



Background

- Central venous catheters (CVCs) account for over 90% of catheter-related bloodstream infections
- Fibrin sheaths occurring in 63% of temporary and permanent hemodialysis (HD) catheters
- Catheter related right atrial thrombi (CRAT) are a known but rare complication

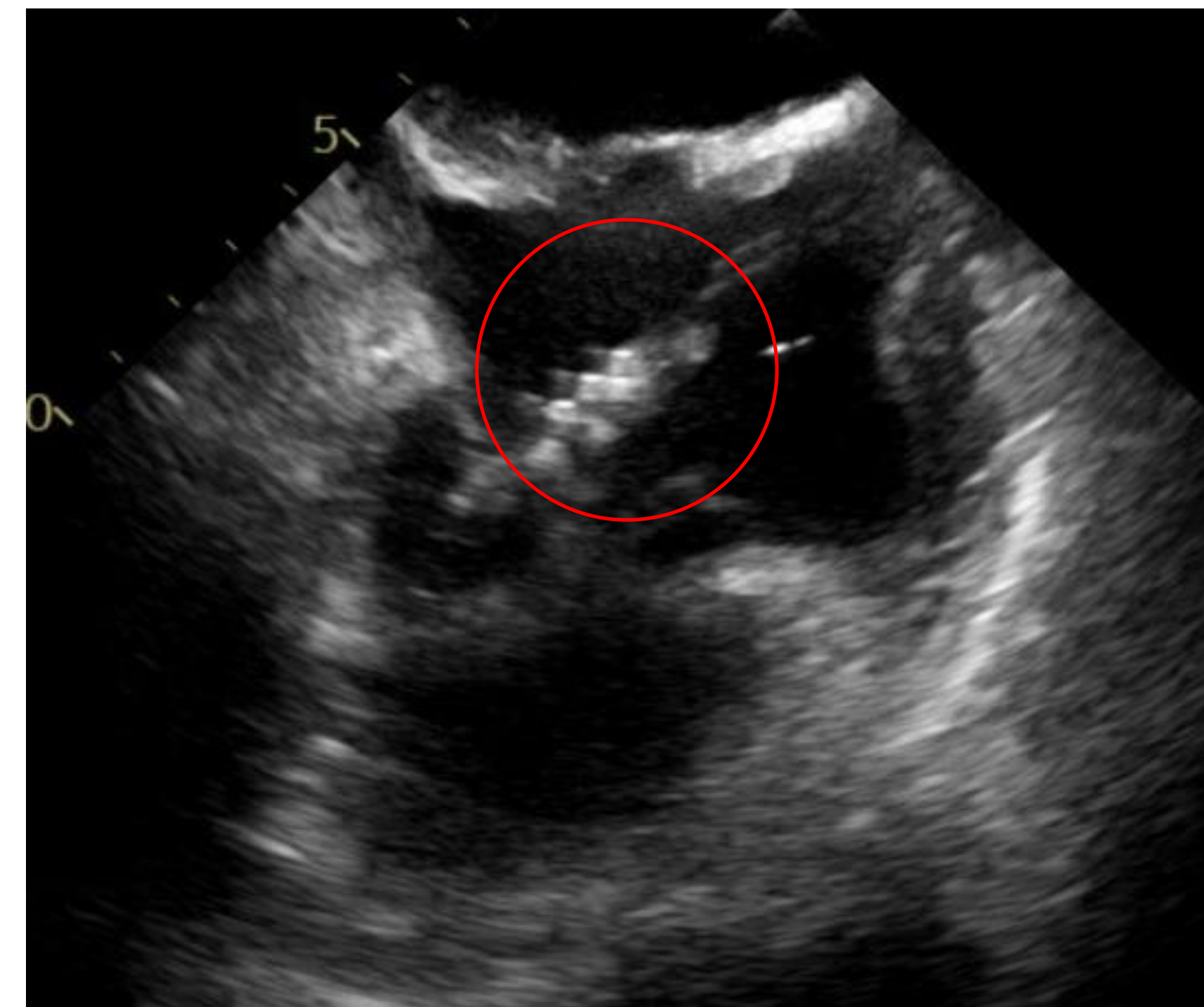
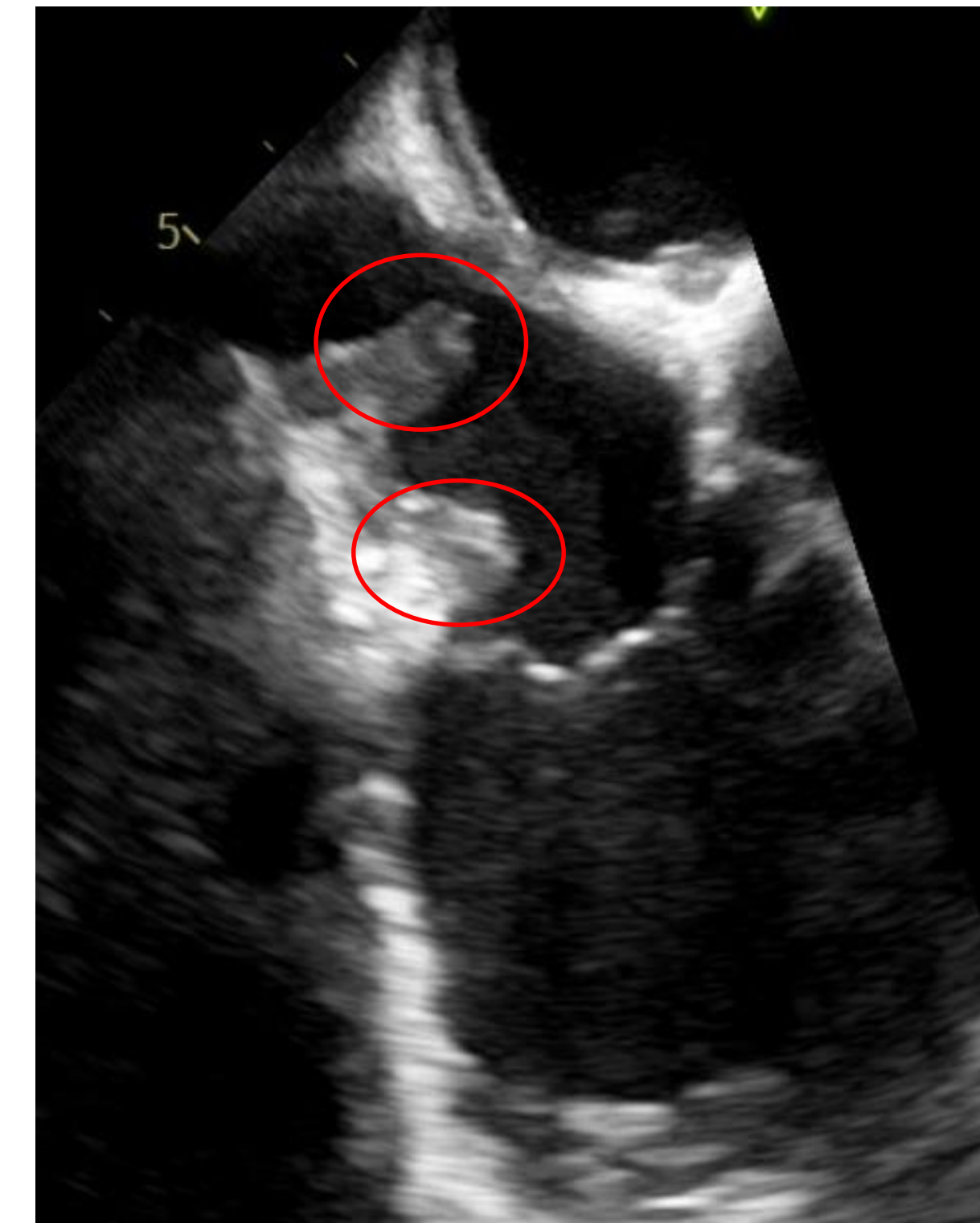
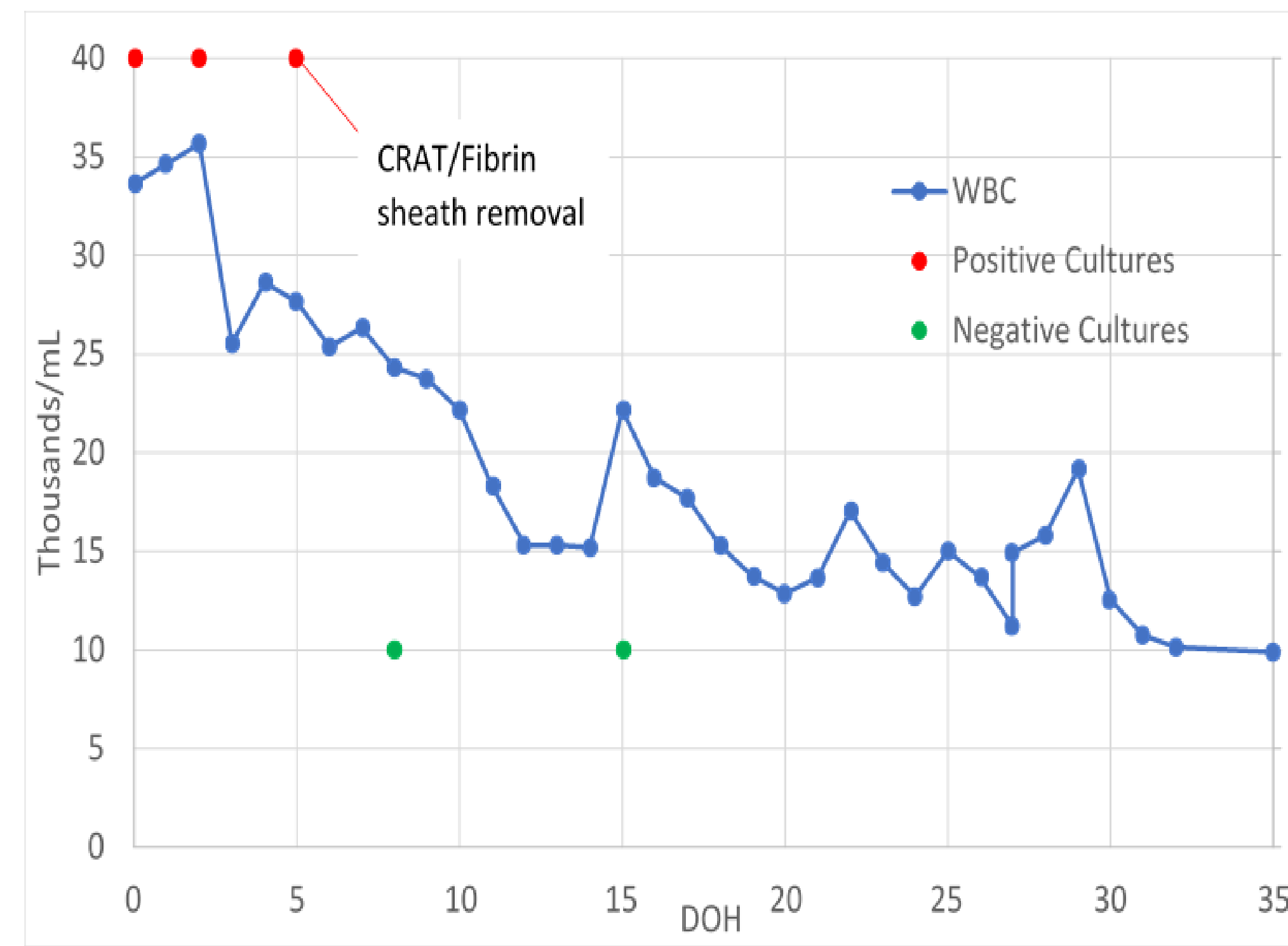
Case Presentation

