A Dedicated IVC Filter Clinic

A clinic with this singular focus may improve the retrieval rates of optional IVC filters.

BY JEET MINOCHA, MD; ROBERT K. RYU, MD; JENNIFER KARP, RN; AND ROBERT J. LEWANDOWSKI, MD

The availability of optional (or retrievable) inferior vena cava (IVC) filters has altered the practice patterns for IVC filters, with a shift to these optional devices and a lowering of thresholds for filter placement.[1,2] For example, optional IVC filters are now placed for prophylactic indications in patients who are at increased risk for developing a clinically significant pulmonary embolism (PE) and are unable to undergo primary prophylaxis, such as in the setting of trauma.[3] As a result, the number of filter placements in the United States has increased steadily each year, with optional filters now accounting for more than half of all filter placements.[1,4-6] If retrieved, optional filters offer the theoretical benefit of fewer long-term complications than those associated with permanent IVC filters.[7,8] Unfortunately, in clinical practice, as few as 20% of optional IVC filters are ever retrieved.[1,2,4,9-11]

With the increasing popularity of optional IVC filters, we analyzed our experience with these devices at our large, academic medical center. During the 8-year period from 2001—when we first started placing optional IVC filters—to 2008, our average optional filter retrieval rate in interventional radiology was only 35%. Why was our retrieval rate so low when every optional filter was purportedly placed with the intent of its retrieval? We uncovered many different reasons for our meager retrieval rate, but we noticed one common, important shortcoming: we were largely depending on referring clinicians or our patients to contact us when they were eligible for filter retrieval. As a result, we were losing many of our optional filter patients to follow-up.

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OUR IVC FILTER CLINIC

We established a dedicated IVC filter clinic in January 2009 to improve our care of patients with optional IVC filters. Our IVC filter clinic includes a clinical nurse coordinator who works with a dedicated interventional radiologist at our pre-existing interventional radiology clinic. In addition, we created a separate, comprehensive IVC filter clinic database (Table 1) in a Microsoft Excel spreadsheet.

The nurse coordinator updates our prospective IVC filter clinic database with all patients who have IVC filters placed by an interventional radiologist. Before any filter placement, the interventional radiologist consults with the referring physician and confirms the indication(s) for the type of filter to be placed (ie, permanent or optional). All optional filters are placed with the intent of their retrieval after the need for mechanical prophylaxis against PE expires.

After filter placement, the nurse coordinator and interventional radiologist monitor patients in the clinic database and coordinate filter removal with the patient's physician when clinically indicated. Referring physicians are typically emailed or called 2 to 4 weeks after filter placement by the dedicated interventional radiologist to discuss the possibility of IVC filter removal and/or the

TABLE 1. SAMPLE DATA FROM OUR IVC FILTER CLINIC DATABASE

Filter Indication	Date Filter Placed	Date Follow-Up Needed	Follow-Up Completed (Y/N)	Clinic Date	Filter Successfully Removed (Y/N)	Date Filter Removed
LLE DVT, bilateral PE	1/08/09	1/22/09	Y	2/5/09	Y	2/9/09
New LE DVT, discontinued enoxaparin because PLT < 50	1/16/09	1/30/09	Y	NA	N	NA
Failed AC treatment: enoxaparin (bleeding, large hematoma)	1/20/09	2/3/09	Y	NA	N	NA
PE, patient having surgery	1/31/09	2/14/09	Y	2/12/09	Y	2/19/09
High risk: long surgery, prolonged immobility	2/5/09	2/19/09	Y	3/5/09	Y	3/16/09
Recent atrial fibrillation/atrial flutter, unable to have AC because PLT < 50	2/9/09	2/23/09	Y	NA	N	NA
Saddle PE, right DVT	2/9/09	2/23/09	Y	NA	Y	4/21/09
LE DVT	2/11/09	2/25/09	Y	NA	Y	3/4/09
Saddle PE, DVT	2/12/09	2/26/09	Y	NA	Y	3/23/09
Chronic DVT: bilateral innominate, subclavian, axillary, right internal jugular, GIB	2/12/09	2/26/09	Y	NA	Y	3/3/09

Abbreviations: AC, anticoagulant; DVT, deep vein thrombosis; GIB, gastrointestinal bleeding; LE, lower extremity; LLE, left lower extremity; PLT, platelet count.

timing of removal. This correspondence is recorded in the clinic database and is repeated until the filter is removed or kept as a permanent device (Table 1).

In addition, we created an IVC filter clinic Web site for patients and referring physicians that has information about the indications for placement and retrieval of optional IVC filters, as well as resources on IVC filters and their potential complications (www.ivcfilter.northwestern.edu).

