A Dedicated Inferior Vena Cava Filter Service Line: How to Optimize Your Practice

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Abstract

Despite the increased placement of retrievable inferior vena cava filters (rIVCFs), efforts to remove these devices are not commensurate. The majority of rIVCFs are left in place beyond their indicated usage, and often are retained permanently. With a growing understanding of the clinical issues associated with these devices, the United States Food and Drug Administration (FDA) has prompted clinicians to remove rIVCF when they are no longer indicated. However, major obstacles exist to filter retrieval, chief among them being poor clinical follow-up. The establishment of a dedicated IVC filter service line, or clinic, has been shown to improve filter retrieval rates. Usage of particular devices, specifically permanent versus retrievable filters, is enhanced by prospective physician consultation. In this article, the rationale behind a dedicated IVC filter service line is presented as well as described the structure and activities of the authors' IVC filter clinic; supporting data will also be provided when appropriate.

Keywords

- IVC filters
- IVC filter clinic
- quality improvement
- interventional radiology

Objectives: Upon completion of this article, the reader will be able to describe the obstacles that exist to IVC filter retrieval and how a dedicated service line can improve retrieval rates and optimize clinical practice.

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The placement of inferior vena cava (IVC) filters has dramatically increased over the past decade, with retrievable IVC filters (rIVCFs) representing the majority of IVC filters

being placed today. The American College of Chest Physicians and American College of Radiology (ACR)/Society of Interventional Radiology (SIR) have each published evidence-based guidelines for the placement of IVC filters, with the ACR/SIR practice guidelines dividing indications for filter placement into therapeutic and prophylactic. Today, prophylactic indications account for more than 50% of all filter placements.¹

However, the use of rIVCF has not been accompanied by efforts to ensure proper follow-up and timely removal, with retrieval rates reported to be as low as 8.5%.² This problem is further compounded by the increased rates of device-related complications observed with rIVCF relative to permanent devices,³ including device fracture/embolization, migration, and penetration of components into adjacent retroperitoneal structures.^{4–6} These findings prompted the United States Food and Drug Administration (FDA) to issue a safety communication in 2010, stating that implanting physicians are responsible for the ongoing care of patients with rIVCFs, and that devices should be removed when no longer clinically necessary.⁷

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The FDA updated this communication on May 6, 2014, focusing on recent data and post-market surveillance studies for these devices. The updated recommendations suggest that all physicians involved in the treatment and follow-up of patients receiving IVC filters should actively consider the risks and benefits of filter removal, and that referral for removal should occur when the risk/benefit profile is favorable. The FDA also mandated collection of additional clinical data for currently marketed IVC filters in the United States, with the intent of addressing unanswered safety concerns. Manufacturers were given two options for obtaining data. Most manufacturers are participating in the PRESERVE (PREdicting the Safety and Effectiveness of Inferior Vena Cava Filters) study, a multicenter, multidisciplinary, prospectively enrolled study jointly administered by the SIR and Society of Vascular Surgery (SVS). Other manufacturers are conducting post-market studies (522). The data gathered from these studies will help the FDA, manufacturers, and health care professionals assess the use and safety profile of these devices as well as understand evolving patterns of clinical use of IVC filters, with the goal of ultimately improving IVC filter utilization and patient care.⁸

Optimizing Device Utilization: The Rationale for a Dedicated IVC Filter Service Line

The underpinning of a successful service line is to have physicians and staff dedicated to excellence in a particular area. This includes staying abreast of current practice guidelines and the latest research in the clinical and preclinical arenas, as well as adhering to recommendations from regulatory bodies, such as the FDA. To that end, the authors have created a dedicated IVC filter clinic, designed to optimize IVC filter utilization and facilitation of timely IVC filter removal. At the initial outset of this clinic, these goals were met by prospective physician consultation of patients who require placement of an IVC filter, as well as consistent follow-up and outreach to facilitate removal of IVC filters when no longer indicated. Achieving these goals has fostered collaborative relationships with referral services, which in turn has led to referrals for complex IVC filter retrieval.

