

## Using inferior vena cava filters to prevent pulmonary embolism

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### ABSTRACT

**OBJECTIVE** To review the evidence for using inferior vena cava (IVC) filters to prevent pulmonary embolism (PE) in high-risk patients.

**QUALITY OF EVIDENCE** Ovid MEDLINE was searched from 1966 to 2006 for all English-language papers on IVC filters. Evidence was graded according to the 3-level classification system. Most evidence found was level II.

**MAIN MESSAGE** Inferior vena cava filters are used to prevent PE in patients with contraindications to, complications of, or failure of anticoagulation therapy and patients with extensive free-floating thrombi or residual thrombi following massive PE. Current evidence indicates that IVC filters are largely effective; breakthrough PE occurs in only 0% to 6.2% of cases. Contraindications to implantation of IVC filters include lack of venous access, caval occlusion, uncorrectable coagulopathy, and sepsis. Complications include misplacement or embolization of the filter, vascular injury or thrombosis, pneumothorax, and air emboli. Recurrent PE, IVC thrombosis, filter migration, filter fracture, or penetration of the caval wall sometimes occur with long-term use.

**CONCLUSION** When used appropriately, IVC filters are a safe and effective method of preventing PE. Using retrievable filters might reduce long-term complications.

### RÉSUMÉ

**OBJECTIF** Réviser les données concernant l'utilisation des filtres de la veine cave inférieure (VCI) pour prévenir les embolies pulmonaires (EP) chez les patients à risque élevé.

**QUALITÉ DES PREUVES** On a recherché dans Ovid MEDLINE entre 1966 et 2006 tous les articles de langue anglaise sur le filtre de la VCI. Le système à trois niveaux a été utilisé pour classer les preuves. La plupart des données trouvées étaient de niveau II.

**PRINCIPAL MESSAGE** Le filtre de la veine cave inférieure est utilisé pour prévenir les EP chez les patients qui présentent des contre-indications, des complications ou un échec de l'anticoagulothérapie et chez ceux qui ont des thrombi flottants volumineux ou des thrombi résiduels après une EP massive. Les données actuelles indiquent que les filtres de la VCI sont fort efficaces; des EP les franchissent dans seulement 0,0-2,5% des cas. Les contre-indications à leur implantation sont l'absence d'accès veineux, l'occlusion de la veine cave, une coagulopathie non corrigable ou une septicémie. Les complications incluent: insertion au mauvais endroit ou embolisation du filtre, lésion ou thrombose vasculaire, pneumothorax et embolie gazeuse. À long terme, il peut se produire des EP récurrentes, des thromboses de la VCI, une migration ou une fracture du filtre, ou une pénétration de la paroi de la veine cave.

**CONCLUSION** Le filtre de la VCI, utilisé judicieusement, est une méthode sécuritaire et efficace pour prévenir les embolies pulmonaires. L'utilisation de filtres récupérables pourrait réduire les complications à long terme.

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Deep-vein thrombosis (DVT) as a consequence of surgery, immobility, or other factors is a common presenting complaint. Although most DVT remains confined to the calf, the likelihood of pulmonary embolism (PE) increases as DVTs extend proximally. Pulmonary emboli continue to be a major cause of morbidity and mortality.<sup>1</sup> Treatment for PEs is normally anticoagulation therapy; however, when this is contraindicated or there are additional risk factors, inferior vena cava (IVC) filters are commonly used to reduce risk of PE.

Inferior vena cava filters span the luminal diameter of the IVC and mechanically trap venous thromboemboli (VTE) from the lower extremities, preventing them from reaching and compromising pulmonary circulation. The filters do not have anticoagulant effects or prevent the occurrence of DVT.<sup>2</sup> They are implanted percutaneously with imaging guidance by interventional radiologists.

Generally, IVC filters are used for patients with proven VTE for whom anticoagulation therapy is contraindicated or proves ineffective. This includes those who have concurrent bleeding diatheses or active hemorrhage, recurrent VTE and PE despite conventional treatment, an inability to achieve or maintain therapeutic anticoagulation or poor compliance with anticoagulant medications, or those who have had pelvic surgery in the presence of extensive DVT or have had to discontinue anticoagulation therapy before surgery.<sup>3</sup> These filters are also used for patients with VTE who, despite anticoagulation therapy, remain at high risk of PE due to the location of the VTE, for example those who have extensive proximal or free-floating DVT.<sup>3</sup>

