Before You Place That Filter ...

A guide to IVC filter placement and troubleshooting procedural challenges.

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Evidence-based guidelines from the American College of Chest Physicians and Society of Interventional Radiology recommend inferior vena cava (IVC) filter placement in patients with proven venous thromboembolism with a failure of, a contraindication to, or a complication secondary to anticoagulation.[1,2] However, with the recent availability of retrievable or so-called optional IVC filters, the use of these devices has expanded significantly in patients who are perceived to be at high risk for pulmonary embolism (PE).[1] In this article, we focus on the anatomical factors, procedural challenges, and complications related to the use of these devices.

PREPROCEDURAL EVALUATION

Assuming that there is a proper indication for IVC filter placement, the procedure is performed using sterile technique. In some instances, IVC filter placement has been performed using intravascular ultrasound for guidance.[3] In most instances, an IVC gram is performed at the time of the filter placement procedure. The IVC gram is performed to define: (1) the IVC anatomy and make sure that there are no anatomic variants such as a duplicated IVC or a circumaortic or retroaortic renal vein; (2) the diameter of the IVC (to make sure that the IVC is not too large for the filter); (3) that there is no IVC thrombus that would obviate or complicate the placement of the filter; (4) the location of the renal veins (because the optimum filter location is just below the level of the lowest renal vein, so if thrombosis of the IVC filter occurs, there is minimum dead space above the filter for thrombus to form and serve as a source of significant PE); and (5) that the catheter is actually in the IVC and not in a parallel vein such as a lumbar vein. If a cross-sectional imaging study such as a computed tomography (CT) or magnetic resonance imaging (MRI) scan is available and defines the IVC and renal venous anatomy, the IVC gram is obtained mainly for the purposes of items 3 to 5 mentioned previously. The CT and/or MRI are also reviewed to make sure there are no extrinsic masses that are compressing the IVC.

A marker or calibrated multisidehole catheter should be used and positioned in the field of view to provide an internal calibration reference. Placing the catheter at the confluence of the IVC and the common iliac veins and power injecting 20 mL of contrast

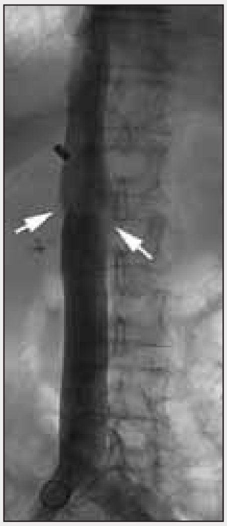

Figure 1. A preprocedure IVC gram shows a marker pigtail catheter positioned at the common iliac vein bifurcation. Both iliac veins are patent. There is a normal-sized IVC. The inflow "defect" from the renal veins (arrows) serves as a good reference for filter deployment below the renal veins.

per second for 2 seconds results in reflux of contrast into both iliac veins to ensure that there is no IVC duplication, to fully define the IVC anatomy, and to demonstrate the "washout defects" due to the inflow of unopacified blood from the renal veins. Accurate measurements of the IVC length below the lowest renal vein and its diameter are determined based on the reference calibration catheter. After obtaining the IVC gram, the patient, the image intensifier, and the procedure table should not be moved in order to minimize changes in parallax and to preserve the relationship between the venous anatomy and the bony landmarks (Figure 1). On occasion, it may be necessary to perform selective venography when an inflow defect suggests a circumaortic left renal vein (Figure 2) versus a prominent lumbar vein.

PERMANENT VERSUS OPTIONAL IVC FILTERS

The primary advantage of using an optional filter over a permanent filter is that an optional filter has the possibility of being removed from the patient when it is no longer needed or it can be left in place as a permanent filter. Indeed, some physicians would argue that there is really no future for permanent filters. Placement of an optional filter has the additional advantage of being able to be immediately retrieved and redeployed if the initial deployment was not optimum (Figure 3). However, there are no data that demonstrate the in vivo durability of all of the currently available optional IVC filters for > 5 years, and the retrievability of each optional filter over time is not the same.

