

# How Have Your Protocols for IVC Filter Placement, Monitoring, and Retrieval Changed in the Past Several Years?



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Before retrievable filters, patient management was straightforward. The question of retrieval never came up. The implanting physician placed the filter and handed the patient back to the primary service for follow-up care, and that was good medicine. With retrievable filters, indications have softened, and many filters are not needed long term. Expecting the primary care service to make a timely referral for filter retrieval is a mistake, and patients will be lost to follow-up. Furthermore, retrievable filters can have significant downstream complications, including fracture, embolization, migration, and vena cava penetration, most of which can be avoided by judicious filter use and timely removal.

My filter practice has become more conservative over the past 10 years. I've seen many retrievable filters placed with good intentions that were never retrieved, and some of these have resulted in serious, even life-threatening, complications. Because of this, I am slower to place a filter and much more likely to follow the patient closely after implantation. That's also good medicine.

When I get ready to implant a filter, I decide whether the filter will be "definitely permanent," "definitely temporary," or "uncertain" at the time of implantation. If the filter falls into the "definitely permanent" category, I place a filter that I have long-term confidence in and sign off on the patient's care. If the filter is not definitely permanent, I add the patient's name to our filter registry for continued clinical follow-up. My advance practice nurse calls the patient and the referring service at specified intervals for clinical updates. She usually starts 4 weeks after implantation and calls every 1 to 2 weeks thereafter. We communicate frequently, and she makes notations in the registry about the patient's clinical status, antithrombotic meds, and ambulatory state. When the patient's risk of venous thromboembolism is back to baseline, the filter is removed. In some cases, the patient's clinical status declines, and the filter is left in permanently. The filter decision is discussed with the patient and the managing service and recorded in the registry.

When I dictate my initial report for filter placement, I indicate that the filter can be used as a temporary or permanent device. If the filter is expected to be retrieved, then I add that to the dictation and state that my service will follow the patient for filter management. In some cases, I will schedule an office visit to determine at a later date what to do with the filter and the patient. The combination of scheduled office visits and a patient registry have improved my retrieval rates significantly. Patient follow-up is extremely important. The best way I've found to do this is creating a comprehensive registry.

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We have tried to tighten up our IVC filter protocols over the past few years. However, we have found that if we decline to place a filter, we find that some other service will place it. Clinicians find a way to get what they want, even though the indications are weak by playing one service off of the other.

The vascular service line at the hospital, which includes interventional radiology, vascular surgery, and cardiology, has just formed a cross-service committee that will come up with recommendations for filter placement and review the indications for filters placed. The same committee has recently implemented a cross-discipline follow-up program, which identifies all patients who have had a retrievable filter placed and sends out letters informing and reminding them that they have a retrievable filter. The letter informs them who to contact for more information and to schedule a retrieval. The letter campaign only started 1 month ago, so its effectiveness in getting patients back is not yet known. Hopefully, these measures will improve our compliance with placement recommendations and improve our retrieval rates.

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Since the introduction of retrievable inferior vena cava filters (IVC), I have been aggressive about removing them whenever feasible. Initially, this was due to the published 8-year results of the PREPIC (Prévention du Risque d'Embolie Pulmonaire par Interruption Cave) trial. This study suggested that patients with IVC filters had a higher incidence of recurrent deep vein thrombosis (DVT) than patients who were not randomized to IVC filter placement and were only anticoagulated. This study suggested that the presence of an IVC filter somehow increased the risk of recurrent DVT. Therefore, in order to realize this supposed benefit, any retrievable filter would need to be removed.

Currently, I am even more aggressive about removing retrievable IVC filters but for a different reason. Recently, the FDA issued a medical device alert notice recommending that clinicians consider removing retrievable filters when protection from PE is no longer needed. The reason behind this alert is the increased fracture rate associated with retrievable—especially nitinol—IVC filters.

