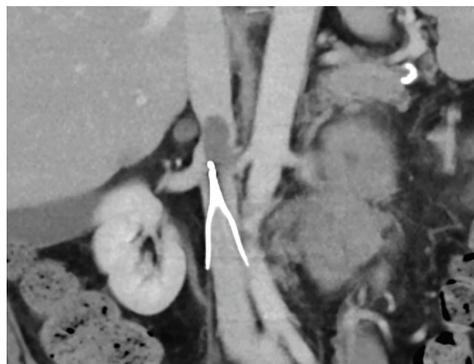


Cath Lab Digest

A product, news & clinical update for the cardiac catheterization laboratory specialist



CASE REPORT

Imaging and Technical Skills Applied to the Complex Management of a Thrombosed IVC Filter

Vinit Amin, MD

Inferior vena cava (IVC) filter placement is indicated for an expanding list of clinical situations to prevent pulmonary embolism (PE), including prophylactically for those with a high risk for venous thromboembolism (VTE) who have undergone a surgical procedure.¹ Once placed, optional or temporary IVC filters often become permanent² and are at the same time associated with myriad complications, both thrombotic and mechanical. Filter thrombosis has been shown to be the most common delayed complication from IVC filter placement.³

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Matthew Menard, MD, Co-Director of the Endovascular Surgery Program at Brigham and Women's Hospital; Associate Professor of Surgery, Harvard Medical School;



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Imaging and Technical Skills Applied to the Complex Management of a Thrombosed IVC Filter

Vinit Amin, MD

IVC filter extraction is a well-established procedure¹ that increases with complexity and risk in the presence of IVC thrombosis.⁴ If the filter is not successfully retrieved, other mechanical complications may occur such as filter angulation, fracture, migration or perforation, or the filter may become embedded in the IVC wall. It is important to be familiar with advanced retrieval techniques and tools to perform lifesaving, image-guided interventions. The case described herein illustrates the coordinated use of novel devices to provide embolic protection against pulmonary embolism while extracting a thrombosed filter.

Case Presentation

A 48-year-old female presented to the emergency

department with fatigue and abdominal pain. Her hemoglobin was 6 g/dL and a computed tomography (CT) scan confirmed a recurrent gastrointestinal stromal tumor (GIST) with hemorrhage. A large thrombus was seen attached to the apex of an IVC filter (Figure 1A) which had been placed after a gastrointestinal resection surgery 2 years prior (Figure 1A). Due to embolization concerns, a complex intervention to retrieve the IVC filter safely and extirpate the residual IVC thrombus was undertaken. Given the bleeding risk, the patient did not receive anticoagulation.

The patient was positioned supine, and her right neck and bilateral inguinal regions were prepped. A focused ultrasound of the right neck was performed demonstrating that the right internal jugular (IJ)

vein was patent and free of thrombus. Under direct sonographic visualization, the vessel was accessed with a micropuncture kit. An .035-inch guidewire was advanced into the IVC and the micropuncture sheath was exchanged for a 6 French (F) vascular sheath. A multi-side port infusion catheter was advanced and an inferior venacavogram showed a large filling defect corresponding to the prior CT finding (Figure 1B).

The 6F sheath was exchanged for an Intri24 sheath (Inari Medical) (Figure 2A), which was advanced over the wire into the IVC and positioned above the level of the filter.

A focused ultrasound of the right inguinal region demonstrated that the right common femoral vein (CFV) was patent and free of thrombus. Under direct sonographic visualization, the right CFV was then accessed with a micropuncture kit, and an .035-inch wire was advanced centrally into the IVC. The micropuncture sheath was exchanged for a 12F vascular sheath that was advanced into the IVC with a radiopaque tip placed just above the IVC filter. An Inari FlowTrievers catheter containing 3 self-expanding nitinol mesh discs (Figure 2B) was advanced through the sheath and the 2 most cephalad discs were deployed in the IVC above the level of the existing right IJ vein sheath tip, to provide embolic protection during filter retrieval (Figure 1C).

