# Inferior Vena Cava Filter Placement in Patients with Venous Thromboembolism without Contraindication to Anticoagulation

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*The "Things We Do for No Reason" (TWDFNR) series reviews practices that have become common parts of hospital care but may provide little value to our patients. Practices reviewed in the TWDFNR series do not represent "black and white" conclusions or clinical practice standards but are meant as a starting place for research and active discussions among hospitalists and patients. We invite you to be part of that discussion.*

Anticoagulation is the cornerstone of acute venous thromboembolism (VTE) management. Nonetheless, the use of inferior vena cava (IVC) filters in addition to anticoagulation is increasing, with wide variation in practice patterns and a growing recognition of filter-related complications. Rigorous randomized controlled data demonstrating that IVC filters, particularly the increasingly commonly placed retrievable filters, provide a mortality benefit are sparse. Given our review of IVC filter use and the lack of evidence demonstrating that IVC filters provide a mortality benefit, we recommend using anticoagulation alone for stable medical service patients admitted with acute VTE. In nuanced cases, hospitalists should engage in multidisciplinary care to develop individualized treatment options.

## CASE PRESENTATION

A 65-year-old woman with a history of diabetes mellitus, metastatic breast cancer, and peptic ulcer disease presents to the Emergency Department for the evaluation of right thigh swelling, chest pain, and dyspnea after a transcontinental flight. Physical examination is notable for a pulse of 114 beats per minute, blood pressure of 136/93 mm Hg, respiratory rate of 14 breaths per minute, oxygen saturation of 95% on room air, and swelling of the right thigh. Computerized tomography imaging demonstrates multiple bilateral pulmonary emboli. Emergency department physicians begin anticoagulation and inform you that they have ordered the placement of a retrievable inferior vena cava (IVC) filter.

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## BACKGROUND

Acute venous thromboembolism (VTE) accounts for more than 500,000 hospitalizations in the United States each year.[1] Although the management of VTE centers around anticoagulation, the concurrent use of IVC filters has increased over the past several decades.[2] Several observational studies have attempted to quantify IVC filter usage and have shown that overall filter placement has increased at an impressive rate. Within two decades, the number of patients undergoing IVC filter placement has increased nearly 25 times from 2,000 in 1979 to 49,000 in 1999.[2] Recent Medicare data show that claims for IVC filter placement procedures have increased from 30,756 in 1999 to 65,041 in 2008.[3] IVC filter placement rates are higher in the US than in other developed countries; one review projected that in 2012, the IVC filter placement rate in a given population in the US is 25 times higher than that in a similar population in Europe.[4]

The guidelines for IVC filter usage are largely based on expert opinion, and solid data regarding this intervention are lacking. This combination is problematic, especially because the practice is becoming commonplace, and filter-related complications are increasingly recognized. Additionally, the appropriateness of filter use varies among providers, as evidenced by a retrospective study in which three VTE experts reviewed medical records to determine the appropriateness of filter placement. They unanimously agreed that filter use was appropriate in 51% of the cases, unanimously agreed that filter use was inappropriate in 26% of the cases, and lacked consensus on the appropriateness of filter use in 23% of the cases.[5] The striking lack of consensus among experts underscores the wide range of opinion regarding the appropriateness of IVC filter placement on a case-by-case basis. Moreover, evidence suggests that physician adherence to guidelines for appropriate IVC filter use is suboptimal. One single-center study showed that only 43.5% of filters placed by interventional radiology practitioners met the guidelines established by the American College of Chest Physicians (ACCP), with a slightly increased percentage of filter placement meeting guidelines if the requesting provider is an IM-trained physician.[6]

## WHY YOU MIGHT THINK IVC FILTER PLACEMENT IS HELPFUL IN PATIENTS WITH VTE WITHOUT CONTRAINDICATION TO ANTICOAGULATION

In theory, the concept of IVC filters makes intuitive sense—filters block the ascent of any thrombus from the lower extremities to prevent the feared complication of a pulmonary

embolism (PE). Unfortunately, rigorous data are limited, and consensus guidelines vary between different specialty organizations, further obfuscating the role of IVC filter placement in the management of VTE. For example, the ACCP recommends against the use of IVC filters in most patients with VTE receiving anticoagulation and does not list any prophylactic indications.[7,8] Meanwhile, the Society of Interventional Radiology lists prophylactic indications for IVC filter placement in certain patient populations, such patients with a risk of VTE and a high risk of bleeding, and notes numerous relative indications for IVC filter placement.[8] Notably, these differences in expert opinion likely influence practice patterns, as evidenced by the increase in IVC filter placement for relative indications.[9,10]