In the clinic, we keep a frequently updated list of all patients in whom we have placed a retrievable filter. At the time of filter placement, I generally schedule these patients for a return visit to my clinic in 3 months to be evaluated for retrieval of the filter if clinically appropriate. If the filter cannot be removed, and depending on the type of filter that was placed, I will reschedule them for another return to the clinic in 3 to 6 months to re-evaluate for retrieval.

In patients whose retrievable filters cannot be removed, I have gone to yearly abdominal films to assess the integrity of the IVC filter. Any filter that is found to be fractured is then removed. I have found the IVC Filter Module of the American Venous Forum's American Venous Registry useful in that email "retrieval reminders" can be sent to the implanting physician automatically in any patient who has been entered into the registry program.

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Over the last several years, I have witnessed an increased number of complications related to IVC filters. Therefore, I have limited my practice of implanting these devices, which are often indicated and do save lives. Complications I most often see are occlusions of filters that are placed in patients with traumatic injuries. The most common complication that I treat is IVC filter thrombosis with massive leg swelling.

I have also witnessed an increased number of fractured filters in the IVC. Based on these findings, I have studied the dynamics of the vena cava and the significant changes in size that can occur based on both volume status and the respiratory cycle. I am currently not convinced that any of the filters that have been commercially available took these forces into account when designed. Thus, I have limited my implantation

of filters to patients with a DVT who cannot tolerate anticoagulation, patients with limited cardiopulmonary reserve with a large DVT, and, finally, patients who have suffered a large PE.

When implanting a filter when I believe that the risk of DVT/PE is limited, I will choose an optional filter for retrieving. I like to use filters that do allow some time to remove the filter (in about a 3- to 4-month period). For patients in whom I have placed these filters, I have followed them closely and removed the filters.

Hopefully, in the near future, better device designs will improve the outcomes compared to currently available devices and allow for patients at risk of PE to receive one of these life-saving devices while limiting their complication rate.

The Crux IVC filter (Crux Biomedical, Menlo Park, CA), which was just recently cleared by the FDA, was designed to overcome the current challenges of IVC filters. This is a filter that was designed in combination with Eric Johnson, Tom Fogarty, and myself.

It has a unique design that allows for bidirectional placement and removal. Furthermore, it is designed to withstand the hemodynamics of the vena cava, which include significant volume changes as well as respiratory dynamics that we have studied. The clinical trial results of this filter were recently presented at SIR.



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Our protocol for optional filter follow-up was established around 2003 and has changed slightly over time. When each filter is placed, we make an assessment whether the indication for the filter is for a permanent or time-limited increased risk of PE. If the risk is temporary, the patient is entered into a database maintained by our PA. Patients are scheduled for a follow-up appointment in the interventional radiology clinic with him for 1 month after placement in order to make an assessment of continuing need for the filter. If the clinic appointment is not feasible, then our PA will call the patient at 1 month. If the patient's risk has changed and a permanent filter is indicated, we now ask the patient to return in 1 year for a follow-up appointment and an

abdominal film. For patients whose risk of PE remains time limited, a plan is established at the first follow-up for eventual filter retrieval. This will vary for each patient and may take weeks to months to reach.

When the patient is no longer at increased risk of PE, a final clinic visit is required during which medication history, VTE history, and the potential to return to a state of high risk for PE are determined. In addition, we will obtain anteroposterior and lateral abdominal plain x-rays in all patients, and perform lower extremity venous ultrasound in patients who did not have VTE at the time of filter placement. When patients are therapeutically anticoagulated, we do not interrupt oral anticoagulants or bridge to heparin to remove the filter. Similarly, if patients are subtherapeutic on warfarin, we will delay filter retrieval until they have been therapeutic for at least 2 weeks.

When patients are referred from outside of the system for retrieval, we will see them first in clinic to review their history, symptoms, exam, and imaging.

The single most important element in this follow-up system is a dedicated and readily accessible individual—in our case, our PA, Andrew Johnson. He interfaces with patients, referring physicians, and all of the relevant clinical services by both coordinating follow-up and raising awareness of the differences in management between permanent and optional filters.