An Inari Trierer24 aspiration catheter was advanced through the right IJ vein sheath to the level of the thrombus. Aspiration thrombectomy was performed with multiple aspirations. Acute thrombus formation was noted within the catheter. The benefit of giving heparin outweighed the bleeding risk and 3000 units were administered intravenously. After multiple attempts of aspiration thrombectomy, a repeat venogram was performed, demonstrating limited removal of the large thrombus. The removed thrombus demonstrated an organized, chronic component and was presumably adhered to the IVC wall.

After thrombus aspiration, a 12F sheath was advanced through the existing 24F Intri sheath with the distal tip advanced to the level of the filter. A 15 mm EN Snare System (Merit Medical) and 6F catheter were inserted through the introducer. After multiple unsuccessful attempts to engage the filter hook, a guidewire was advanced centrally through the sheath to help redirect the snare and catheter. Subsequently, the snare was used to successfully engage the filter hook. The 12F sheath was advanced over the filter and the snare and filter removed as a single unit. The IVC filter was closely inspected, confirming that the IVC filter was intact and had been removed in its entirety. A large piece of chronic thrombus was aspirated through the sheath at the time of filter retrieval and no significant thrombus remained in the filter (Figure 1D).

A repeat inferior venacavogram demonstrated a residual large filling defect, further confirming

