

Strut through the heart: acute pericarditis and hemopericardium from an embolized IVC filter strut

Ellen Liu, MD, Laurie Bossory Goike, MD, Obiora Egbuche, MD, MPH, Alexander Meyer, MD, Asvin Ganapathi, MD

Background

- Inferior vena cava (IVC) filters are used for prevention of pulmonary embolism when anticoagulation is contraindicated or ineffective.
- Use of retrievable IVC filters has increased significantly, yet the retrieval rate remains low.
- Longer dwell time is associated with increased adverse events, including migration of filters and fractured parts which, although rare, can lead to potentially life-threatening cardiovascular complications.

Case Presentation

- 71 year old male with a history of Factor V Leiden mutation, deep vein thrombosis on Warfarin status post IVC filter placement presented to his local emergency department due to ongoing chest pain.
- HS-troponin was 1036.2 pg/mL which downtrended. INR was 2.2. Initial electrocardiogram (ECG) revealed sinus bradycardia without any ST segment changes.
- Computed tomography (CT) angiography of the chest was negative for acute pulmonary embolism. A linear density was noted in the right ventricle (Figure 1).



Figure 1: CT angiogram of the chest showing a density (arrow) within the right ventricle

Case Presentation

- Transthoracic echocardiogram revealed a normal ejection fraction and trivial pericardial effusion.
- Coronary angiography revealed normal coronary arteries.
- Fluoroscopic images demonstrated a linear density associated with the right ventricle and the presence of an IVC filter with 11 struts.
- On arrival to the Ohio State University Wexner Medical Center, a repeat ECG (Figure 2) revealed diffuse ST elevation consistent with pericarditis. HS-troponin remained stable at 772 pg/mL.
- Repeat echocardiogram (Figure 3) showed an enlarging pericardial effusion with a linear echo density within the pericardial space adjacent to the right atrium and ventricle, concerning for strut migration from within the ventricle into the pericardial space.

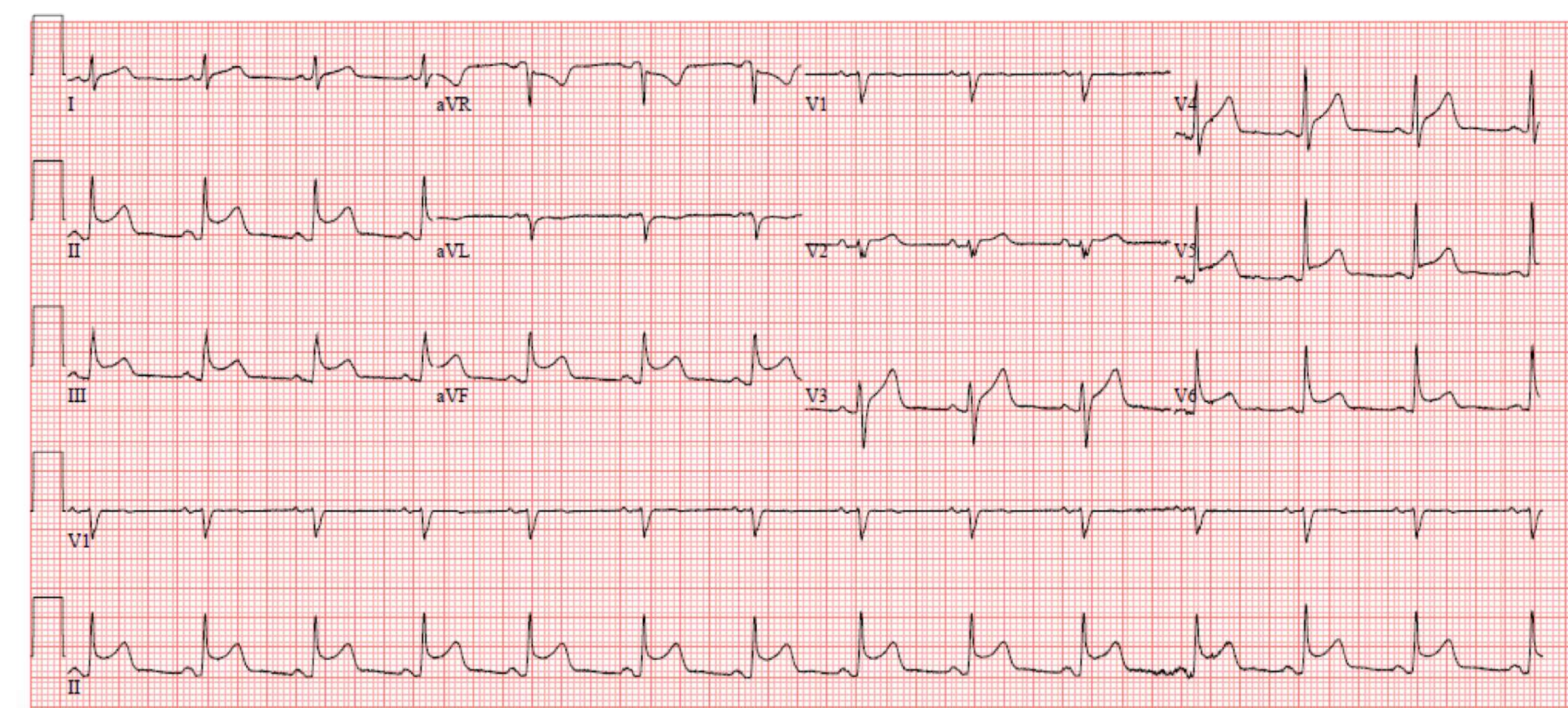


Figure 2: Electrocardiogram on admission showing diffuse ST segment elevation



Figure 3: Subcostal view on bedside echocardiogram showing a linear density (arrow) adjacent to the right atrium and ventricle with a moderate to large pericardial effusion (asterisk)

Case Presentation

- The patient was brought urgently to the operating room where bloody pericardial fluid was evacuated and an IVC filter strut was removed from the inferior wall of the right ventricle (Figure 4).
- A subsequent CT of the abdomen revealed an infrarenal IVC filter with eleven legs, multiple extending outside the IVC lumen. Decision was made to forego retrieval due to the high risk nature of the procedure.