More recently, IVC filters have been used as a prophylactic measure for patients at high risk of developing, but without established, VTE. This includes those with severe trauma, hypercoagulable states, prolonged immobilization, and severe cardiopulmonary disease, where even a minor PE can be fatal.<sup>3</sup>

Percutaneous filters have been available since the 1970s. Early use was limited, however, by high complication rates, including caval occlusion, filter migration, and recurrent PE.<sup>4</sup> Recent advances in composition and design of the filters and the introduction of removable filters have helped to decrease complications and increase usage.<sup>5</sup>

Inferior vena cava filters can be grouped as permanent, remaining indefinitely without a mechanism for percutaneous removal; temporary, tethered externally and removed within a limited time; or retrievable, designed as permanent devices but which can be

removed through a second procedure. Manufacturers' recommendations for removal vary, but retrieval has been carried out up to 1 year after implantation. There are 3 removable filters available in Canada at this time. Filters can be placed in other veins to prevent thromboembolism, but due to the limited data available on these placements, we will not discuss them in this article.

### Quality of evidence

Ovid MEDLINE was searched from 1966 to 2006 using the phrase *inferior vena cava filters* with the following search terms *adverse effects, or standards, or classification, or statistics and numerical data, or contraindications, or economics, or trends, or utilization*. The search yielded 322 articles. Limiting the search to the English language resulted in 261 articles. Among these, we excluded articles from review if it was evident from the title, abstract, or key words that the studies had fewer than 20 patients, did not use a clinical measure as outcome, or were duplicate or review articles. References from all articles were scanned for other relevant articles. In all, 17 relevant studies were analyzed. Most published data on IVC filters comes from large retrospective or prospective case studies, although 1 randomized trial was conducted in 2005.

### Levels of evidence

**Level I:** At least one properly conducted randomized controlled trial, systematic review, or meta-analysis

**Level II:** Other comparison trials, non-randomized, cohort, case-control, or epidemiologic studies, and preferably more than one study

**Level III:** Expert opinion or consensus statements

### How filters are placed

Choice of access site depends on a patient's anatomy, the site of VTE, and the type of filters available. Generally, the right internal jugular vein or the right femoral vein is the preferred route, but left-sided venous approaches or approaches from arm veins can be used in some circumstances. Ultrasound scanning is often used to confirm entry site and to guide puncture in difficult cases.

Using local anesthetic, the subcutaneous tissues are infiltrated and the vein punctured under strict aseptic conditions. A cavagram is generally done to confirm anatomy and the presence or absence of intraluminal filling defects, and to identify the renal veins and anatomical variants. Conscious sedation with midazolam and fentanyl can be used. Following the cavagram, the diameter of the IVC is calculated; most filters cannot be placed if the cava is larger than 28 mm, the exception being the bird's nest filter.

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The filter is usually placed below the renal veins but can be placed in a suprarenal position when there is renal vein thrombosis or thrombus extending proximal to the renal veins, during pregnancy, and when there is thrombus proximal to an indwelling filter. The procedure usually takes less than 60 minutes.

### When and how filters are removed

The main criterion for removing a temporary or retrievable IVC filter is an acceptably low risk of PE. This might be the case when a patient is having sufficient primary therapy and has no current or looming contraindications to maintaining this therapy. Interrupting medical anticoagulation is not necessary during retrieval.<sup>3</sup> Retrieval can also be attempted if the device migrates or loses its structural integrity or if perforation occurs, although in such circumstances, removal might not be possible. Retrieval is not always possible if the filter is strongly adhered to the IVC wall or is angulated.

Before removal, patients should undergo imaging to rule out DVT. If DVT is present, the procedure should be postponed and therapeutic anticoagulation continued for at least 2 to 3 weeks.<sup>3</sup> Timing of removal remains controversial, as there is insufficient evidence on this issue; it remains a matter of clinical judgment.

Fluoroscopic imaging of the IVC or contrast-enhanced computed tomography or magnetic resonance venography is done before removal. Identifying trapped thrombus in the filter, especially a large volume of it, increases the risk of PE during retrieval, and retrieval is not usually attempted if the thrombus volume exceeds 1 mL. If this is the case, removal of the filter should be postponed and medical therapy initiated or continued. After the filter is removed, a final radiographic assessment of the IVC is done to detect any trauma to, or residual thrombus in, the IVC. The filter itself is also examined to see whether it is structurally intact.