All currently available optional filters can be safely deployed in an IVC up to 28 to 32 mm in diameter, depending on the specific optional filter manufacturer indications for use. An IVC that is > 28 to 32 mm in diameter is called a *megacava*. In addition, the IVC is very elastic, and its diameter can vary depending on the volume status of the patient and whether the patient is performing a Valsalva maneuver at the time of the venogram. However, most IVCs are elliptical in shape. Therefore, the anterior-posterior diameter of the IVC tends to be less than the medial-lateral diameter, which provides some component of safety while determining the IVC diameter based on a venogram. When a megacava is encountered, there are a few available treatment options. The Gianturco-Roehm Bird's Nest filter (Cook Medical, Bloomington, IN), which is a permanent filter, can be placed in an IVC up to 40 mm in diameter. The Bird's Nest filter consists of four stainless steel wires (25 cm X 0.18 mm) attached to two V-shaped struts and is best suited for an IVC that is at least 7 cm

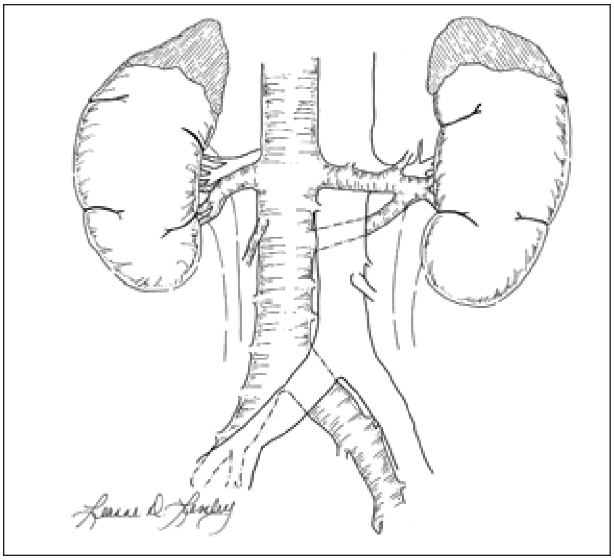

Figure 2. Circumaortic left renal vein. If this entity is not recognized, the patient may be at risk for PE (thrombus bypasses through the circumaortic renal vein).

in length below the renal veins. Alternatively, bilateral common iliac venous filters may be placed, especially when the use of an optional filter is desired.

LOCATION OF FILTER PLACEMENT

Most filters are placed in an infrarenal location, because 90% of clinically significant PE originates from the lower extremity or pelvic veins. Therefore, the optimal position of an IVC filter is immediately below (for nonconical filters) or just at the level of the lowest renal vein (for conical filters) for the reasons previously described. The inflow of blood from the renal veins will tend to minimize clot formation craniad to an appropriately placed infrarenal IVC filter. However, placement of filters in the suprarenal IVC, bilateral iliac veins, superior vena cava (SVC), or in both components of a duplicated IVC (Figure 4) has been performed based on the patient's anatomy and the likely source of PE.

Suprarenal placement of an IVC filter is performed if there is a duplicated IVC, if there is a large volume of thrombus within the infrarenal IVC or extrinsic compression of the IVC preventing the safe positioning of an infrarenal filter, or if there is extensive renal or gonadal venous thrombosis. There are some physicians that will place a filter in a suprarenal location in women who are likely to become pregnant. Filters placed in a suprarenal location are potentially subjected to chronic trauma from the overlying liver and may be more prone to fracture or penetrating the IVC over time. In addition, conical-shaped filters can severely tilt if their legs

