



Case Report

# Retrograde Insertion of Inferior Vena Cava (IVC) Filter: A Bailout Plan

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## Abstract

Venous thromboembolism poses a significant threat to patient health and remains a leading cause of preventable morbidity and mortality. To mitigate the risk of pulmonary embolism resulting from deep vein thrombosis, the insertion of an Inferior Vena Cava (IVC) filter has become a critical intervention. While several approaches are available for IVC filter placement, the internal jugular approach has gained recognition for its unique advantages. This case study provides a comprehensive examination of an 85-year-old female patient who underwent IVC filter insertion through the internal jugular approach with an indication of extensive bilateral iliac venous thrombosis, secondary to femoral vein dialysis catheter. By exploring the clinical experience and outcomes associated with this specific technique, we aim to elucidate the benefits, considerations and potential implications for future practice. Through an in-depth analysis of this case, interventional radiologists, clinicians and healthcare professionals involved in venous thromboembolism management can gain valuable insights into the safety, efficacy and patient-centered outcomes of the internal jugular approach for IVC filter insertion.

**Keywords:** Inferior Vena Cava Filter; Deep Vein Thrombosis; DVT; Internal Jugular Approach

## Introduction

85-year-old female patient with history of nephrectomy for renal cell carcinoma with extensive bilateral iliac venous thrombosis, secondary to femoral vein dialysis catheter. Anticoagulation was contraindicated due to an upper gastrointestinal bleed. A retrievable inferior vena cava filter, Option Elite from Argon was deployed via right jugular vein as the femoral vein access was contraindicated due to bilateral iliac thrombosis.