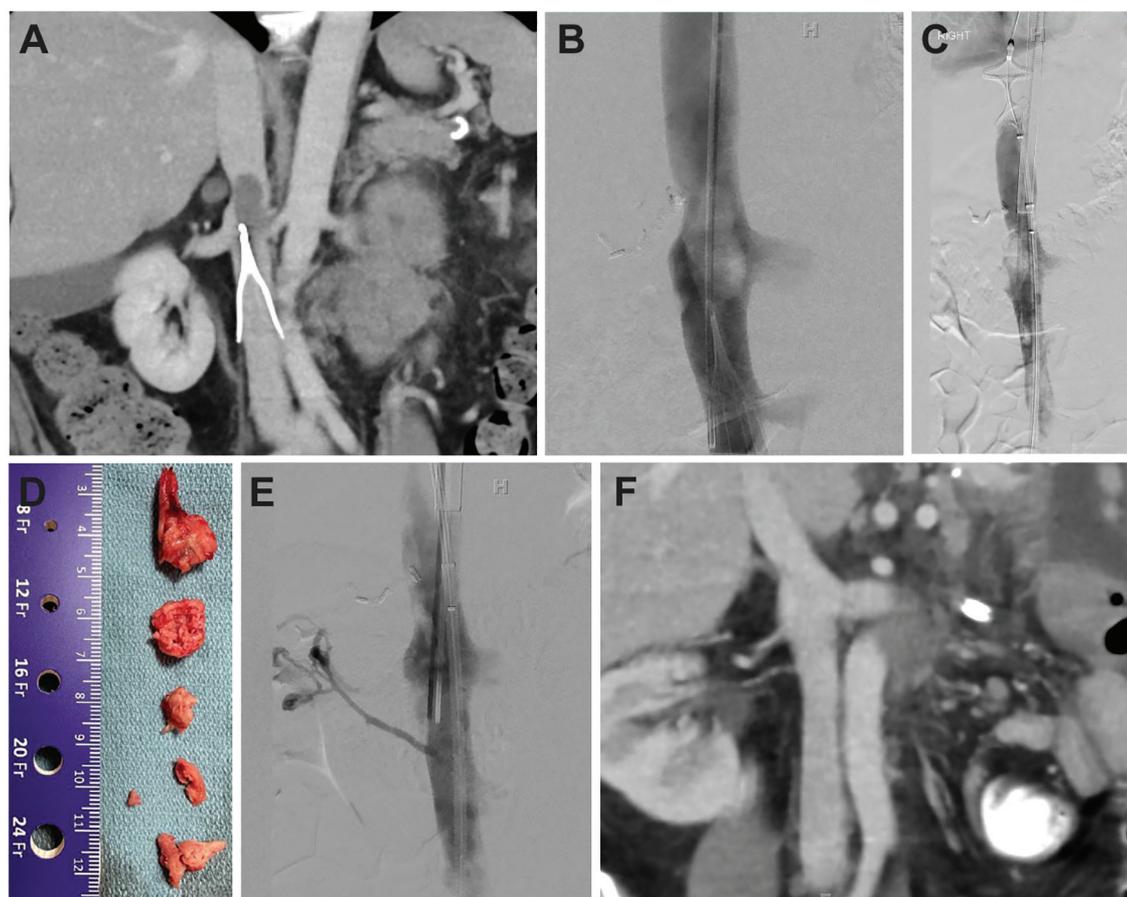


Figure 1A-F. Preprocedure computed tomography (CT) scan in coronal view demonstrates thrombus at the apex of the inferior vena cava (IVC) filter (A). Inferior venacavogram confirms a large filling defect (B). A FlowTrievers catheter (Inari Medical) deployed in the IVC above the level of the existing right internal jugular vein sheath for embolic protection (C). Large pieces of highly chronic thrombus were extracted (D). Final inferior venacavogram shows complete resolution (E). Postprocedure CT scan in coronal view confirms thrombus clearance (F).