THE IMPACT

Since launching our IVC filter clinic in January 2009, we have placed 152 optional filters. We have increased the median number of optional filters that we place per month from three in the preclinic period to 10 in the post-clinic period. Importantly, we have significantly increased our retrieval rate of optional IVC filters from 35% to 70% (Table 2). The number of failed retrieval attempts—categorized as a technical failure of the retrieval procedure—has been similar in the pre- and postclinic periods (6% vs 3%, respectively), suggesting that the improved retrieval rate is not related to a decrease in technical failures.

DISCUSSION

Although all of the optional IVC filters that we placed before 2009 were done so with the intent of their retrieval, our preclinic retrieval rate was similar to rates reported in the literature largely because we did not use a standard methodology to coordinate the removal of our implanted optional devices.[2,4,9] Now with our IVC filter clinic, we actively monitor all patients with optional IVC filters, and our nurse coordinator helps manage the retrieval of eligible optional filters. We have transferred all of the responsibility of filter retrieval away from the referring physicians and patients to the interventional radiology department.

Because the majority of optional filters are usually not retrieved, improved patient selection and management are critical with these devices. Optional filters that are not retrieved carry the same long-term complication risks as permanent devices, including an increased risk of subsequent deep vein thrombosis, filter migration and/or embolization, symptomatic penetration of the filter outside the IVC, filter fracture, and IVC stenosis or occlusion.[1,2,8,12,13] Kim et al confirmed similar thrombotic com-

TABLE 2. IMPACT OF OUR IVC FILTER CLINIC ON OPTIONAL IVC FILTER RETRIEVAL RATE

	Pre-IVC Filter Clinic	Post-IVC Filter Clinic
Optional IVC filter retrieval rate	35%	70%

plications rates in patients with permanent filters and optional filters kept as permanent devices.[14] In their cohort, only 11% of optional filters were successfully retrieved; in these patients, none had documented venous thromboembolism after retrieval.[14] The long-term durability of optional filters is also not well established. Furthermore, because reimbursement by third-party payers is typically the same for permanent and optional filters, more expensive optional filters that are kept as permanent devices result in greater technical costs for a practice than less-expensive permanent filters.[15] D'Othée et al developed a cost analysis model to show that the use of optional versus permanent devices for filter placement is financially advantageous for an institution only if 41% of the filters are eventually removed.[15]

The patient population served by an institution also influences the indications for and potential change of optional filters from retrievable to permanent devices.[2,4] For example, at centers where optional filters are placed for PE prophylaxis in trauma patients, the patient population is traditionally younger with historically difficult follow-up—likely contributing to the low retrieval rates at these institutions.[11] Recently, Ko et al developed an institutional protocol for prospective monitoring of prophylactic optional IVC filters in trauma patients.[16] Their protocol included a physician assistant on the trauma service who compiled a prospective optional filter database and coordinated the removal of these filters either during the inpatient stay or as an outpatient. This protocol significantly improved their optional filter retrieval rate from 37% to 84%.

Even with an improved retrieval rate of 70% in our IVC filter clinic practice, there is still room for additional improvement. As we move forward, we plan to use our new, comprehensive clinic database to learn how to improve patient selection for optional IVC filters and increase our retrieval rate further.

CONCLUSIONS

Our experience supports the establishment of an optional IVC filter database that is actively monitored by dedicated staff. Our higher post-IVC filter clinic retrieval rate is mostly the result of improved patient follow-up; we are now providing more comprehensive postprocedural care for our patients—something we were not doing in the pre-IVC filter clinic period. Theoretically, this practice should increase the retrieval rate of optional IVC filters and potentially reduce long-term complication rates, thereby improving long-term outcomes in patients with IVC filters. ■

Jeet Minocha, MD, is with the Department of Radiology, Northwestern Memorial Hospital in Chicago, Illinois. He has disclosed that he holds no financial interest in any product or manufacturer mentioned herein. Dr. Minocha may be reached at (312) 695-5753; jeet@md.northwestern.edu.

Robert K. Ryu, MD, is with the Department of Radiology, Northwestern Memorial Hospital in Chicago, Illinois. He has disclosed that he holds no financial interest in any product or manufacturer mentioned herein.

Jennifer Karp, RN, is with the Department of Radiology, Northwestern Memorial Hospital in Chicago, Illinois. She has disclosed that she holds no financial interest in any product or manufacturer mentioned herein.

Robert J. Lewandowski, MD, is Director of the IVC Filter Clinic, Department of Radiology, Northwestern Memorial Hospital in Chicago, Illinois. He has disclosed that he holds no financial interest in any product or manufacturer mentioned herein.

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