### Outcomes of using IVC filters

Several large studies have examined the outcomes of using IVC filters for preventing PE (Tables 1<sup>6-11</sup> and 2<sup>12-22</sup>). Most data are derived from nonrandomized case series. Substantial differences exist between studies with respect to subject populations as well as to intensity, comprehensiveness, and duration of follow-up.

For permanent filters, research has shown that breakthrough PE—despite the IVC filter—occurred in 0% to 6.2% of cases.<sup>6-11</sup> One randomized controlled trial<sup>10</sup> showed that PE occurred in 15.1% of high-risk patients who did not receive IVC filters. Other studies on removable filters showed breakthrough PE occurring in 0% to 1.9% of cases.<sup>12-22</sup>

The primary benefit of IVC filters is to prevent or substantially reduce the occurrence of PE in patients who either have or are at high risk of developing PE and for whom medical management is not suitable. Absolute

contraindications to implanting IVC filters include lack of an access route to the IVC or no suitable location in the IVC for placing a filter. Relative contraindications include severe coagulopathies, septic emboli, or positive blood culture results.<sup>23</sup>

### Complications

Various complications have been reported with use of IVC filters. In the short-term, access site hematomas were noted in 2.4% to 4.2% of cases,<sup>8,11,14</sup> access site thrombosis in 3.8% to 4.2% of cases,<sup>8,21</sup> and in 1 series, access site infection in 1% of cases.<sup>11</sup> Filter misplacement occurred in 1.1% to 4.6% of cases.<sup>7,14,16</sup> No vascular injury, arteriovenous fistula, or air emboli were reported. Most complications were relatively minor; however, if an IVC filter is inadvertently placed in an iliac vein, protection from emboli in the contralateral lower limb is not provided. Misplacement can also jeopardize removal.

In the long-term, filter sepsis occurred in up to 1.2%,<sup>12</sup> filter thrombus in 3.1% to 11.4%,<sup>7,8,12-14,16,20-22</sup> angulation in up to 0.6%,<sup>12</sup> and endothelialization despite planned retrieval in up to 1.9% of cases.<sup>12,21</sup> Inferior vena cava occlusion occurred in 0.6% to 6.7% of patients<sup>6,8,9,12,22</sup> and filter migration in 1% to 3%.<sup>6,13,16</sup> There were no reports of filter fracture or penetration through the caval wall. Thrombus formation, angulation, and endothelialization are complications that preclude removal of the filter. Inferior vena cava occlusion causes painful, edematous lower limbs, and migration can be serious depending on where the filter lodges. In the studies examined, no patients required surgery to retrieve migrated filters.

New DVT formation, with IVC filters in situ, was reported in 3.1% to 44% of cases.<sup>6,8,10,14,16,19,20</sup> The lone randomized trial showed that DVT occurred in patients with IVC filters more often (35.7%) than in those without (27.5%).<sup>10</sup> Additional research is required to substantiate this.

There can be difficulties with filter removal. Retrieval failed in 0% to 23%<sup>12-22</sup> of cases, and postretrieval pneumothorax (6.3%) and transient Horner syndrome (6.3%) were reported in 1 case series.<sup>21</sup>

### Other treatments to consider

An IVC filter is not an alternative to traditional medical management. Anticoagulation therapy remains the first-line treatment for preventing PE and should be considered whenever possible before turning to filtration devices. Generally, anticoagulation therapy involves either unfractionated heparin or low-molecular-weight heparins, such as enoxaparin, followed by warfarin therapy. Comprehensive guidelines provide details on this type of management.<sup>24</sup>

Mechanical prophylaxis of VTE should also be considered. Mechanical methods include