The placement of rIVCFs is the province of multiple medical specialties, including interventional radiology, interventional cardiology, and vascular surgery. This diffusion significantly complicates monitoring of patients with these devices, and poor clinical follow-up impedes retrieval of devices that are no longer indicated. Various methods have been described for following up patients with rIVCFs. Lynch described a method where the electronic medical records of all patients who received rIVCFs are flagged and reviewed. These records are monitored every 1 to 3 months to determine if patients are eligible for removal. Once they are identified for removal, they are contacted via mail. Up to three letters and a phone call attempt are made to bring patients back for IVC filter removal. This system is led by interventional radiology physicians monitoring patient charts.⁹ Another method described is to use the define, measure, analyze, improve, and control methodology (DMAIC) to implement a quality improvement project to

increase IVC filter retrieval rates via two methods: mailing of letters to patients and managing clinicians and automatic scheduling of clinic visits at 4 weeks postplacement from a database maintained by physician assistants.¹⁰ The authors' approach, the establishment of an IVC filter clinic with dedicated physicians and nurse coordinator, has been shown to dramatically improve retrieval rates.¹¹ This includes providing patient education, a tracking system to minimize patients lost to follow-up, and dedicated personnel to oversee the process.¹¹

Forming the Clinic

The IVC filter clinic was formed in January 2009. At its inception, a primary goal was to increase retrieval rates of rIVCF placed within the department. After caring for the first 100 patients, the data were reviewed and demonstrated an increase in retrieval rates from 29 to 60%, solely attributable to prospective follow-up of all patients with rIVCF.¹¹ A secondary goal was to improve IVC filter utilization by providing prospective consultation to referring physicians prior to filter placement, specifically in regard to permanent versus retrievable devices, in an effort to improve patient outcomes. This is primarily due to the elevated risk of device-related complications with rIVCF³; therefore, patients who are unlikely to present for retrieval are unlikely to benefit from retrievable devices and may be exposed to unnecessary risk. An analysis was performed on the impact of physician consultation, and found that a concordant opinion on the type of device a patient should receive was associated with significantly higher retrieval rates.¹²

Shortly after establishment of the clinic, a dedicated Web site was created for the IVC filter clinic. The Web site was constructed with both patients and referring physicians in mind, and information tailored to each party is readily available. For patients, there is easily understood content describing IVC filters, indications for device placement, and in the case of retrievable filters rationale for timely removal. For referring physicians, in addition to contact information for referral, the Web site highlights publications to support the authors' approach in caring for these patients, and provide a calculator to aid in choosing which type of filter best serves their patient.¹³

Logistics and Clinical Activities of the IVC Filter Clinic

Patient Referral

Upon receiving a request for IVC filter placement, information is gathered from the medical record; this is then reviewed by one of the clinic physicians. If there is a concordant opinion between the clinic physician and referrer on the type of device to be placed, the patient is subsequently scheduled for placement. If there is a discordant opinion between the referrer and clinic physician, the referrer is contacted to discuss the patient and reach a consensus. The impetus behind having a physician-to-physician discussion is based on a study that demonstrates that concordant opinions on which type of device a patient should receive is reflected by

higher overall filter retrieval rates.¹² To further guide the discussion on which type of filter best serves a particular patient, a calculator is used that was derived from the authors' experiences with patients in the IVC filter clinic as well as societal guidelines.¹⁴ This calculator takes into account patient factors including age, sex, history of VTE, presence of neurologic disease, presence of malignancy, VTE with anticoagulation complication, VTE with anticoagulation failure, high-risk VTE (central venous thrombus or submassive/massive PE), and prophylaxis. Again, this is largely driven by the concept that retrievable devices are associated with a greater risk of device-related complications relative to permanent devices³; if a patient is unlikely to have their filter removed, they may be unnecessarily exposed to added risks associated with a rIVCF.

