Ask the Experts:
What is your practice's current IVC filter retrieval protocol, and in which cases do you deviate from it?

DEEPAK SUDHEENDRA, MD, RPVI
Assistant Professor of Clinical Radiology & Surgery
Hospital of the University of Pennsylvania
Philadelphia, Pennsylvania
He has disclosed that he is a consultant for Teleflex and is on the speaker's bureau for Boston Scientific Corporation.
Dr. Sudheendra may be reached at deepak.sudheendra@uphs.upenn.edu.

Since the introduction of retrievable filters, our division has kept a database of every patient in whom a retrievable filter was placed by the interventional radiology department. Over the years as we started to learn more about the complications of retrievable filters, we became more aggressive in reaching out to patients for filter retrieval. Today, our database has matured to include more detailed information such as the reason for filter placement, type of retrievable filter, and the referring physician to further improve patient follow-up.

A successful inferior vena cava (IVC) filter retrieval program begins with a candid discussion with the patient about the indications for IVC filter placement, the risks and benefits of having a filter, and the type of filter (permanent vs retrievable) that will be inserted. This is also an opportune time to educate and update the referring physician or medical team about this same information and any other important new data about venous thromboembolism and filters.

Upon hospital discharge, patients in whom a retrievable filter was placed are given a 3-month clinic appointment with the interventional radiology attending who placed that filter. During this clinic visit, the patient's clinical history is reviewed, and the indications for either continuing IVC filtration or proceeding with filter removal are discussed. In cases where ongoing anticoagulation is needed or there is concern about recurrent venous thromboembolism, a discussion with the patient's primary physician is initiated to ensure that all parties are in agreement with the clinical plan. If the filter is needed beyond 3 months, the patient is reevaluated at a specified time interval for possible filter retrieval. We continue to reevaluate patients every 3 to 6 months until their filter is removed. Only in cases in which the patient has passed or it is determined that permanent filtration is needed do we deviate from our protocol and discontinue filter surveillance.

MARIE-FRANCE GIROUX, MD
Vascular and Interventional Radiologist
CHUM-Pavillon Notre-Dame
Montréal, Québec, Canada
She has disclosed that she received a research grant from Cordis Corporation.
Dr. Giroux may be reached at marie-france.giroux.chum@ssss.gouv.qc.ca.

In my institution, all filters used are optional/retrievable filters. Therefore, every patient is considered for possible filter retrieval. Nevertheless, only a portion of those filters will actually be retrieved.

We have two dedicated interventional radiology nurses in charge of following all patients who had an IVC filter placed at our institution. They call the patient 3 months after IVC filter placement for follow-up and determine if the IVC filter was retrieved. At the same time, they fax a letter to the treating/referring physician. This letter contains the patient's information, explains to the medical doctor that the patient had an optional IVC filter implanted that can be recuperated if no longer needed, and lists the indications for such a retrieval (eg, no continuing indication of thromboembolic event prophylaxis). In this document, the doctor is asked to communicate with us quickly (the two nurses' contact information is provided) if he intends to leave the IVC filter permanently or if he wishes for it to be retrieved at this time.

If the above actions do not provide results (ie, the patient still has his optional IVC filter in place and we do not hear back from the physician), the letter to the doctor is faxed again 6 months after IVC filter placement. Additionally, a noncontrast abdominal CT is obtained from the patient, read by an interventional radiologist, and the results are sent to the referring physician. The CT findings described will include any observations related to the IVC filter, particularly any concerns about migration, penetration, fracture, or incorporation. In relation to these findings, the interventional radiologist will emit an opinion on the technical feasibility/difficulty of IVC filter retrieval as well as on its desirability (eg, a fractured filter will usually lead to filter retrieval recommendation).

Again, at 9 months after placement of the IVC filter, if no steps were taken to retrieve the filter, a final letter is faxed to the treating/referring physician, with no further follow-up on our part if the patient's physician does not contact our interventional radiology department.

All of the information concerning IVC filter installations, retrievals, and refusals of retrieval is consigned in an Excel file. This file also permits documentation of discussions with the patient and the referring physician if necessary.