Table 1. Results of studies on outcomes of use of permanent IVC filters

STUDY	TYPE OF STUDY	TYPE OF FILTER	NO. AND TYPE OF PATIENTS	FOLLOW-UP TIME	FINDINGS	COMPLICATIONS
Wojcik et al, <sup>6</sup> 2000	Uncontrolled retrospective review with prospective follow-up callback, case series	Various permanent filters (Greenfield, bird's nest, Simon-Nitonol)	105 patients: indications were DVT or PE or prophylaxis	Mean 28.9 mo (range 5-62)	No PE detected	1 filter migration (0.95%), 1 IVC occlusion (0.95%), 28 new DVTs (4.4%), 11 with leg swelling (10.4%)
Rousseau et al, <sup>7</sup> 2001	Uncontrolled prospective multicentre case series	6-F nitinol TrapEase permanent filter	65 patients: indications were DVT or free-floating thrombi with contraindication to anticoagulation therapy or complications developing from anticoagulation therapy	6 mo	95.4% technical success (3 wrongly inserted filters); no symptomatic PE after 6 mo	3 filter misplacements (4.6%), 23 deaths by 6 mo (35.4%); in 42 surviving patients, 2 filter thrombosis (4.8%) but no other complications (migration, filter fracture, vessel wall perforation)
Benevenia et al, <sup>8</sup> 2004	Retrospective review, comparative study of filters and mechanical DVT prophylaxis vs mechanical prophylaxis only	Various permanent filters	47 patients, all of whom had metastatic pathologic fractures in their lower extremities and for whom anticoagulation therapy was contraindicated; prophylactic treatment (24 received filters; 23 did not)	5 y	Filter group: 2 DVTs (8.3%), no PE. No filter group: 1 DVT (4.2%), 5 PE (22%) of which 2 were fatal	1 implantation revision (4.2%), 1 IVC occlusion and lower limb edema (4.2%), 1 femoral vein DVT at insertion site (4.2%), 1 insertion site hematoma (4.2%), 2 DVT (8.3%)
Zerati et al, <sup>9</sup> 2005	Uncontrolled retrospective review	Various permanent filters (LGM-VenaTech, Greenfield, TrapEase)	50 cancer patients with contraindications to full anticoagulation treatment	5 y	1 PE despite filter (2%)	20 deaths due to cancer progression (40%); of 30 survivors, 1 PE (3.3%), 2 IVC occlusions (6.7%), 1 filter thrombus (3.3%)
PREPIC study group, <sup>10</sup> 2005	Randomized trial	Permanent filters (VenTech, titanium GF, Cardinal, bird's nest)	400 patients: indications were DVT with or without PE, randomized to receive filter or not in addition to anticoagulation therapy for at least 3 mo	8 y	Symptomatic PE in 9 patients with filters (6.2%) and 24 patients without filters (15.1%); DVT in 57 with filters (35.7%) and 41 without filters (27.5%), post-thrombotic syndrome in 109 (70.3%) with filters and 107 (69.7%) without filters	At 8 years, 103 patients with filters had died (2 from PE), and 98 without filters had died (5 from PE); conclusion is that IVC filters reduce risk of PE but increase risk of DVT and have no effect on overall survival or major bleeding events
Dovrish et al, <sup>11</sup> 2006	Retrospective review, case series	Greenfield permanent filter	109 patients: indications were thromboembolism despite anticoagulation therapy, contraindication to anticoagulation therapy, prophylaxis, noncompliance with anticoagulation therapy	Median of 2 y	5 fatal PE despite filter (4.6%)	56 patients died, 4 patients with groin hematoma at insertion (3.5%), 1 localized infection at access site (0.9%); anticoagulation therapy as soon as possible following filter implantation resulted in 2.5-fold reduction in overall mortality and thromboembolic events

DVT—deep vein thrombosis, IVC—inferior vena cava, PE—pulmonary embolism.

