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CASE REPORT

Case Report: Filtering the data on IVC filters [version 1; peer review: peer review discontinued]

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Abstract

Venous thromboembolic disease is associated with high rates of morbidity and mortality. First line therapy for thromboembolic disease remains anticoagulation. However, certain populations warrant consideration of an inferior vena cava (IVC) filter. This case report discusses an example of a patient who presented with an acute pulmonary embolism and highlights the utilization of the inferior vena cava (IVC) filter as patient therapy. Thus, in this case report we will review the indications for IVC filter placement and compare the compliance of IVC filter placement to established guidelines of use.

Keywords

Inferior Vena Cava Filter , Venous Thromboembolic Disease

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Introduction

Pulmonary embolism (PE) and deep vein thrombosis (DVT), collectively known as venous thromboembolism (VTE), remain significant clinical problems in the United States and are responsible for over 250,000 hospitalizations and 50,000 deaths per year in the U.S. alone⁴. In light of this, standard therapies of care have been established in managing VTEs. First line therapy in the management of VTE is anticoagulation. However, anticoagulation may often be contraindicated including in patients at an increased bleeding risk. In these patients, an alternative approach has been recommended via the interruption of the inferior vena cava (IVC). This case report will demonstrate an example of the use of the IVC filter as well as review the guidelines for IVC filter placement when systemic anticoagulation cannot be utilized.

Case

A 46-year-old woman presented with one week of worsening shortness of breath and sub-sternal chest pain. She also noted swelling of her bilateral lower extremities, but denied recent travel, smoking, or use of oral contraceptives. Past medical history was significant for a first trimester miscarriage 15 years prior. Heart rate was 104 and other vital signs were normal. There was a systolic murmur at the left-upper sternal border and trace bilateral lower extremity edema. Hemoglobin was 10.2 g/dL, with a normal MCV, and a pro-BNP was 5415 pg/mL. EKG revealed tachycardia with evidence of right heart strain in a S1Q3T3 pattern. A V/Q scan demonstrated extensive bilateral pulmonary emboli, with a possible saddle embolus and an echocardiogram showed right ventricular dilation and moderate to severe tricuspid valve regurgitation. Lower extremity dopplers revealed extensive left lower extremity thrombus from the femoral to the external iliac vein. The patient was started on low molecular weight heparin at a dose of 1mg/kg every 12 hours and an IVC filter was placed given the substantial clot burden. Evaluation for a hypercoagulable state including factor V Leiden deficiency and a comprehensive antiphospholipid profile were unremarkable. Follow-up lower extremity dopplers three months later revealed improvement of thrombus in the evaluated veins including the peroneal, common femoral, and external iliac veins. A repeat echocardiogram six months later showed resolution of right heart strain pathology. The patient followed up with the hematology department and the decision was made to continue the patient on life-long anticoagulation in the setting of an unprovoked venous thromboembolism. The patient also followed up with the radiology department about eight months after filter insertion, but given the time that had lapsed since it was inserted and the increased difficulty of extraction, the filter was not removed at that time.

Discussion

Venous thromboembolic disease remains a significant clinical problem in the United States with mortality rates reaching as high as 30% for pulmonary embolism alone if left untreated⁵. While first line treatment for venous thromboembolic events remains systemic anticoagulation, certain populations warrant consideration of an inferior vena cava (IVC) filter. The American College of Chest Physicians (ACCP) and the Society of Interventional Radiology (SIR) recommend IVC filters in patients at an increased bleeding risk who are unable to tolerate systemic anticoagulation. The SIR extends IVC filter use to patients with free-floating proximal DVTs, massive PE treated with thrombolysis/thrombectomy, chronic PE

treated with thromboendarterectomy, VTE with limited cardiopulmonary reserve, poor compliance to anticoagulant medications, high risk of complication of anticoagulation such as frequent falls, and as in our patient, ilio caval DVTs. The SIR also recommends IVC filter use for prophylaxis in patients with a hypercoagulable state, during periods of immobilization such as after trauma, or in surgical patients who cannot tolerate systemic anticoagulation⁷. Given these recommendations, IVC filter placement is becoming increasingly common with a 25-fold increase in the use of IVC filters from 1979 to 2009⁶. Currently 58% of new filters are placed solely for prophylactic use⁶.

With the surge in utilization of IVC filters, it is crucial to ascertain the efficacy of IVC filters in preventing pulmonary embolism. Data shows incidence rates of PE to be as low as 2–4% following filter placement³. However, much of the data is collected from retrospective systematic reviews and does not compare IVC filter use to anticoagulation. In a randomized controlled trial of the efficacy of IVC filters combined with anticoagulation compared to anticoagulation alone, there was no statistically significant difference in the incidence rate of PE, suggesting that IVC filters offer no additional benefit if anticoagulation can be tolerated³. There are also no large randomized control trials comparing the efficacy of IVC filter placement as a prophylactic measure, despite increasing use for this indication. In addition, several retrospective studies have assessed the compliance of IVC filter placement with accepted standards. Approximately 80% of IVC filter placements met SIR guidelines, whereas only 40% met ACCP guidelines¹. In our case, IVC filter placement only met SIR guidelines.

Several severe complications including increased risk of DVTs (5.4%), vena cava obstruction (2.8%), filter migration (1.3%), filter fracture, and vena cava perforation have all been affiliated with IVC filter use⁶. The use of an IVC filter for greater than 30 days was associated with an increased risk of all complications. However, rates of removal of retrievable IVC filters ranged as low as 12% to 45%⁶. In summation, with the increased utilization of IVC filters, the low rates of compliance to accepted guidelines, the low rates of removal of IVC filters, and the potential for serious complications it is crucial for clinicians to be aware of current guidelines for filter placement and understand their efficacy. With this knowledge, clinicians will be able to make an informed decision on when to appropriately utilize the inferior vena cava as patient therapy.

Consent

Written informed consent for publication of their clinical details was obtained from the patient.

Author contributions

HK conceived the case report. HK prepared the first draft of the case report. All authors were involved in the revision of the drafts and have agreed to the final content.

Competing interests

No competing interests were disclosed.

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