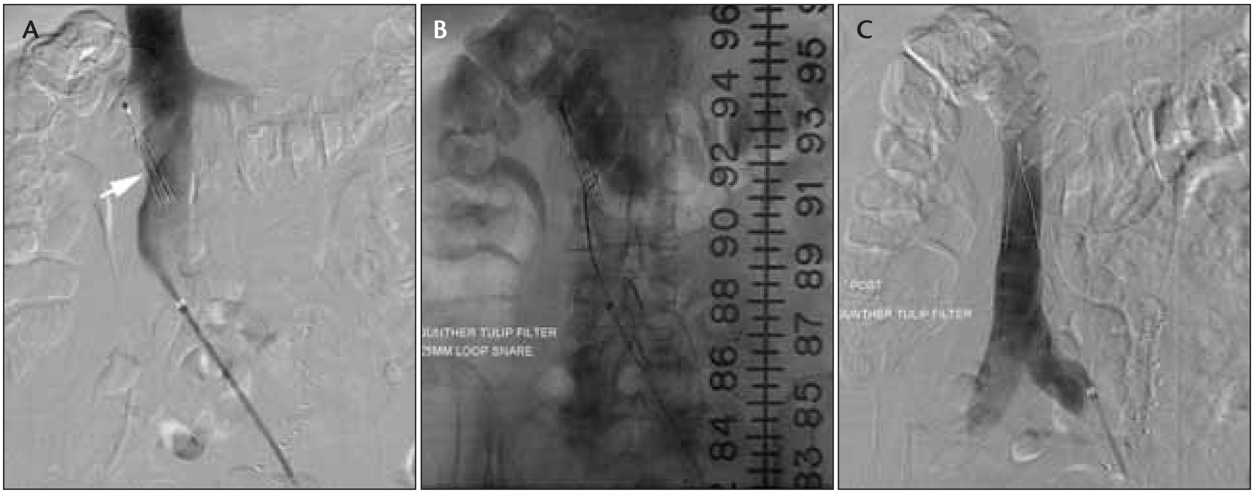

Figure 3. An IVC gram shows a Günther Tulip filter that was inadvertently placed at the IVC wall (arrow), and therefore the filter was not fully expanded (A). An Amplatz GooseNeck snare (ev3 Inc., Plymouth, MN) was used to retrieve and reposition the filter from the IVC wall (B). A follow-up IVC gram shows the previously maldeployed filter was repositioned and redeployed properly using a loop snare (C).

prolapsed into a hepatic vein. We experienced one patient who developed significant pain with deep inspiration after placement of a suprarenal filter and, upon inspection, we suspected that one of its legs was protruding into a hepatic vein and irritating the liver capsule during respiration. Upon removal of the filter, the pain immediately resolved.

Bilateral iliac vein filters are typically used in patients with a megacava (> 28–32 mm) or a duplicated IVC, or in patients with a retroaortic left renal vein component that drains into the IVC close to the iliac venous confluence.

Upper extremity and large volume internal jugular venous thromboses are being encountered with increasing frequency as the use of central lines increases. Due to the relatively smaller size of upper extremity veins, the risk for clinically significant PE is lower as compared to the risk associated with lower extremity and pelvic venous and IVC thrombosis. However, it may be a very challenging clinical situation when a patient with significant acute subclavian, axillary, and brachial venous thrombus presents with PE (and no other obvious source for the PE) and cannot be anticoagulated. In these types of cases, the benefits of placing an SVC filter must be weighed against the potential risks. The SVC is much shorter in length than the IVC, and the legs of a conical filter could prolapse into the azygous vein, causing the filter to tilt significantly. In addition, many of these patients undergo multiple central venous line placements, and the various wires and catheters could become engaged with the SVC filter and displace the filter. Constant cardiac motion and mediastinal pulsation could also cause the hooks or legs of the filter to penetrate the SVC, leading to a hemopericardium and tamponade.[4] Therefore, placement of an SVC filter should be only undertaken after careful consideration of each individual case, factoring in the anatomical challenges and the lack of good outcomes data with SVC filters.[5] If a decision is made to place an SVC filter, the ideal location is one in which the filter legs are craniad to the azygous vein (which is usually outside of the pericardial reflection) and just caudal to the confluence of the brachiocephalic veins.

Choosing the Venous Access Site for Filter Placement

The right internal jugular or right common femoral veins are the most common access sites for filter deployment.[6] With the availability of more flexible and lower-profile filter devices, the left internal jugular, both external jugular, left femoral, and upper extremity veins, as well as a transcaval approach, have all been used as access sites for IVC filter placement for a variety of reasons (eg, extensive trauma, diffuse thrombosis, etc.). The transcaval approach is the least often used approach due to its complexity, but the left common femoral vein approach is the least desired of the other access site options for placement of a non-self-centering conical-shaped filter. The acute angle of the left iliac vein with the IVC directs the filter delivery sheath against the right lateral aspect of the IVC wall, causing the filter to be deployed in a tilted, and therefore less functional, orientation (Figure 3).