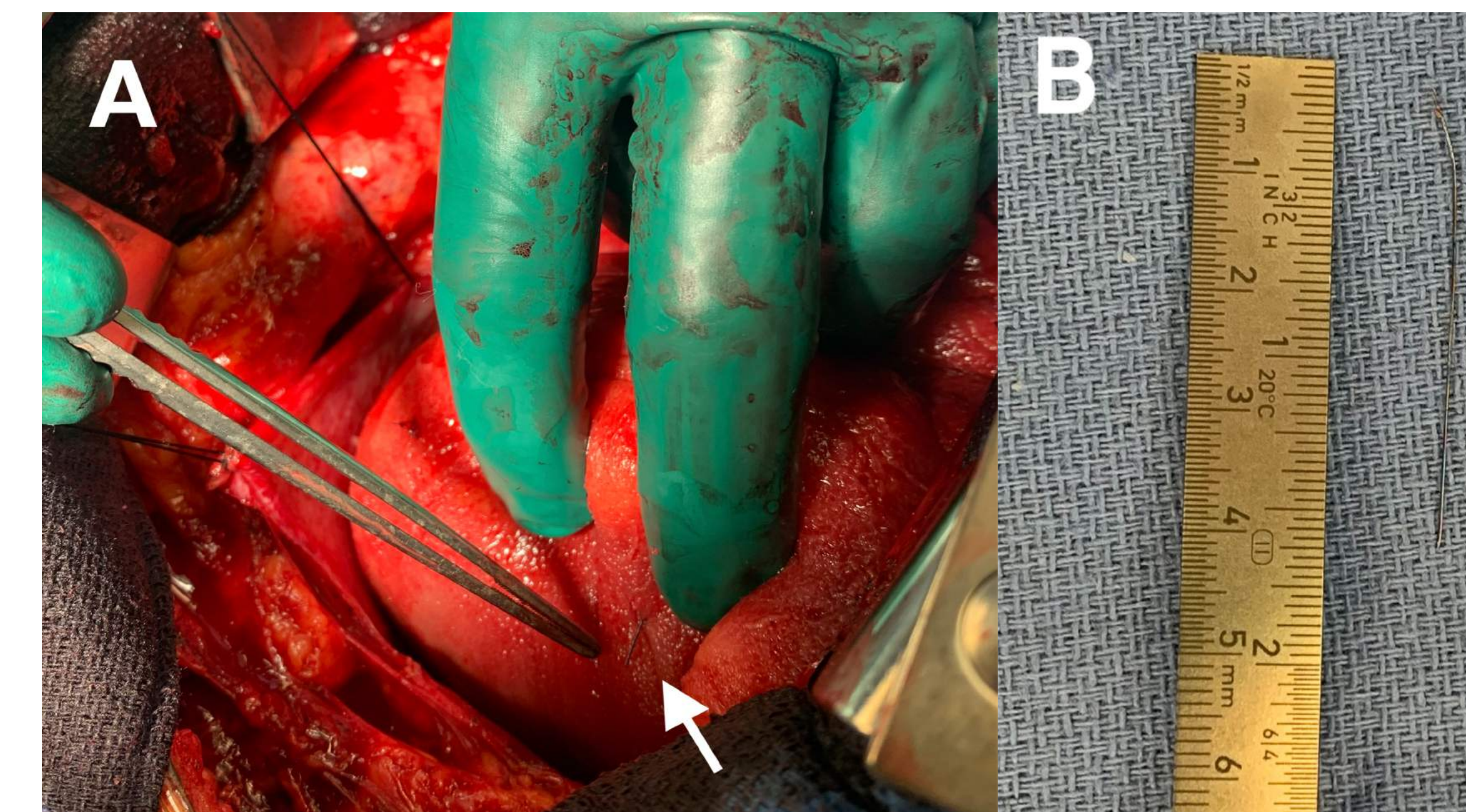


Figure 4: Intra-operative view of the IVC filter strut within the myocardium (A, white arrow) and following retrieval (B)

Discussion

- This case reiterates the importance of filter retrieval and the risks associated with increased dwell time.
- Use of IVC filters has increased exponentially over the past few decades. Estimated placement rates range from 12% to 17% of all patients with venous thromboembolism.
- Prompt removal of IVC filters is recommended by the Food and Drug Administration, although the reported retrieval rates are suboptimal.
- Embolized fractured parts are the second most commonly reported adverse event to the FDA.

Discussion

- Filter or strut migration into the heart can lead to complications including pericarditis, ventricular arrhythmias and tamponade and requires surgical or endovascular retrieval, although surveillance of embolized struts has also been reported.
- This case also demonstrates the importance of monitoring for progression of embolized parts. The patient had an unremarkable ECG on presentation and initial echocardiogram revealed only a trivial effusion. The development of acute pericarditis and enlarging effusion was consistent with strut migration from within the ventricle into the pericardial space. Due to anticoagulation use and potential for hemopericardium and tamponade, prompt retrieval of the strut and drainage of pericardial fluid was necessary.

Conclusions

- Although the overall incidence of filter fracture and embolization is low, the potential of complications warrants careful selection of patients and timely removal of IVC filters when its use is no longer indicated.
- A migrated IVC filter or fractured strut should be on the differential for a patient with a history of IVC filter placement who presents with an acute cardiovascular event.

References

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