Guidelines for the Use of Retrievable Vena Cava Filters

a report by

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Optional vena cava (VC) filters are filtration devices that can be placed percutaneously into the inferior VC (IVC) to provide protection from pulmonary embolism (PE). These devices can be either removed (retrievable filters) or altered in some way to no longer function as a filter while remaining in the IVC (convertible filters), although the latter are not yet commercially available. The retrieval of a filter is accomplished during a second percutaneous procedure through either a jugular or femoral venous access, using a snaring or other retrieval device. Left in place, optional filters function as permanent filters. These devices are considered distinct from temporary filters, which are tethered by an intravascular catheter or guidewire, are sometimes externalised through a venous access site and must be removed within a specified timeframe.

Retrievable IVC filters for short-term caval interruption are being utilised with increasing frequency. The availability of retrievable IVC filters has contributed to the progressive relaxation of the indications for filter placement. These changes in clinical practice occur in the absence of prospective, randomised trials confirming an actual benefit of removal of VC filters. In response to this lack of information, a multidisciplinary consensus panel has developed guidelines for the use of optional IVC filters. The members of the group were drawn from interventional radiology, trauma and vascular surgery and internal medicine (see Panel Members at the end of the article).

The goal of the group was to produce a guidelines document for all physicians using optional VC filters. The discussion focused on optional filters (retrievable or convertible) as a general class of devices, rather than on specific filters. The panel addressed the indications for placement of optional filters, recommending follow-up while filters are in place, the evaluation of patients before discontinuation of filtration and the management of patients after the procedure. The final document was published in March 2006.

Why the Interest in Optional Filters?
The first-line treatment and prevention of venous thromboembolism (VTE) remains pharmacological with anticoagulation. When a patient is at high risk of PE and anticoagulants are contraindicated or have failed, an IVC filter is usually placed. Filters do not treat established PE or deep vein thrombosis (DVT), nor do they prevent the development of new VTE. However, permanent VC filters are strongly believed to increase the long-term risk of DVT without reducing the overall mortality from VTE. Despite over 40 years of clinical experience, the role of permanent filters in patients with VTE remains a controversial area.

There are many risk factors for VTE and some, such as trauma or surgery, are transient. Along similar lines, the contraindication of anticoagulation in patients with, or at risk of, VTE may also be temporary. It seems reasonable that patients transiently at high risk of clinically significant PE and/or with transient contraindications of anticoagulation may not require permanent caval interruption. This reasoning, based on extrapolation from admittedly deficient data, is, in part, driving the use of optional VC filters.

What Are the Indications for Optional Filters?
All optional filters are approved for permanent implantation. Optional and permanent filters, as two classes of devices, perform with similar efficacy and safety profiles. In clinical practice, many optional filters often become permanent as a result of changes in the patient’s clinical status. Loss of patient to follow-up or inability to technically retrieve the device. No retrievable filter can be placed with an absolute certainty of removal. For this reason, the existing indications for permanent filters are wholly applicable to retrievable filters (see Table 1). There are no newly identified patient populations for whom permanent filters are absolutely contraindicated and optional filters are indicated.

How then to decide when to use a retrievable filter? The decision to use such a device should be made after the patient has demonstrated a legitimate indication for a caval interruption. Once the need for a filter is established, careful evaluation of the patient’s long-term risks for VTE and/or complications of anticoagulation, ability to comply with...
medications and medical care and life expectancy will determine which type of filter is most appropriate. The consensus panel recommended that patients with short-term risks for VTE and/or PE, short-term contraindication to anticoagulants, life expectancies greater than six months and the ability to comply with medications and follow-up appointments should be considered for optional filters (see Table 2). The intention of the life-expectancy recommendation is that patients will live long enough to realise the benefit of undergoing a filter-removal procedure. When uncertainty exists about one of these criteria, an optional filter can be placed, and the risk re-evaluated later.

Once the Retrievable Filter Is In, How Should Patients Be Managed?
Patients with retrievable VC filters require careful tracking and routine follow-up. This is not the customary practice for permanent filters. A recent report on trauma patients found that a common reason for failure to retrieve filters was poor rates of follow-up. The consensus panel recommends that the physician who placed the filter should take the responsibility of performing the follow-up.

The presence of the filter should not change how the patient is treated for VTE. Patients with optional filters placed for established VTE should have anticoagulant therapy initiated at the first safe opportunity. This is regardless of the presence of the VC filter, as the filter will not affect resolution of the existing VTE or prevent recurrent disease.

Patients with filters placed for prophylactic indications, such as trauma, should be assessed frequently for suitability for initiation of medical prophylaxis. This assessment should be made on a daily basis with the goal of instituting appropriate anticoagulant and mechanical VTE prophylaxis as soon as possible. In the event that a patient with filter placed for a prophylactic indication develops acute VTE, anticoagulation therapy should be initiated as soon as it is safe to do so.