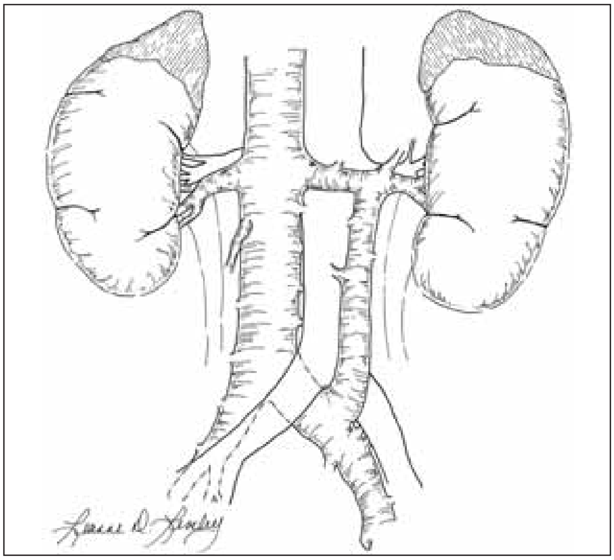

Figure 4. Duplicated IVC. The left IVC originated from the left common iliac vein and terminates at the left renal vein. If this entity is not recognized, patients are at risk for PE (especially thrombus originating from left lower extremity bypasses through the left IVC).

Anatomic Considerations

The reported prevalence of a duplicated IVC is about 0.2% to 0.3%.[7] With a duplicated IVC, the left IVC most often drains into the left renal vein (Figure 4). There are several reports of clinically significant PE after placement of an IVC filter in patients with an undiagnosed duplication of the IVC.[8] While obtaining an IVC gram with a catheter placed in the distal right-sided IVC, it is important to have contrast reflux well into the left common iliac vein; otherwise, a duplicated IVC may be missed. On occasion, a separate access into the left common femoral vein is needed, because the iliac veins may not join together but rather empty into their respective IVC moieties. Venographic evidence that might alert one to the possibility of a duplicated IVC is a diminutive right-sided IVC or a large amount of unopacified blood flowing from the left-sided IVC into the left renal vein and subsequently into the right-sided IVC. When these findings are observed and there are no previous cross-sectional studies that have excluded the presence of a duplicated IVC, a left common iliac venogram should also be obtained. When the presence of a duplicated IVC is diagnosed, the filter can be placed in a suprarenal location or within each IVC component.[7] Our preference is to place a single filter within the suprarenal IVC. Suprarenal IVC filters are reported to be safe and effective in the prevention of PE, despite some concern about the increased risk for filter fractures.[9]

FILTER AND IVC THROMBOSES

The reported frequency of IVC thromboses varies widely (0%–28%), depending on the consistency, duration, and method of follow-up evaluation.[10] Approximately 50% of IVC thromboses may be present without patients reporting symptoms. Therefore, detailed imaging of the IVC should be performed before any filter retrieval attempt. Having stated this, our experience with retrieval of Günther Tulip or Celect filters (Cook Medical) at a mean of 43 days (1–343 days) showed a very low incidence of clot burden in these filters during venography at the time of their retrieval.[6] However, our experience may be biased toward patients that are less likely to have thrombophilia and therefore