**Table 2. Results of studies on outcomes of use of removable inferior vena cava filters**

STUDY	TYPE OF STUDY	TYPE OF FILTER	NO. AND TYPE OF PATIENTS	FOLLOW-UP TIME	FINDINGS	RETRIEVAL TIMES	SUCCESSFUL RETRIEVALS	COMPLICATIONS
Antevil et al., <sup>12</sup> 2006	Retrospective review, case series	Various retrievable filters	161 patients: indications were prophylaxis or demonstrated VTE in multitrauma patients	Mean 94 d (range 15–268)	1 case (0.5%) of PE despite indwelling filter	Mean 94 d (range 2–268)	33 of 43 attempts were successful (77%)	2 septic filters (1.2%), 1 IVC occlusion (0.6%), 8 filter thrombi (5%), 1 filter endothelialization (0.6%), 1 filter angulation (0.6%)
Bovyn et al., <sup>13</sup> 2006	Uncontrolled prospective case series	Tempofilter II temporary filter	103 patients: indications were complications, contraindications, or ineffectiveness of anticoagulation therapy	90 d postretrieval (range 34–252)	1 case (1.0%) of PE despite indwelling filter	29.5 d (range 2–86)	101 of 102 attempts were successful (99%)	16 filter thrombi (15.5%), 1 filter migration to right atrium (1%), 9 with moderate IVC narrowing (8.7%)
Rosenthal et al., <sup>14</sup> 2006	Uncontrolled prospective case series	Various retrievable filters	127 patients: indication was multitrauma	71 d (range 5–116)	1 case (0.8%) of postfilter retrieval PE; 4 DVTs (3.1%) while filter in place	71 d (range 5–116)	66 of 70 with indication for removal were successful (94%); 4 were left due to thrombus	39 patients died of other injuries (22.7%), 7 complicated filter placements (5.5%), 3 groin hematomas (2.4%), 3 misplaced filters (2.4%), 4 filter thrombi (3.1%)
Rosenthal et al., <sup>15</sup> 2005	Retrospective review, case series	OptEase retrievable filter	40 patients: indications were contraindication to anticoagulation therapy, recent major trauma, recent DVT or PE	3 mo	No incidence of PE	Mean 16 d (range 3–48)	100% successful retrieval of those attempted	2 cases of filter misplacement in right common iliac vein (5%)
Imberti et al., <sup>16</sup> 2005	Uncontrolled prospective multicentre case series	ALN retrievable filter	30 patients: indications were acute VTE with contraindication to anticoagulation therapy, prophylaxis following trauma, or prophylaxis before major surgery	Median of 18.2 mo	100% technical success; no PE found; 2 patients with DVT (6.7%)	Median of 123 d (range 30–345)	14 of 18 attempts were successful (78%)	3 filter emboli (10%), 1 filter migration (3%)
Allen et al., <sup>17</sup> 2005	Retrospective review, case series	Günther Tulip retrievable filter	51 patients: indications were prophylaxis or demonstrated VTE in multitrauma patients	21 d	No symptomatic PE	Within 14 d	24 of 25 attempts were successful (95%)	6 patients died of other causes (11.8%); no other complications; 29 filters became permanent (57%)
Oliva et al., <sup>18</sup> 2005	Prospective multicentre nonrandomized study	OptEase retrievable filter	27 patients: indications were DVT, PE, or high risk of PE with no known thromboembolic disease	Mean 11 d (range 5–14)	No symptomatic PE observed during filter placement and 1 mo postretrieval	Mean 11 d (range 5–14)	All 21 attempts were successful; 3 not removed due to ongoing contraindication to anticoagulation therapy, 2 left due to large filter thrombi, 1 left due to poor patient prognosis	None observed
Morris et al., <sup>19</sup> 2004	Retrospective review, case series	Various retrievable filters	130 patients: indications ranged from absolute to prophylactic	19 d (range 11–41)	1 case (0.8%) of postfilter retrieval PE	19 d (range 11–41)	15 patients had filters removed (93% technical success)	None observed

continued on page 54



Table 2 continued from page 53

STUDY	TYPE OF STUDY	TYPE OF FILTER	NO. AND TYPE OF PATIENTS	FOLLOW-UP TIME	FINDINGS	RETRIEVAL TIMES	SUCCESSFUL RETRIEVALS	COMPLICATIONS
Hoff et al, <sup>20</sup> 2004	Uncontrolled prospective case series	Günther Tulip retrievable filter	35 patients: indications were blunt trauma with no known thromboembolic disease but contraindication to anticoagulation therapy and mechanical prophylaxis	Range 6–14 d	No PE during hospital stay; 3 DVTs (8.6%) while filter in place	Mean 10.2 d (range 6–14)	18 of 22 attempts were successful (82%)	4 filter thrombi resulting in failed retrieval attempt (11.4%)
Terhaar et al, <sup>21</sup> 2004	Uncontrolled retrospective review with prospective follow-up callback, case series	Günther Tulip retrievable filter	53 patients: indications were planned major surgery with recurrent PE or high PE risk, extensive iliofemoral thrombus, DVT with anticoagulant complications, breakthrough PE despite anticoagulation therapy, and contraindication to anticoagulation therapy	13 mo (for permanent filter patients)	1 case of PE (1.9%)	Median 34 d (range 7–126)	16 of 19 attempts were successful (84%)	1 postretrieval pneumothorax (6.25%), 1 PE 12 h postinsertion (1.9%); 2 right internal jugular vein thromboses (3.8%), 1 transient Horner syndrome postretrieval (6.25%); 3 failed retrieval attempts (2 due to filter thrombi [3.8%], 1 due to adherence to IVC wall [1.9%]); 6 patients died (unrelated to filter placement or retrieval) (11.3%)
Millward et al, <sup>22</sup> 2001	Retrospective (and prospective) multicentre review, case series	Günther Tulip retrievable filter	90 patients: indications were PE or DVT with contraindication to anticoagulation therapy or prophylaxis after massive PE or free-floating thrombus or prophylaxis after trauma or before major surgery	Retrieved: mean 103 d (range 5–420); nonretrieved: mean 85 d (range 7–420)	97.6% technical success (2 wrongly inserted filters, no PE in retrieval or nonretrieval groups)	Mean 9 d (range 2–25)	52 of 53 attempts were successful (98%); 1 failure due to initial filter misplacement	Retrieval group: 3 deaths unrelated to filter, 1 misplaced in iliac vein (1.1%), 1 recurrent DVT 230 d postretrieval. Nonretrieval group: 7 deaths unrelated to filter, 10 large filter thrombi precluding planned retrieval (11.1%), 2 IVC occlusions (2.2%)