A 37-year-old male with a PMH of ESRD on HD, hypertension, and non-ischemic cardiomyopathy was admitted with sepsis from MSSA bacteremia. Pan CT revealed bilateral pulmonary septic emboli. The HD catheter was replaced and a TEE was performed.

On TEE, a fibrin sheath was found distal to the 1-day-old temporary catheter tip in the right atrium with associated vegetations vs thrombi concerning for CRAT. This was identified as the source of septic emboli and bacteremia. A multidisciplinary team of Medicine, Cardiology, Infectious Disease, Interventional Radiology and Cardiothoracic surgery discussed the case and planned intervention. Using a FlowTriever device, IR performed extirpation of fibrin sheath via suction thrombectomy, under TEE guidance from Cardiology. Ultimately, the bacteremia cleared 5 days after removal of the fibrin sheath.

Despite source control, fevers continued intermittently with protracted leukocytosis secondary to complications of septic emboli: pulmonary embolism (PE), loculated pleural effusion, left lower lobe pneumonia. Fever and leukocytosis resolved after PE was treated with heparin and continued antibiotics. The pleural effusion failed to resolve after multiple chest tubes and required decortication via VATS

Due to these severe complications, the patient had a prolonged hospital course of 40 days. After completing almost 6 weeks of antibiotics, he was transitioned to AV access for HD and discharged in stable condition.



Top Left: Trend of leukocytosis over hospital stay with overlay of blood cultures and intervention

Bottom Left: Fibrin sheath abutting tricuspid valve with separate temporary HD catheter seen in the upper atria

Top Right: Two echogenic structures suggestive of vegetation seen in right atria after extirpation of fibrin sheath

Bottom Right: Large loculated left sided pleural effusion as a complication to septic emboli

Discussion

- Incidence of catheter related infection is significantly higher when a fibrin sheath is present (84% vs 21%)
- CRAT is known but rare, thus, there are no current guidelines or algorithms for CRAT management.
- Multiple techniques exist to manage fibrin sheaths of which balloon disruption and stripping are most used. Choice of technique is often operator dependent or patient benefit dependent.
- Catheter associated fibrin sheaths are often asymptomatic and when symptomatic, present with catheter dysfunction.
- Instead of signs of malfunction, this patient presented with sepsis due to fibrin sheath acting as a nidus of infection leading to formation of an atrial thrombus which led to septic emboli.
- Timely diagnosis and aggressive management of CRAT is important to prevent protracted medical course and complications.
- According to the CDC, *S. Epidermidis* is the most frequently isolated organism in these infections but the presence of MSSA in this case may indicate an exogenous insertion site infection as the nascence.

Conclusion

- Aggressive sepsis treatments and workup should be initiated without any delay.
- Identifying CRAT in patients with sepsis and HD catheter should be done in an urgent manner using TEE.
- For CRAT management, extraction is the most important for source control. Balloon disruption would not be recommended since this will not remove the thrombus.
- With the increase of intravascular devices, more studies need to be conducted to determine best practices for fibrin sheath and CRAT management. In 2021, FDA approved Inari FlowTriever device for management of right atrial clots.

References

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