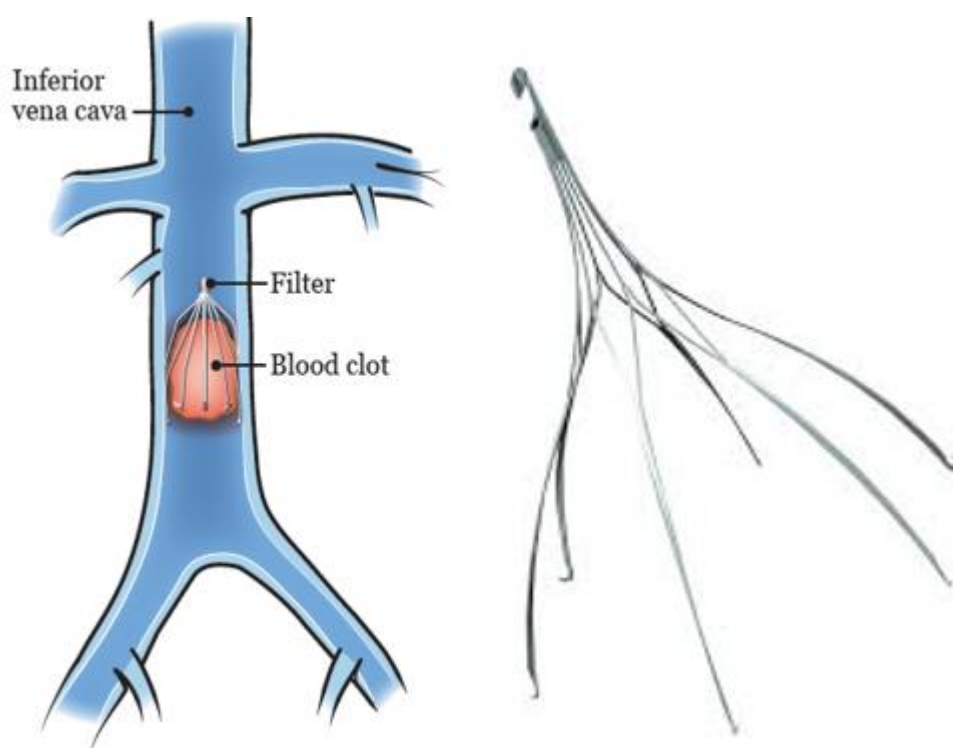
## Material and Methods

An 85-year-old lady was admitted at our facility after presenting with persistent bilateral lower limb swelling, groin swelling, difficulty in breathing on mild exertion with associated chest tightness, wheezing and orthopnea. The patient also reported dizziness, palpitations and passage of dark stools. The patient's past medical history is significant for systemic hypertension, diabetes mellitus, hypothyroidism and a history of renal cell carcinoma (sarcomatoid type). The patient had undergone nephrectomy in 2005, with recurrence in 2013. Evaluation during the recurrence revealed a ureteric stump and bladder tumor, which were treated with laser vaporization of the ureteric stump tumor and transurethral removal of the bladder tumor. During evaluation at time of admission, worsening renal function was noted as follows: urea 14.3 serum creatinine 545.42 mol/l, sodium 132mmol/l, potassium 4.8mmol/l and chloride 104mmol/l. A hemogram done showed normocytic normochromic anemia as follows: Hb 8.2g/dl, MCV 91.2%, MCHC 31.4%, Hematocrit 26.1%, RBC 2.84 x 10<sup>12</sup>/l, WBC 5.62x 10<sup>9</sup>/l, polys 65.7%, lymphocyte 23.0%, mono 8.7%, Platelet count 276. Other lab investigations done include a stool for occult blood which tested positive, an INR which was at 1.15 and LFTs which were normal.

An impression of fluid overload following end stage renal disease and upper GI bleeding was made. Nephrology consult yielded the need for urgent hemodialysis. A femoral hemodialysis catheter was inserted and patient started on regular hemodialysis. An OGD was also done which confirmed upper GI bleeding. However, the bilateral lower limb swelling was noted to be persisted despite several hemodialysis sessions.

A bilateral lower extremity venous doppler was then done which showed echogenic thrombi in the bilateral common iliac, external iliac and femoral veins. The thrombi were non-occlusive but the common iliac are occlusive. There are two right proximal femoral cyst were also visualized on the right femoral vein. Calf veins (the popliteal, paired peroneal and posterior tibial calf veins) were patent bilaterally.

Following diagnosis of VTE, there was need for prompt management of the thrombi. This posed a challenge seeing as though the patient had upper GI bleeding which was a contraindication to anticoagulation. In this context, the decision to insert an Inferior Vena Cava (IVC) filter emerged as a critical choice (Fig. 1).



**Figure 1:** The IVC filter with blood clot.

The IVC filter, OptionELITE vena cava filter was implanted under conscious sedation and aseptic technique. The right internal jugular vein was accessed via the Seldinger technique after infiltration of lignocaine. A 6Fr sheath was inserted, the renal veins were identified and position marked on the screen. The orientation of the device was confirmed to ensure correct deployment. The delivery device catheter was positioned over a standard 0.35 J tip wire. The device was deployed below the two renal veins at Lumbar L2 -L3 interspace. The position was confirmed with a venogram hand injection. The patient was transferred to the higher dependency unit for observation.

The IVC filter was considered an appropriate intervention due to its ability to mitigate the risk of life-threatening pulmonary embolism while circumventing the contraindication to anticoagulation therapy associated with the patient's upper gastrointestinal bleeding. Furthermore, it was imperative to choose the internal jugular approach for IVC filter placement, considering the patient's existing femoral catheter for hemodialysis and the associated risk factors.

## Results

In this clinical scenario, the decision to deploy a retrievable Inferior Vena Cava (IVC) filter, specifically the OptionElite (Argon Medical Devices, Plano, TX), through the right jugular vein, represents a meticulously tailored and patient-centric intervention (Fig. 2).