Overall, the increased concern over vena cava filters in general and optional devices in particular has led to refinements in our follow-up protocol but no drastic changes. We have seen a slight reduction in overall filter volume, most notably in patients with prophylactic indications.



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For 25 years, we have been inserting filters into patients and comprehensively following them. In our surveillance program, we strive to follow-up with all patients annually with a clinical interview, plain abdominal radiograph, and a Doppler ultrasound exam, all performed by me. After about 10 years, we offer them a follow-up every 2 years, although most prefer to keep coming annually.

I believe the most significant finding of this rather obsessional prospective study is the lack of significant (negative) findings. Specifically, they almost never occlude or migrate, rarely have further VTE, (well, in fact, have exactly the same VTE risk as a matched general population), and have the expected low rate of recurrent PE. As a result, I disagree, in part, with the current national/international recommendations recommending removal after a few months. Most of the patients in whom we implant filters are over 60 years of age, and many are undergoing surgery for malignant disease. This group, who makes up > 80% of our clientele, does not, in my opinion, benefit from filter removal.

In young patients, without ongoing VTE risk, for example trauma victims, this may not hold, and we do offer extraction in these patients. For the rest, we discuss it, but almost none request it. All patients are on a database, and we arrange outpatient follow-up as a routine, including a 6-week review to discuss filter removal.

Despite this, we do tend to try and deploy all filters with the tip away from the caval wall, in case removal is requested. We have developed a simple, quick method to "center" most filters that have deployed against the wall; it adds 2 minutes and about 30 seconds of screening time, with no additional equipment cost to what is usually a quick procedure.

The older filters broke (asymptotically); the newer ones tend not to. A change I have noted recently is a tendency for some of the newer filters to perforate the caval walls, and possibly adjacent organs. This seems to be asymptomatic in the majority, but it is hard to exclude odd aches and pains, particularly in a group who have often had multiple major abdominal surgeries.

We continue to advise against putting patients on anticoagulation just because they have an IVC filter; about one-third of our group are anticoagulated for other ongoing reasons, but most are not, and the two groups have the same outcomes. We have observed this policy for 25 years and will continue with it.

In summary: put them in right, leave them in usually, keep an eye on them, and don't routinely anticoagulate.

Care Unit (SICU) and involve patients presenting to our level one trauma center. Typically, we place retrievable filters at the bedside with the help of intravascular ultrasound (IVUS). If patients are headed to the OR for orthopedic or general surgical procedures, we will place the filters using fluoroscopy and avoid the cost of the IVUS catheter. The most frequent indication for filter placement in this patient population is of course inability to anticoagulate, many due to traumatic brain injury. The course of such an injury is highly variable. Within a few weeks, some patients are ambulatory, while many others are not, even months later and are still at significant risk for DVT and PE.

Our original protocols for getting patients back in for filter retrieval were not very effective. Each surgeon kept a log of implanted filters and tried to contact patients to get them back in. As many trauma patients transition from an inpatient setting to other facilities (neuro rehab, long-term acute care, skilled nursing facilities, etc.) for continued care, our ability to find the patients was not very effective. It was quite difficult for our office personnel to dedicate the time to track down the patients who had not made it back home yet. We partnered last year with the trauma research department to assist in getting patients back in for filter removal. They have an abundant supply of personnel dedicated to performing outcomes research and were already keeping track of the patients after discharge. Utilizing their resources has been the biggest change in our IVC filter practice.

Upon discharge, patients have a scheduled appointment to see us to discuss filter removal. If they are unable to make the appointments, the trauma office keeps track of the patients and frequently contacts them and their caregivers to get them back in when they are physically able to do so. In order to remove the filters, we require that the patients have a recent negative lower extremity duplex ultrasound. In addition, they should be ambulatory. This new protocol has significantly increased our device retrieval rates. ■



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The vast majority of the IVC filter consults in our vascular surgery practice come from our Surgical Intensive

### WEIGH IN ...

Tell us how your IVC filter use has changed over the last several years.

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