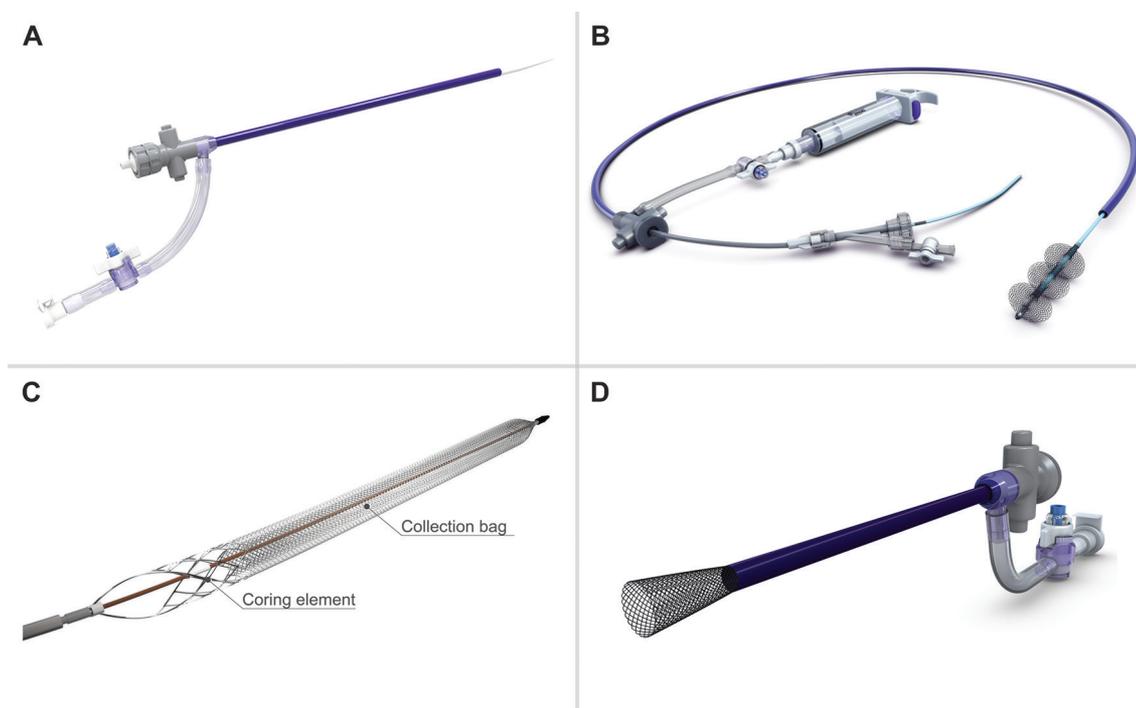


Figure 2A-D. The Intriti24 introducer sheath (Inari Medical) is advanced over an .035-inch guidewire. It is comprised of an atraumatic tip dilator with a proximal locking hub and a hydrophilic-coated shaft that reduces friction upon insertion. Once inserted, a radiopaque marker band assists in targeting and positioning the device, in this case, above the level of the filter (A). The FlowTrievers System (Inari Medical) is shown, which includes a catheter with 3 nitinol discs that can be expanded into the vessel for embolic protection during filter retrieval (B). The ClotTrievers System (Inari Medical) is comprised of a sheath with an integrated funnel (C) and a catheter with an atraumatic coring element and collection bag (D). Once positioned beyond the thrombus and deployed, it expands into the vessel and is then retracted, capturing and removing thrombus. Images courtesy Inari Medical.

Inferior vena cava (IVC) filter extraction is a well-established procedure¹ that increases with complexity and risk in the presence of IVC thrombosis.⁴ If the filter is not successfully retrieved, other mechanical complications may occur such as filter angulation, fracture, migration or perforation, or the filter may become embedded in the IVC wall.

that the chronic thrombus and scarring was associated with the caval wall.

Subsequently, the Inari ClotTrievers System (Figure 2C-D) was advanced through the 24F Intriti sheath, placed distal to the thrombus, and the nitinol coring element was expanded. With a single pass, additional chronic thrombus was successfully

removed. A final inferior venacavogram demonstrated successful thrombus resolution (Figure 1E).

All wires and catheters were removed. The right CFV and IJ vein sheaths were removed, and hemostasis was achieved with manual compression and purse string suture, respectively. The patient was transferred to the postanesthesia care unit without postprocedure complications. A follow-up CT performed 2 weeks later confirmed thrombus clearance (Figure 1F).

Conclusion

This case highlights how thoughtful planning and combinatorial use of a suite of venous interventional products can allow for the safe treatment of patients with complex interventional needs. ■

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Vinit Amin, MD

Vascular and Interventional Radiologist,
Abbott Northwestern Hospital
Minneapolis, Minnesota



Dr. Vinit Amin can be contacted at vinitamin@gmail.com

Selected Meetings Calendar

Miami Valves

February 2-4, 2023
Loews Coral Gables Hotel, Miami, FL
miamivalves.org

Western AFib Meeting

February 24-25, 2023
Sheraton Park City, Park City, UT
theafibmeeting.com

Cardiovascular Research Technologies (CRT)

February 25-28, 2023
Omni Shoreham Hotel, Washington, DC
crtmeeting.org

The American College of Cardiology With the World Heart Federation (ACC.23/WCC)

March 4-6, 2023
New Orleans, LA
accscientificsession.acc.org

Charing Cross Symposium (CX) 2023

April 25-27, 2023
Hilton London Metropole, London, U.K.
cxsymposium.com

CRF's 28th Annual Interventional Cardiology Fellows Course

May 10-13, 2023
Caribe Royale Orlando, Orlando, FL
fellows2023.crfconnect.com/register

EuroPCR

May 16-19, 2023 • Paris, France
pcronline.com/Courses/EuroPCR

Society for Cardiovascular Angiography and Interventions (SCAI) 2023 Scientific Sessions

May 18-20, 2023 • Phoenix, AZ
scai.org/scai-2023-scientific-sessions

New CardioVascular Horizons (NCVH)

May 30-June 2, 2023 • New Orleans, LA
ncvh.org/ncvh-2023

Leipzig Interventional Course (LINC) 2023

June 6-9, 2023 • Leipzig, Germany
leipzig-interventional-course.com