Patient Monitoring

Once the patient receives an IVC filter, they are entered into an electronic database. Patients are then prospectively followed up, and 2 to 4 weeks after placement, the coordinator evaluates the patients' progress using the electronic medical record. Specifically, it is determined if the patient was discharged, and if so, whether they were discharged home or to a subacute facility; if they were discharged on anticoagulation; whether there is continued risk for VTE; and which physicians they will be following up with to discuss timing of the retrieval of their rIVCF. If this information cannot be obtained from the medical record, the patient may be called directly to obtain this information.

Two- to four-weeks postplacement, the referring clinician is contacted, generally via e-mail, to notify them that their patient had a filter placed and that the interventional radiology service would like to remove this filter when it is no longer indicated. With the implementation of this communication system, it has been noted that strong relationships have been developed with referring services. Many clinical services now routinely contact the clinic coordinator to answer clinical questions and provide updates on patients.

If it cannot be determined to where the patients was discharged or who their managing physician is, the nurse coordinator mails a letter to the patient stating they have an IVC filter in place, asking them to discuss this with their physicians, and subsequently contact the coordinator to schedule retrieval when appropriate. The coordinator may call the patient approximately once a month over several months and may send up to three letters if patients are not responsive, before being considered lost to follow-up.

Special Referral Relationships

The institution of the IVC filter clinic has led to some special ongoing referral relationships with surgical services. Patients with a history of VTE or genetic coagulopathy are referred preoperatively for a prophylactic filter placement. Once the patient has recovered, is ambulatory, and (if appropriate) has reinitiated anticoagulation, the authors ensure that they return to interventional radiology for filter retrieval. Though the placement of prophylactic filters is controversial, and is primarily based on data from the trauma population, there are some data

to support the use of prophylactic rIVCF placement to mitigate the risk of perioperative pulmonary embolism.¹⁵ In coordination with the referring service, the patient is scheduled for filter retrieval 4 to 6 weeks after surgery.

Another important relationship is with the affiliated rehabilitation hospital; aside from patients who develop VTE while in inpatient rehabilitation, the clinic is routinely referred patients who have rIVCF placed at an outside institution, when there is no set plan for filter retrieval by the implanting physician.

Referral for Filter Removal

Over time, referrals for removal of filters placed at outside institutions have increased dramatically. Referrals for retrieval include devices that have been in place for extended periods of time, are fractured or damaged in some way, or have failed retrieval at an outside facility. Referring physicians and patients are provided information supported by recent data; primarily that rIVCFs that have been in place for an extended period of time can be safely removed, regardless of dwell time.¹⁶ Referrals come from both clinicians and patients who self-refer based on Internet research, encountering the clinic's Web site, or through the U.S. government's clinical trial registry.

Prior to consulting with a patient about complex filter retrieval, the following information is obtained, if possible: type of filter, date of filter placement, indication for filter placement, indication/appropriateness for filter retrieval, and any prior retrieval attempts. Cross-sectional imaging of the abdomen, usually via computed tomographic venography, is reviewed to assess the status of the filter and IVC. In addition, lower extremity duplex sonography is obtained to determine whether any acute deep venous thrombosis (DVT) is present, which may alter management and procedural planning/timing.

After filter retrieval, patients are contacted at 1 week to assess their condition and answer any specific questions. In cases where further intervention beyond filter retrieval is required, such as venous stent placement, a follow-up visit and imaging is scheduled.

Conclusion

The institution and evolution of the IVC filter clinic has resulted in a paradigm shift in IVC filter utilization and management of patients with these devices. Initially designed as a mechanism to prospectively follow up patients after rIVCFs were placed to ensure timely retrieval, it has since grown into a fully formed and realized service line within the department. In addition to managing patients with filters placed at the authors' institution, the clinic actively manages patients with complex filter-related issues, including devices that have been in place for an extended period of time, fractured devices, and recanalization of the IVC when filter-related thrombosis occurs. Furthermore, members of the clinic are active in research and education on both the national and local level. Utilizing a data- and quality-driven approach, a dedicated IVC filter service line can have a significant impact on patient care and safety.

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