DVT—deep vein thrombosis, IVC—inferior vena cava, PE—pulmonary embolism, VTE—venous thromboemboli.

pneumatic compression stockings and aggressive mobilization after surgery.

### Referral for placement

Placement of IVC filters is available in all major centres in Canada and in most centres with practising interventional radiologists. Placement and removal of these filters is generally done in hospital for many reasons: the procedure requires technical expertise coupled with adequate fluoroscopic equipment, the complexity of scheduling filter placement with appropriate anticoagulation therapy is more easily managed in hospital, and interventional radiologists generally practise only in hospitals. Ideally, patients should be admitted to hospital if conventional therapy does not work, whether due to noncompliance or otherwise. Physicians providing in-hospital care can then refer their patients to interventional radiology if they feel filter placement is indicated. The ultimate decision for IVC filter placement and removal is a collaborative one between referring physician and radiologist. The procedure could be done on an outpatient basis, but this is not the current norm.

### Future directions

In recent years, use of IVC filters has surged; 1 report showed a greater than 12-fold increase in use from 1979 to 1999.<sup>5</sup> This trend is likely to continue owing to better and safer filters. More importantly, these devices are now being used for other indications, including prophylaxis despite absence of VTE, and in conjunction with anticoagulation therapy to reduce the likelihood of PE occurring in high-risk patients.<sup>5</sup> The quality of evidence is not yet ideal, however. Apart from 1 randomized trial in 2005, most data on these devices are drawn from nonrandomized case series. While these studies show that IVC filters are an acceptable method of preventing PE when anticoagulation therapy is no longer viable, little evidence suggests that IVC filters are prophylactically superior to anticoagulation therapy or that a combination of IVC filters and anticoagulation therapy is better than therapy alone. In fact, no studies to date compare the outcome of IVC filters with medical management. Randomized controlled trials are needed to determine

whether there are substantial differences among the many filters currently used.

Finally, more studies are required to create guidelines for when filters can be removed safely to minimize recurrence of PE and still maximize successful and safe retrieval of the filter.

## Conclusion

Inferior vena cava filters are effective at preventing PE in patients with proven DVT for whom medical anticoagulation is contraindicated or has failed. These filters are also used for patients at high risk of PE even if they do not have DVT. Studies to date show that only a very few cases of PE occur in patients with these filters. ✱

## Competing interests

None declared

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## EDITOR'S KEY POINTS

- Anticoagulation is the first-line therapy for treatment and prevention of pulmonary embolism (PE). In some patients with proven deep-vein thrombosis or at high risk of PE, however, medical anticoagulation is contraindicated or has failed. In these patients, inferior vena cava filters can be used to prevent PE.
- Current evidence indicates that these filters are usually effective in preventing breakthrough PE. Filters can be removed when a patient has an acceptably low risk of PE.
- Short-term complications are usually minor and include access-site hematomas and thrombosis. Complications, such as sepsis or thrombosis, can occur with long-term use.

## POINTS DE REPÈRE DU RÉDACTEUR

- L'anticoagulation est l'intervention de choix pour traiter et prévenir l'embolie pulmonaire (EP). Toutefois, chez certains patients présentant une thrombose veineuse profonde bien démontrée ou un fort risque d'EP, l'anticoagulation peut être contre-indiquée ou ne pas réussir. Chez ces derniers, le filtre de la veine cave inférieure peut être utilisé pour prévenir les EP.
- D'après les données actuelles, ce filtre est généralement efficace pour prévenir le passage de nouvelles EP. Il peut être retiré lorsque le risque d'EP est suffisamment bas.
- Les complications à court terme sont généralement peu sévères, telles des hématomes ou thromboses au site d'entrée. À long terme, des complications de septicémie ou de thrombose peuvent survenir.

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