## WHY IVC FILTERS PLACEMENT IN PATIENTS WITH VTE WHO CAN BE ANTICOAGULATED IS NOT HELPFUL

The Prevention du Risque d'Embolie Pulmonaire par Interruption Cave (PRECIP) trial is the most robust study supporting the 2016 ACCP recommendation against IVC filter use in patients that can receive anticoagulation.[7,11] This study randomized 400 patients with deep vein thrombosis (DVT) at high risk for PE to anticoagulation with or without permanent filter placement to address VTE and mortality rates associated with IVC filter placement. The trial showed that the VTE burden shifts in the presence of IVC filters. At 2-year follow-up, the group with IVC filters had nonsignificantly fewer PEs than the control group and an increased incidence of DVT. Mortality rates did not differ between groups.[11] At eight-year follow-up this shift in VTE burden is again seen given that the number of PEs in patients who received IVC filters decreased and the incidence of DVTs increased. Again, mortality did not differ between groups.[12] A subsequent study randomized 399 patients with DVT and acute symptomatic PE with at least one additional marker of severity to anticoagulation with or without retrievable IVC filter placement and showed no difference in recurrent PE or mortality at 3 or 6 months.[13] These results argue against placing retrievable filters in patients receiving anticoagulation.

The identification of associated adverse events further favor the judicious use of IVC filters. A retrospective review of the long-term complications of IVC filters based on imaging data showed a 14% fracture rate, 13% IVC thrombosis rate, and a 48% perforation rate.[14] Multiple studies have shown that the associated complication rates of retrievable filters are higher than those of permanent filters; such an association is concerning given that retrievable filter usage exceeds permanent filter usage.[14,15] The increase in retrievable filter usage is likely attributable to their attractive risk-benefit calculation. In theory, retrievable IVC filters should be perfect for patients who have conditions that increase VTE risk but create temporary contraindications, such as trauma or major surgery, to anticoagulation. However, anticoagulation is preferred over IVC filters in the long term because the complication rates of IVC filters increase with dwell time.[16] Given the reports of adverse events and concern that IVC filters are not appropriately removed, the Food and Drug Administration recommends removing retrievable IVC filters once the risk of filters outweighs the benefits, which appears to be 29-54 days after implantation.[17] However, successful retrieval rates are low, both because of the low rates of removal attempts and because of the interference of complications, such as embedded or thrombosed filters, with removal.[10,18] As an example, in a retrospective review of all patients who received an IVC filter at an academic medical center over the period of 2003-2011, nearly 25% of patients were discharged on anticoagulation after IVC filter placement.[10] This suggests that their contraindication to anticoagulation and need for IVC placement have passed by the time of discharge. Nevertheless, clinicians attempted filter retrieval in only 9.6% of these patients, representing a significant missed opportunity of treatment with anticoagulation rather than IVC filters.[10]

Factors such as filter plan documentation, hematology involvement, patient age ≤70 years, and establishment of dedicated IVC filter clinics are correlated with improved rates of filter removal; these correlations emphasize the importance of a clear follow-up plan in the timely removal of these devices.[18,19]

## WHEN MIGHT IT BE HELPFUL TO PLACE IVC FILTERS IN PATIENTS WITH NO CONTRAINDICATION TO ANTICOAGULATION?

IVC filter placement is inappropriate in the vast majority of patients with VTE who can be anticoagulated. However the ACCP does acknowledge that a small subset of patients – specifically, those with severe or massive PE – may fall outside this guideline.[7] Clinicians fear that these patients have low cardiopulmonary reserve and may experience hemodynamic collapse and death with another "hit" from a recurrent PE. This recommendation is consistent with the evidence that in unstable patients with PE, IVC filter placement is associated with decreased in-hospital mortality.[20] Data remain limited for this situation, and the decision to place an IVC filter in anticoagulated but unstable patients is an individualized one.

## WHAT YOU SHOULD DO INSTEAD: REFRAIN FROM IVC FILTER PLACEMENT AND TREAT WITH SYSTEMIC ANTICOAGULATION

In stable patients admitted to the medical service with VTE and who can be anticoagulated, there is little evidence that placement of an IVC filter will improve short- or long-term mortality. Hospitalists should anticoagulate these patients with a vitamin-K antagonist, heparin product, or novel oral anticoagulants.

## RECOMMENDATIONS

- Anticoagulate hemodynamically stable patients who are admitted to the medical service with VTE and who do not have a contraindication to anticoagulation. Do not place a permanent or retrievable IVC filter.
- IVC filter placement may benefit unstable patients who may experience hemodynamic collapse with an increased PE burden. IVC filter placement should be discussed with a multidisciplinary team.
- When discharging a patient with an IVC filter, hospitalists should improve retrieval rates by scheduling subsequent re-

moval. The discharge summary should contain information about the IVC filter, as well as clear instructions regarding the plan for removal. The instructions should include radiology follow-up information and the designation of responsible physicians in case of questions.

## CONCLUSION

Although IVC filter use is increasing, the evidence does not support their use in hemodynamically stable patients who can be anticoagulated. The patient described in the initial case has no contraindication to systemic anticoagulation. Therefore, she should be started on anticoagulation, and an IVC filter should not be placed.

*Do you think this is a low-value practice? Is this truly a "Thing We Do for No Reason?" Share what you do in your practice and join in the conversation online by retweeting it on Twitter (#TWDFNR) and liking it on Facebook. We invite you to propose ideas for other "Things We Do for No Reason" topics by emailingTWDFNR@hospitalmedicine.org.*

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