

Inferior Vena Cava Filters

Why, Who, and for How Long?



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KEYWORDS

• Vena cava • Filter • Venous thromboembolism

KEY POINTS

- Vena cava filters are indicated for the prevention of pulmonary emboli (PE) in patients who are unable to receive anticoagulation.
- Retrievable vena cava filters should be removed once the indication for PE prevention is no longer present.
- Patients with inferior vena cava (IVC) filters in place require close follow-up to ensure timely removal.

INTRODUCTION

The mainstay of treatment of patients with venous thromboembolic (VTE) disease is anticoagulation. Patients on anticoagulation have low rates of recurrent VTE, and patients with deep venous thrombosis (DVT) have low rates of subsequently developing pulmonary embolism (PE).^{1,2} Before current practice of anticoagulation, primary PE prophylaxis often consisted of surgical ligation or interruption of the inferior vena cava (IVC) as means of disrupting the route for PE to develop. These surgical procedures paved the way for IVC filters, which are used today. IVC filters are implantable devices designed to intercept thrombus that has broken free from the lower extremities or pelvis and prevent its migration to the lungs. The purpose of this article is to review IVC filters and their impact on VTE treatment.

TYPES OF INFERIOR VENA CAVA FILTERS

IVC filters are divided into 2 main categories: *permanent* and *retrievable*. *Permanent* IVC filters are

designed to remain within the patient for the duration of their lifetime and have no engineering considerations to facilitate removal. *Retrievable* (also known as *optional* or *removable*) IVC filters are specifically designed to allow for retrieval once the high-risk period for VTE has passed; however, these filters are also US Food and Drug Administration (FDA) approved to remain permanently. A novel category of IVC filters, the *temporary* IVC filter, are filters that are tethered to a cord or other device, such as a central venous catheter. These filters can be left in place for a very short amount of time while the patient is in the hospital and must be removed. Preliminary data suggest these temporary IVC filters may safely prevent PE in patients with transient indications for IVC filtration, such as trauma.^{3,4}

There is no consensus on any one filter design or type being superior to another. To date, no comparative studies of permanent versus retrievable filters have been conducted nor have there been any head-to-head studies of different filters within either category. Nonetheless, current

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practice patterns have led to a significant increase in the use of retrievable IVC filters, which are now placed much more commonly than permanent filters.⁵ Physicians should consider the length of time IVC filtration is necessary because there are some data to suggest that permanent IVC filters have fewer long-term complications than retrievable filters, and they are more cost-effective.⁶⁻⁸ However, if the indication for filtration is likely to be temporary (ie, the patient may be able to resume anticoagulation in the future), then a retrievable filter would be favored.

INDICATIONS/CONTRAINDICATIONS FOR INFERIOR VENA CAVA FILTER PLACEMENT

In the late 1990s, the PREPIC study was conducted to determine the safety and efficacy of IVC filters in the setting of proximal DVT.⁹ The landmark study found initial benefit of IVC filters in preventing PE, but this was offset by an increase in recurrent DVT in patients with an IVC filter. This study remains one of the few randomized controlled trials (RCT) that has been performed evaluating IVC filters, and the results play a major role in how IVC

filters are currently used. In today's practice, the most widely accepted indication for placement of an IVC filter is the prevention of PE in a patient with VTE and a contraindication to anticoagulation: this is the only unanimously agreed upon indication. Findings from a more recent RCT ("PREPIC II"), which included patients with a diagnosis of PE and DVT, confirmed that there was no reduction in the risk of recurrent, symptomatic PE at 3 months in anticoagulated patients who received an IVC filter versus patients on anticoagulation alone.¹⁰ Other accepted indications for placement of an IVC filter include a complication of anticoagulation, worsening of VTE despite adequate anticoagulation, VTE with poor cardiopulmonary reserve, high-risk or massive PE, and free-floating caval or iliac DVT. The most updated societal guidelines regarding the indications for placement of an IVC filter are highlighted in **Table 1**.

There are no absolute contraindications to IVC filter placement. The most updated recommendations from the American College of Chest Physicians (ACCP) state, "In patients with acute DVT or PE who are treated with anticoagulants, we recommend against the use of an inferior vena

Table 1
Societal guidelines for the placement of inferior vena cava filters

Guideline	Recommendations
CHEST/ACCP Guidelines ^{1,2}	<ul style="list-style-type: none"> • In patients with acute VTE and contraindication to anticoagulation (AC), recommend the use of an IVC filter • In patients with high-risk/massive PE, consider IVC filter in addition to anticoagulation • In patients with recurrent VTE despite adequate AC, IVC filter is an option of last resort
SIR Guidelines ³¹	<p>IVC filters are indicated in patients with PE or IVC, iliac, femoral, or popliteal DVT and one or more of the following:</p> <ul style="list-style-type: none"> • Contraindication to AC • Complication of AC • Failure of AC • Inability to achieve/maintain adequate AC • Thrombus progression despite adequate AC • High-risk/massive PE with residual DVT • Free-floating caval or iliac DVT • Severe cardiopulmonary disease and DVT <p>Prophylactic IVC filters (no documented DVT/PE) are indicated in the following settings:</p> <ul style="list-style-type: none"> • Severe trauma, closed head injury, spinal cord injury, multiple long-bone or pelvic fractures • Patients at high risk for VTE (immobilized, ICU patient, and so forth)
AHA Guidelines ³⁹	<ul style="list-style-type: none"> • Adult patients with any confirmed acute PE (or proximal DVT) with contraindications to anticoagulation or with active bleeding complication should receive an IVC filter • For patients with recurrent acute PE despite therapeutic anticoagulation, it is reasonable to place an IVC filter • Placement of an IVC filter may be considered for patients with acute PE and very poor cardiopulmonary reserve, including those with high-risk/massive PE

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