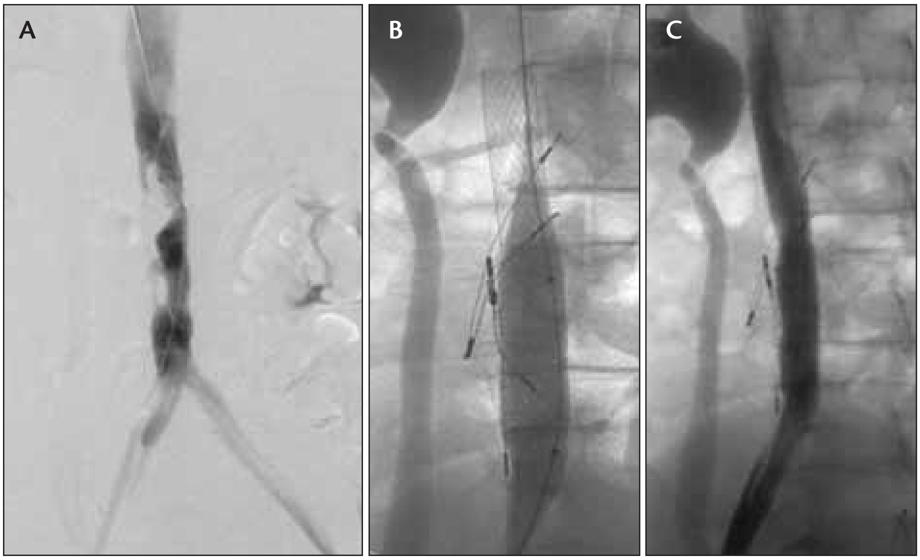

Figure 5. The patient initially presented with complete IVC thrombosis and then underwent 30-hour catheter-directed thrombolysis; follow-up digital subtraction IVC gram shows a large amount of residual, likely chronic, thrombus (A). In an attempt to keep the IVC patent, a stent was deployed next to the Bird's Nest filter, and further balloon expansion of the stent was performed (B). Follow-up venogram shows a widely patent IVC and stent. The filter was displaced by the stent (C).

less likely to have clot in the filter at the time of its retrieval. Chronic IVC occlusion/thrombosis in the presence of a filter in situ is not uncommon and is probably due to the specific patient populations receiving IVC filters as well as the chronicity of the device. Systemic anticoagulation is the first-line treatment in symptomatic patients with IVC thrombosis and a filter. In symptomatic patients, when anticoagulation fails, if the patient has bulky acute/subacute thrombus, thrombolytic agents may be used. If there is a chronically occluded, partially recanalized, string-like IVC present, balloon angioplasty and stent placement could be considered to restore patency through the filter (Figure 5).

FILTER MISPLACEMENT

IVC filter misplacements outside of the confines of the IVC have been reported, including placement of a filter within the aorta[11] and within the spinal canal.[12] Mildly or severely maldeployed filters (mild-to-severe tilting of the filter or placement of the filter too caudal below the renal veins or significantly covering the renal veins) are not uncommon. If a misplaced IVC filter is a permanent IVC filter, retrieval of the filter is much more challenging or sometimes impossible, whereas if an optional filter is used and maldeployed, it may be retrieved and repositioned relatively easily (Figure 3).

FILTER TILT

What degree of tilting of a conical-shaped IVC filter should be considered significant is debatable. However, once tilting of a conical-shaped filter occurs, there are in vitro data that show that the filtration efficiency of the filter may be reduced. In a few published series, there is a suggestion that conical-shaped filters with > 15° of tilting from the longitudinal axis of the IVC may reduce its filtration capability. Tilting of conical IVC filters has been associated with recurrent pulmonary emboli.[13,14] Therefore, if tilting occurs during deployment, filter repositioning may be considered. Using optional filters has significant advantage over permanent filters. Filter retrieval and repositioning is possible even when the filter is severely (> 45°) tilted.[15]

FILTER FRACTURE/MIGRATION

Filter fractures are not a common complication and have been reported in < 1% of cases; however, pregnant patients may be at greater risk for IVC filter fractures due to extrinsic compression from a gravid uterus.[16]

When placing a filter in women of childbearing age, possible long-term outcomes should be discussed with the patient and the referring physician, and the indications for filter placement should be carefully assessed.

Filter migration as a whole is also a rare complication.[17,18] It is important to keep in mind that fracture and migration of an IVC filter or recurrent PE should be suspected in a patient presenting with sudden, unexplained cardiopulmonary compromise and a known IVC filter in place. Although it is a rare complication, IVC filters can migrate to the heart and potentially lead to death. In most of these cases, the filter placed was not sized appropriately for the diameter of the IVC, the hooks of the filter did not adequately engage the caval wall, and/or a large thrombus caused the filter to become dislodged. Early detection of a migrated IVC filter may save a life. Once detected, a migrated filter may be retrieved endovascularly or surgically, depending on its location and its relationship with the cardiac structures (valves, chordae tendineae, papillary muscles, etc.). Filters can also become dislodged when intravascular procedures are performed and devices or guidewires become entangled with the filter. Most filters become fairly well endothelialized within 6 weeks, so a fair amount of force is needed to displace an appropriately sized and placed filter if it has been in place for a few months.