**Figure 2:** Inferior vena cava in the right jugular vein.

The patient's presentation with upper GI bleeding, bilateral iliac DVT and a concurrent contraindication to femoral vein access posed a daunting challenge in terms of Venous Thromboembolism (VTE) management. However, this chosen approach offered a strategic solution for effective VTE management in this unique context. The utilization of a retrievable filter not only addressed the immediate thrombotic risk but also allowed for future removal, aligning with the patient's evolving clinical needs. The selection of the right jugular vein as the access site was deliberate, as it not only minimized potential interference with an existing femoral catheter but also ensured precise and safe filter placement. This case underscores the critical importance of personalized interventions and adaptive strategies in navigating complex medical histories. By doing so, it optimizes VTE management, even when standard therapeutic options are contraindicated, ultimately contributing to improved patient outcomes and enhanced quality of care.

## Discussion

The insertion of an Inferior Vena Cava (IVC) filter is a valuable technique in interventional cardiology. It offers a safe alternative to anticoagulation in patients with contraindications. Placement of an IVC filter begins with proper selection of a suitable filter depending on patient needs. The filters can either be permanent or retrievable [1]. A suitable access point is selected next. The filters can either be placed through the internal jugular vein or the femoral vein. Due to its straight path into the IVC, the IJV is preferred in some instances [2,3]. Commonly, the right IJV will be the access point of choice. However, the left IJV is sometimes preferred as in cases where the right IJV has already been used for central venous catheter insertion [3]. It is important to note that there is a lack of comprehensive studies comparing the rates of complications related to IVCF insertion between the right and left IJV approaches. A previous study conducted by Sulek, et al., albeit focused on central venous catheter insertion revealed that the right IJV approach is safer as the left IJV is often associated with several complications including higher frequency of venous perforation and longer procedural times due to the anatomical angulations related to the innominate vein [4]. When considering IVCF insertion via the left IJV, clinicians should be particularly mindful of the angulation of the sheath during the procedure. The increased angulation in the left IJV approach compared to the right IJV may pose challenges that require careful navigation to ensure the safe and effective deployment of the IVCF [5]. It is therefore important that the procedure is done gently and with caution avoiding the application of excessive force when resistance is encountered and the risk for complication associated with the procedure is minimized. In addition to this, continuous fluoroscopic monitoring is essential during the movement and passage of the IVCF through the sheath to avoid complications such as penetration of the struts. Also, early detection through of complications through fluoroscopy ensure timely intervention. The internal jugular approach offers several advantages in comparison to other access sites. Firstly, it provides a more direct route to the IVC hence lower rates of angulation which facilitates precise deployment of the IVCF [1,6]. This is particularly beneficial in instances where anatomical variations offer challenges in placement. Secondly, the internal jugular approach avoids potential complications associated with the femoral

access site, such as hematoma formation and infection [6]. Studies that compare the difference in efficacy between the femoral vein and the IJV as access points are limited. Whilst some studies have shown no statistically significant differences in crucial factors such as filter tilt, filter tip abutment or penetration to the IVC wall between the various access sites, others have reported significant differences with regards to complications such as angulation [7]. The variability in access sites allows for patient-centered decision-making, taking into account factors such as anatomical considerations and prior catheterization history, without compromising the precise deployment and function of the IVCF. In our context, the results underscore the robustness and reliability of IVCF placement through the internal jugular. Multidisciplinary evaluation (and possibly consideration for palliation) should take place before the decision to insert a vena cava filter in severe oncologic cases depending on overall status [8]. The rates of symptomatic pulmonary embolism and filter-related complications were low after OptionELITE IVC filter placement [9].

## Conclusion

The internal jugular approach for the insertion of an IVC filter is a valuable technique that offers several advantages in specific clinical scenarios. It offers a lower rate of angulation and lower rate of access site complication as compared to other access sites. With proper training and careful patient selection, the internal jugular approach can effectively prevent pulmonary embolism and improve patient outcomes. However, further research and clinical experience will continue to refine our understanding of IVCF placement techniques and optimize patient outcomes.

## Conflict of Interest

The authors have no conflict of interest to declare.

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