When Is It Safe to Remove a Filter?
The most important step in the management of a patient with a retrievable filter is the decision to take the filter out, i.e. discontinue filtration. This topic has been discussed in great detail, as it relates to the fundamental difference between optional and permanent filters (see Table 3). The basic criterion for filter retrieval is that the patient has an acceptably low risk of clinically significant PE. Usually, this is when the patient is being managed satisfactorily with anticoagulation, i.e. primary therapy, or has surpassed the period of risk for VTE. In all cases, the risks of leaving the filter in situ must be weighed against the estimated future risk of development of recurrent PE.

The panel recommended that the following conditions be met by all patients before filter retrieval:

- The patient does not have a current indication for a permanent filter.
- The risk of clinically significant PE is estimated to be acceptably low due to sustained primary treatment (therapy or prophylaxis), or a change in clinical status. Patients should demonstrate the ability to tolerate and maintain primary treatment.
- The patient will not return to a high risk of PE in the near term, such as interruption of anticoagulant treatment for planned surgery, expected change in clinical management or anticipated change in clinical condition.

### Table 1: Indications and Contraindications for All Vena Cava Filters

| Absolute Indications (Proven VTE) | Relative Indications (Proven VTE) |
|----------------------------------|----------------------------------|
| Recurrent VTE – acute or chronic – despite adequate AC | Massive PE treated with thrombolysis/thrombectomy |
| Complication of AC               | Difficulty establishing therapeutic AC |
| Inability to achieve/maintain therapeutic AC | Chronic PE treated with pulmonary artery thromboendarterectomy |

#### Prophylactic Indications (no VTE, primary prophylaxis not feasible*)

- Trauma patient with high risk of VTE
- Surgical procedure in patient at high risk of VTE
- Medical condition with high risk of VTE

*VTE = venous thromboembolism, e.g. deep vein thrombosis (DVT) and/or pulmonary embolism (PE). AC = anticoagulation.*

### Table 2: When to Use a Retrievable Vena Cava Filter

1. The risk of clinically significant pulmonary embolism is transient.
2. The contraindication to anticoagulant medications is transient.
3. Life expectancy of at least six months.

### Table 3: When to Consider Retrieval of a Filter

1. Patient at low risk of clinically significant pulmonary embolism
   a. Patient with VTE
      i. Therapeutic anticoagulation for at least two to three weeks
      ii. No clinical evidence of recurrent or progressive VTE
   b. Patient without VTE
      i. Prophylactic anticoagulant therapy, or risk factors for VTE resolved
      ii. Normal bilateral lower-extremity venous duplex ultrasound
2. Patient is compliant with medications and follow-up care
3. Life expectancy >6 months
4. Return to a high-risk VTE status unlikely
5. Patient desires filter removal
Embolic Protection

anticoagulation – for example failure of anticoagulation – venous or pulmonary imaging is not necessary in patients who have been therapeutically anticoagulated before filter removal.

Patients whose filter was placed for prophylactic indications should not have clinical or objective evidence of interval development of VTE prior to filter removal. As most of these patients have received only prophylactic doses of anticoagulants, or none at all, the panel recommends that these patients undergo bilateral lower-extremity venous ultrasound to exclude DVT before filter removal. Should a patient develop acute VTE while a prophylactic filter is in place, he or she should be managed with primary therapy for VTE before considering removal of the filter.

What if Trapped Thrombus Is Discovered in the Filter at the Time of Retrieval?
Imaging of the filter and VC can be performed at the time of the retrieval with conventional catheter-based techniques, or within the antecedent 24 hours with contrast-enhanced computed tomography (CT), magnetic resonance venography or ultrasonography. The significance of the discovery of a trapped thrombus in a filter is different for patients who had VTE at the time the filter was placed compared with patients who had the filter inserted for prophylactic indications. In patients with known VTE, discovery of a thrombus in the filter requires an assessment of the risk of subsequent PE after the filter is removed. This assessment is based partly on the appearance of the trapped thrombus. For example, large amounts of bulky thrombus within the filter is an immediate embolic risk during retrieval, but more importantly may indicate inadequately treated VTE. Conversely, small filling defects adherent to filter struts pose little risk of PE during filter retrieval and imply a past and resolving embolic event. In some cases the patient with thrombus found in a filter can return after a few weeks of anticoagulation for another retrieval attempt. When in doubt, the filter should be left in place.

When a trapped thrombus is found in the filter of a patient who previously did not have a diagnosis of VTE, i.e. a filter placed for prophylactic indications, the diagnosis of new VTE must be made. The procedure should be terminated and appropriate anticoagulant therapy started, unless contraindicated. The patient can be re-evaluated for filter removal after an appropriate duration of anticoagulant therapy for at least several weeks.

Conclusion
When permanent filters were the only devices available, the decision to place a filter focused on the balance of the immediate risks of pulmonary embolism and anticoagulation.

Patients whose filter was placed for prophylactic indications should not have clinical or objective evidence of interval development of venous thromboembolism prior to filter removal.

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Panel Members
Consensus panel members: Daniel Becker, MD, MPH, Mark Cipolle, MD, PhD, Anthony J Comerota, MD, John A Kaufman, MD, Thomas B Kinney, MD, Steven F Millward, MD, Mary C Proctor, MS, Frederick B Rogers, MD, David Sacks, MD, Ronald F Sing, DO, Michael B Streiff, MD, Anthony C Venbrux, MD.

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