Retrievable inferior vena cava filter use in major trauma

A Vasireddy, AM Phillips, D Lewis

King's College Hospital NHS Foundation Trust, UK

ABSTRACT

Venous thromboembolism (VTE) remains a devastating complication among trauma patients. However, conventional VTE prophylaxis is often contraindicated in major trauma patients due to concurrent injuries. This article discusses the use of retrievable inferior vena cava filters as a method for VTE prophylaxis in major trauma patients.

KEYWORDS

Vena cava filters – Venous thromboembolism – Pulmonary embolism

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CORRESPONDENCE TO

Aswin Vasireddy, SpR in Trauma and Orthopaedics, King's College Hospital, Denmark Hill, London SE5 9RS, UK
T: +44 (0)7838 388 230; F: +44 (0)20 3299 3497; E: avasireddy@doctors.org.uk

Deep vein thrombosis (DVT) and pulmonary embolism (PE) remain common, challenging and often devastating complications in trauma patients. Up to 4% of injury related deaths in the US are caused by PE related 'sudden death', frequently in patients who would otherwise have recovered from their injuries. Similar numbers are likely to occur in other countries.

Rigorous venous thromboembolism (VTE) prophylaxis is crucial when managing any patient. Traditional VTE prevention includes a variety of both mechanical and pharmacological methods. These therapies are not 100% effective, especially in critically injured, high risk patients, who may have contraindications to their use (eg bleeding and extremity injury).

Inferior vena cava filters

Inferior vena cava (IVC) filters have been proved to decrease the risk of PE in various patient populations including the critically ill and severely injured. Concerns include the safety and long-term effects of these devices. Retrievable filters offer a potential solution by offering early protection against PE while avoiding the complications of long-term filters. However, few high level studies of these devices exist.

A number of retrospective and prospective studies in the 1990s illustrated a reduction in the incidence of PE among trauma patients following the use of IVC filters.^{1,2} A contemporary systematic review of the literature found the rate of PE to be statistically lower in the IVC filter group compared with the matched control group without IVC filters.³ Further studies have shown that pulmonary emboli tend to develop in the first four days after admission.⁴ If IVC filter use is to

be considered, the decision to proceed should be made as early as possible.

British Society for Haematology guidelines on the use of IVC filters did not look at trauma in particular.⁵ However, they did suggest that anticoagulation should be given to patients with an IVC filter once the temporary contraindication to anticoagulation is no longer present. This guidance applies to those with an existing DVT and it is not known if it is appropriate for patients who have had a prophylactic IVC filter for trauma.

Guidelines on venous thromboembolism by the National Clinical Guideline Centre – Acute and Chronic Conditions recommend that temporary IVC filters should be offered to patients at a very high risk of VTE and for whom mechanical and pharmacological VTE prophylaxis are contraindicated.⁶ The recommendation also states that filters should remain in situ only for the period of increased risk and should be removed within three months. Permanent filters may be associated with an increased long-term risk of lower limb VTE.

The Eastern Association for the Surgery of Trauma (EAST) has the only published guidelines for the use of prophylactic IVC filters.⁷ They recommend the insertion of a prophylactic vena cava filter in high risk trauma patients such as those who cannot receive anticoagulation because of an increased bleeding risk and who have one or more of the following injury patterns: severe head injury (Glasgow Coma Scale score <8), incomplete spinal cord injury with paraplegia or quadriplegia, complex pelvic fractures with associated long bone fractures or multiple long-bone fractures.

A multicentre retrospective analysis of IVC filter practice patterns in North America found that of the 446 patients who

had a filter inserted, prophylaxis was the indication in 76%.⁸ Filters were usually inserted at 6 days. Retrieval was at 50 days. Only 22% of filters were retrieved because a large group of patients (31%) were lost to follow-up for a variety of reasons. Complications of filter placement were shown not to correlate with injury severity, the hospital placing the IVC filter, trauma volume, use of anticoagulation, age or sex. Three cases of migration, two break-through PEs and six symptomatic caval occlusions were recorded.

Studies have described the high loss to follow-up (approximately 30%) of patients with filters. The most common reason for this is due to transfer of patients to secondary or extended care facilities. Treated initially at major trauma centres, patients are repatriated to local hospitals, which may not have the requisite skills needed to remove filters or there may be a failure to communicate the need for filter removal. One way to minimise failure to remove the filter is to use a systematic multidisciplinary team approach to filter removal at the trauma unit.⁹

The EAST recommendations⁷ are used throughout the US. As much of the international evidence originates from the US, one should consider using these guidelines at major trauma centres in other countries, which may not have their own guidelines.

Conclusions

There is evidence that filters should be inserted as early as possible after trauma to prevent VTE. Once contraindications to anticoagulation have been removed, all patients should take pharmacological prophylaxis until their filter is removed. This should continue as warfarin for three months, when the filter can be removed. Major trauma centres should set up robust follow-up procedures. It may be

prudent to organise IVC filter removal prior to any patient being transferred from a major trauma centre to another hospital or rehabilitation unit.

The British Orthopaedic Association Trauma Group and Research Committee aims to set up a national trauma research network similar to that in Canada. Such a network would enable answers to the many research questions that exist with regards to the use of IVC filters in trauma patients.

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