Filter Hooks and Strut/Leg Caval Penetration

Asymptomatic penetration of a filter hook and/or strut/leg through the IVC wall is not uncommon.[6] Probably the most important factor to assess is how deep the hook or strut/leg has penetrated. Is the penetrating hook and strut/leg at risk for injuring or penetrating an adjacent organ such as the aorta, duodenum (or any bowel), vertebral body, or ureter? Fortunately, most patients with this problem are asymptomatic. However, some patients may develop pseudoaneurysms, infections, bowel injuries, or pain. If the filter is retrievable and the patient is symptomatic, retrieval of the filter should be performed. It may be necessary to place another filter if the patient remains at risk for PE. If the patient is asymptomatic, retrieval can be considered depending on the estimated risk of doing nothing. In some instances, surgical removal of the filter may be necessary.

Fractures of the filter legs/struts have been more problematic with older versions of nitinol-based filters. Despite the many benefits of nitinol technology and its thermal memory characteristics, nitinol material tends to be more prone to fracturing.[19] Even more recent designs have led to numerous case reports of fractured struts/legs, with the free fragments migrating into hepatic veins and pulmonary artery branches; however, there is an effort to change the structure of newer nitinol filters. Because the fragments are small and often difficult to see, they become difficult to retrieve. Whether or not these fragments may lead to future problems is not clear; however, microscopic evaluation of the retrieved filter and limbs revealed bending metal fatigue at the fracture sites. Percutaneous retrieval of filters with arm fracture or arm migration is recommended.[20]

FILTER RETRIEVAL

IVC filter retrieval success depends on filter dwell time, the amount of filter hook and strut/leg penetration/endothelialization, the amount of metal material in contact with the IVC wall, and accessibility of the retrieval hook on the filter to the retrieval device. A variety of techniques and devices have been used to maximize the filter retrieval success rate.[6] In our institution, the retrieval success rate for the Günther Tulip filter is approximately 95% without significant complications, even with filters in place for > 6 months. After filter retrieval, a repeat IVC gram is performed to evaluate the integrity of the IVC. In our reported experience, there were no IVC stenoses > 40% and no extravasation.[6]

In our unpublished experience of more than 350 optional filter retrievals (seven different optional filter types), < 1% of retrieval patients have undergone balloon dilation for IVC stenoses > 70%. Several patients who had stenoses between 40% and 70% were managed conservatively and underwent repeat venography or cross-sectional imaging at follow-up. These patients were asymptomatic and shown to have improvement in their IVC stenoses. Although we have not experienced perforation or laceration of the IVC during filter retrieval, theoretically minor IVC perforations could potentially be managed with observation and gentle balloon tamponade because the IVC is a relatively low-pressure system. Frank extravasation of contrast suggests either a longitudinal or circumferential laceration, which would potentially require open repair or treatment with a covered endograft.

FILTER SAFETY

Overall, IVC filters do what they were designed to do—mechanical prevention of PE by trapping thrombus. Data demonstrate that in-hospital recurrent PE is less and survival greater with the use of anticoagulation and filters than with anticoagulation alone.[21] The judicious use of filters appears safe in appropriately selected patients, and long-term data suggest that filters do provide outcome benefits with regard to prevention of PE at a cost of a slightly increased risk for developing lower extremity swelling and recurrent deep vein thrombosis.[10,22,23]

CONCLUSION

With the development of optional IVC filters, their use has dramatically increased during the past decade despite the absence of level I data supporting its use. For this reason, the most important aspect of using an IVC filter is to ensure that there is an appropriate and good indication for its use. The operator should be very familiar with the device and the anatomy in which the filter is to be placed, knowledgeable and aware of normal variants, and use thoughtful and meticulous procedural planning and techniques to optimize the efficacy of the IVC filter, while minimizing the chance for a misadventure during device deployment. ■

