intolerant to amiodarone and sotalol</li> <li>Coronary artery bypass grafts were patent.</li> </ul> <p><b>2016, 2018, and 2019</b></p> <ul style="list-style-type: none"> <li>Recurrent VF with AICD shocks</li> </ul> <p><b>2014 – Present</b></p> <ul style="list-style-type: none"> <li>Worsening tricuspid valve regurgitation due to septal leaflet impingement by AICD lead</li> <li>Symptomatic right heart failure in 2019</li> </ul>

## TRICUSPID VALVE MALCOAPTION



**A-C:** 2D echo short axis view demonstrating device lead impinging on the tricuspid valve (TV) septal leaflet, resulting in severe tricuspid regurgitation. **D-F:** Four-chamber view also showing TV septal leaflet impingement by device lead resulting in severe tricuspid regurgitation.



A 3D zoomed image of the TV showing device lead (white arrow) impinging on the TV septal leaflet.

## CLINICAL DECISION MAKING

### RECURRENT VF:

- Recurrent VF was presumed to be due to radiation-induced myocardial fibrosis after a cardiac PET scan revealed no evidence of inflammation (e.g., sarcoidosis).
- Thoracoscopic cardiac sympathectomy and radiofrequency ablation were both felt to have a low likelihood of arrhythmia elimination.
- Patient agreed to be re-challenged with amiodarone, which she has tolerated well to date.

### SEVERE TV REGURGITATION:

- Given the evidence of mild RV dilation, mild systolic dysfunction, and symptomatic right heart failure, the patient was evaluated by our heart valve team.
- Medical and surgical challenges included the following:
  - History of radiation to the chest and prior sternotomy (CABG and left lung surgery)
  - Not a candidate for endovascular or laser AICD lead extraction
  - High suspicion for requiring TV repair or replacement
  - Not a candidate for subcutaneous AICD placement due to risk for advanced conduction disease and need for pacemaker in the future

**MULTIDISCIPLINARY TEAM DECISION:** Surgical approach via right thoracotomy and TV replacement with 29-mm Hancock bioprosthetic valve. SVC was scarred down with both pacing wires.

- AICD lead was positioned inferiorly and pinned between the sewing cuff of the TV and the tricuspid annulus.

## CONCLUSION

- Radiation-induced CV complications are varied (severe carotid and coronary artery disease, cardiac arrhythmias, valvular heart disease, and cardiomyopathy) and may present many decades after initial cancer treatment.
- A multidisciplinary approach is essential for the management of these complex patients.