We usually do not deviate from this protocol unless the patient dies during follow-up, the patient needed a permanent filter at placement (as decided by the referring physician), the patient and/or referring doctor could not be reached by any reasonable means, or the patient refuses follow-up. Of course, if a complication arises (eg, IVC filter thrombosis), the protocol will usually need to be adapted, with more aggressive follow-up from the interventional radiologist (eg, seeing the patient in the clinic or the ward) and more direct communication between the patient, the referring physician, and the interventional radiologist.

MATTHEW S. JOHNSON, MD, FSIR
Professor of Radiology and Surgery
Indiana University School of Medicine
Director, Interventional Oncology
Indiana University Health
Indianapolis, Indiana

He has disclosed that he is a paid consultant for BTG International, Boston Scientific Corporation, CeloNova BioSciences, and Cook Medical.
Dr. Johnson may be reached at matjohns@iupui.edu.

This is a very good and timely question, as we hope to enroll our first patient in the PRESERVE registry in the next few weeks. As you know, PRESERVE will evaluate the safety and efficacy of many of the filters used in the United States: All filters except for the Bird's Nest (Cook Medical), Celect (Cook Medical), and Greenfield (Boston Scientific Corporation) will be included in PRESERVE.

Our practice's methodology reflects the protocol for PRESERVE: We attempt to determine the long-term plan for protection against pulmonary embolus (PE) at the time of filter placement. That entails discussion with the patient, his or her family, and the referring service, but also includes determination of the health care professional who will be responsible for making the decision regarding appropriate time for removal of the filter. Identification of the decision maker and discussion with him or her is key to appropriate patient care; without it, filters may be left in place when they are no longer needed. Based on that discussion, we schedule the retrieval procedure to occur at what appears to be the most appropriate time. We call the patient and/or the decision maker 1 or 2 weeks prior to that date to ascertain whether the plan is still appropriate, and we modify it if necessary. For example, if a filter were placed for PE prophylaxis before a high-risk operation, we would schedule the retrieval procedure to take place after that operation. If the operation were delayed, the recovery period is longer than expected, or the risk of PE unexpectedly remains at the time of the follow-up call, we would delay or cancel retrieval.

Determinations such as these will be requested of physicians enrolling subjects in PRESERVE: Why is the filter being placed? How long does it need to stay in place? Or, is it placed with the expectation that it will remain forever? We will follow patients for 2 years if the filter remains in place, or for 1 month after filter retrieval, whichever comes first. Hopefully, PRESERVE will help define optimal care for patients with filters, including the optimum methodology for filter retrieval.

ERIN MURPHY, MD
Vascular Surgery
The RANE Center for Venous and Lymphatic Diseases at St. Dominic's
Jackson, Mississippi

She has stated that she has no financial interests related to this article.
Dr. Murphy may be reached at ehmurphymd@gmail.com.

With the advent of retrievable IVC filters came a dramatic rise in the utilization of filters for prevention of PE. Unfortunately, the increased implantation of these filters has not been mirrored by an increased retrieval rate. Contemporary series report retrieval

rates ranging from 20% to 50% at best, largely attributed to poor patient follow-up in addition to physician oversight. Less commonly, physician or patient preference or persistent indications for filtration are cited as justification for prolonged filter use. Although the risk of complications from long-term indwelling IVC filters is reportedly low, there has been a distinct rise in filter-related events in patients who fail to undergo retrieval in a timely manner. Importantly, these complications can be serious and dangerous and include filter migration, filter fracture, filter or strut embolization with possible resultant arrhythmias and cardiac tamponade, symptomatic caval penetration with reported aortic and duodenal injury, caval thrombosis, and deep vein thrombosis.

In my practice, I am now regularly treating patients with caval thrombosis related to filter occlusion and have seen patients with all the previously mentioned complications. Many of these patients have had filters in place for years longer than indicated. In addition to the medical ramifications of filters left in situ, legal ramifications are now emerging as lawyers advertise to patients who have not undergone retrieval.