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1. Kaufman JA, Kinney TB, Streiff MB, et al. Guidelines for the use of retrievable and convertible vena cava filters: report from the Society of Interventional Radiology multidisciplinary consensus conference. J Vasc Interv Radiol. 2006;17:449-459.
2. Hoppe H, Nutting CW, Smouse HR, et al. Günther Tulip filter retrievability multicenter study including CT follow-up: final report. J Vasc Interv Radiol. 2006;17:1017-1023.
3. Aidinian G, Fox CJ, White PW, et al. Intravascular ultrasound—guided inferior vena cava filter placement in the military multitrauma patients: a single-center experience. Vasc Endovasc Surg. 2009;43:497-501.
4. Hussain SM, McLafferty RB, Schmittling ZC, et al. Superior vena cava perforation and cardiac tamponade after filter placement in the superior vena cava—a case report. Vasc Endovasc Surg. 2005;39:367-370.
5. Usoh F, Hingorani A, Ascher E, et al. Long-term follow-up for superior vena cava filter placement. Ann Vasc Surg. 2009;23:350-354.
6. Turba UC, Arslan B, Meuse M, et al. Günther Tulip filter retrieval experience: predictors of successful retrieval. Cardiovasc Intervent Radiol. 2009. Epub ahead of print.
7. Sartori MT, Zampieri P, Andres AL, et al. Double vena cava filter insertion in congenital duplicated inferior vena cava: a case report and literature review. Haematologica. 2006;91(Suppl):ECR30.
8. Nanda S, Bhatt SP, Turki MA. Inferior vena cava anomalies—a common cause of DVT and PE commonly not diagnosed. Am J Med Sci. 2008;335:409-410.
9. Kalva SP, Chlapoutaki C, Wicky S et al. Suprarenal inferior vena cava filters: a 20-year single-center experience. J Vasc Interv Radiol. 2008;19:1041-1047.
10. Kinney TB. Update on inferior vena cava filters. J Vasc Interv Radiol. 2003;14:425-440.
11. Xenos ES, Minion DJ, Sorial EE, et al. Endovascular retrieval of an intraaortic greenfield vena cava filter. Vasc Endovascular Surg. 2008;42:165-167.
12. Cuadra SA, Sales CM, Lipson AC, et al. Misplacement of a vena cava filter into the spinal canal. J Vasc Surg. 2009;50:1170-1172.
13. Streiff MB. Vena caval filters: a comprehensive review. Blood. 2000;95:3669-3677.
14. Kinney TB, Rose SC, Weingarten KE, et al. IVC filter tilt and asymmetry: comparison of the over-the-wire stainless-steel and titanium Greenfield IVC filters. J Vasc Interv Radiol. 1997;8:1029-1037.
15. Turba UC, Glaiberman C, Picus D, et al. Management of severe vena cava filter tilting: experience with Bard G2 filters. J Vasc Interv Radiol. 2008;19:449-453.
16. Ganguli S, Tham JC, Komlos F, et al. Fracture and migration of a suprarenal inferior vena cava filter in a pregnant patient. J Vasc Interv Radiol. 2006;17:1707-1711.
17. Janjua M, Omran FM, Kastoon T, et al. Inferior vena cava filter migration: updated review and case presentation. J Invas Cardiol. 2009;21:606-610.
18. Wu GS, Gilet A, Kirshbaum M, et al. Inferior vena cava filter migration with severe deformity of filter. J Vasc Interv Radiol. 2009;20:1257-1259.
19. McCowan TC, Ferris EJ, Carver DK, et al. Complications of the nitinol vena caval filter. J Vasc Interv Radiol. 1992;3:401-408.
20. Hull JE, Han J, Giessel GM. Retrieval of the recovery filter after arm perforation, fracture, and migration to the right ventricle. J Vasc Interv Radiol. 2008;19:1107-1111.
21. Decousus H, Leizorovicz A, Parent F, et al. A clinical trial of vena caval filters in the prevention of pulmonary embolism in patients with proximal deep-vein thrombosis. Prevention du Risque d'Embolie Pulmonaire par Interruption Cave Study Group. N Engl J Med. 1998;338:409-415.
22. Hammond CJ, Bakshi DR, Currie RJ, et al. Audit of the use of IVC filters in the UK: experience from three centres over 12 years. Clin Radiol. 2009;64:502-510.
23. Eight-year follow-up of patients with permanent vena cava filters in the prevention of pulmonary embolism: the PREPIC (Prevention du Risque d'Embolie Pulmonaire par Interruption Cave) randomized study. Circulation. 2005;112:416-422.