On the contrary, timely filter retrieval once the imminent risk of PE has subsided is associated with extremely low complication rates (< 1%). Thus, the best option in the vast majority of patients is the early and expedient removal of IVC filters once they are no longer acutely indicated. This time frame generally falls between 4 to 8 weeks postimplantation; we are aggressive about scheduling follow-up appointments to reassess filter need and schedule retrieval in this time frame.

In the case of patients referred with prolonged filter indwell times, it is my practice to offer a retrieval attempt regardless of duration since implant. I am most aggressive in younger, compliant patients with the potential for a lifetime of risk ahead. I generally do not offer complicated retrievals to patients older than 80 or those with persistent indications for filtration. I routinely employ advanced retrieval techniques during these cases, including dual access, balloon displacement, filter realignment with a stiff wire, and use of a snare sling. These techniques have a high success rate (> 95%) and a relatively low complication rate (< 2%). Importantly, this low overall complication rate is less than the reported rates of IVC thrombosis or stenosis (2% to 30%), deep vein thrombosis or postthrombotic syndrome (5% to 70%), filter migration (1% to 69%), or filter fracture (0% to 15%) associated with prolonged indwelling IVC filters. I have had success with these techniques in patients up to 10 years postimplantation. Although I have successfully used endobronchial forceps for filter retrieval, this technique has a small but real risk of complications including caval damage with subsequent hemorrhage or thrombosis demonstrated in up to 12%. I generally reserve the use of forceps or other aggressive techniques including the use of sharp dissection instruments or endovenous lasers, for patients with symptomatic filter complications where the increased risk can be justified. In patients with IVC filter thrombus > 50% or filter occlusion, I consider clot removal techniques acutely (percutaneous mechanical thrombectomy or lysis) if the patient qualifies or a trial of anticoagulation prior to retrieval. In patients with persistent filter thrombus or occlusion, filter crushing with stenting across the filter can relieve obstructive symptoms. This latter technique may also be used in patients with filter fracture to lower embolization risk if retrieval fails.

Ultimately, I believe selective indications for IVC filtration, diligent follow-up, and timely retrieval can prevent the majority of IVC filter complications. Furthermore, since many complications can occur 5 to 10 years postimplantation, even those patients with extended filter indwell times can potentially benefit from retrieval with a low risk of complications. We encourage and educate all practitioners involved in the care of patients with filters to refer for discussion of retrieval.

MARK J. GARCIA, MD, MS, FSIR
Interventional Radiology
Medical Director
Peripheral Vascular Labs
Christiana Care Health Services
Newark, Delaware

He has disclosed that he is a speaker for Boston Scientific Corporation.

Dr. Garcia may be reached at mjgarcia59@me.com.

Concerning filter placement, we generally attempt to adhere to the accepted guidelines as much as possible. There are always exceptions, but there has to be a fairly compelling reason to deviate from the guidelines.

Logistically, filter retrievals are a more difficult issue to tackle. We have attempted to implement a variety of programs, protocols, and algorithms to identify patients who should return for retrieval evaluation.

These attempts have been met with varying degrees of reluctance, resistance, and difficulties with infrastructure and technology. Currently, when a patient receives a retrievable IVC filter, his or her discharge instructions include a letter of instruction that explains to the patient and family that if the patient's need for filtration is temporary and resolved, and the referring physician is in agreement, the patient should contact the vascular interventional radiology office to schedule an appointment to be evaluated for removal. If filter removal seems reasonable, an IVC Doppler study is obtained to determine filter patency prior to the attempted retrieval. Patients who are identified as having filter thrombus are further evaluated for conservative management (which may include initiating or furthering anticoagulation therapy) or intervention (thrombolysis or thrombectomy). Central imaging (either CT or MRI) is obtained for patients who have long-term indwelling filters beyond the instructions for use retrieval interval and show clinical signs or symptoms that might suggest thrombosis or filter penetration/perforation. Retrieval technique is discussed, including the possibility of IVC recanalization/reconstruction. The discussion will include alternative methods of removal, such as using grasping forceps and laser-assisted retrieval. To date, these alternative methods have been extremely successful in aiding the removal of difficult-to-retrieve optional filters as well as permanent filters such as the Greenfield filter (Boston Scientific Corporation). ■