



Senior Medicine Rotation: Evidence-Based Medicine Project
Stewart Reed

Resident Name: Christine Chan **Block:** June **Date:** 6/28/2013

Case SIGNOUT:

Ms. MM is a 70 year-old lady with a history of hypertension, non-insulin dependent diabetes, coronary and peripheral artery disease, remote MI, diastolic heart failure, cerebrovascular disease, and two prior provoked DVTs (one during pregnancy, another following trauma sustained from a motor vehicle accident), but no prior PE. She presented to the ED with left lower extremity swelling and pain. Recent outpatient lower extremity venous duplex showed left-sided thrombosis of the common femoral and distal superficial femoral veins (proximal DVT). A previous evaluation for hypercoagulable states was negative for proteins C and S, and anti-thrombin III deficiency, as well as hyperhomocysteinemia and anti-phospholipid and anti-cardiolipin antibodies. She had, however, declined genetic testing for Factor V Leiden and prothrombin gene mutations. Regarding treatment for her DVT, she refused to self-inject or have a visiting nurse inject Lovenox at home, and declined rivaroxiban as an alternative to Coumadin, so she was admitted for a Lovenox bridge to Coumadin.

Clinical Question:

Would the addition of an IVC filter to anticoagulation therapy decrease the patient's risk of pulmonary embolism secondary to her proximal lower extremity DVT?

BACKGROUND:

Mechanism: In most patients with pulmonary embolism (PE), the most important pulmonary derangement is mismatching of ventilation and perfusion leading to hypoxemia. Those with diastolic heart failure are more sensitive to decreased LV filling caused by tachycardia, which is one of the most common physiologic consequences of PE.

Epidemiology: Recent hospital-based studies estimate an incidence of 1 case per 1000 persons per year, with 200,000 to 300,000 annual hospitalizations. 30% of untreated patients die, and 8% of those receiving effective therapy die.

Clinical presentation: Tachypnea and tachycardia are the most common signs of PE, but they are also nonspecific. Dyspnea, pleuritic chest pain, hemoptysis, lightheadedness, syncope, pleural rub, accentuated P2, RV dysfunction, TR, hypotension, elevated JVP.

DDx: pneumonia, musculoskeletal pain, pneumothorax, costochondritis, congestive heart failure, chronic lung disease, asthma, acute MI, aortic dissection, pericarditis, and anxiety states.

Dx: D-dimer: Sensitivity and negative predictive value for VTE are 98% or above. **ABG:** hypoxemia, hypocapnia, respiratory alkalosis.

ECG: manifestations of acute cor pulmonale, such as the S₁ Q₃ T₃ pattern (10%), right bundle-branch block, or right axis deviation. 20% of patients with PE have no ECG changes. **CXR:** evidence of pulmonary infarction (Hampton hump=wedge-shaped, pleural-based consolidation with a rounded convex apex directed towards the hilus) or decreased vascularity (Westermark sign=increased translucency on frontal radiographs). **Contrast-enhanced CT-chest:** PIOPED II: sensitivity 83%, negative predictive value of a normal CT scan was 96% in patients with a low pre-test probability of embolism and 89% for those with an intermediate probability, but only 60% in those with a high-probability. **V/Q scanning:** nondiagnostic in up to 70% of patients with suspected PE, although indicated for patients in cases of contrast allergy, renal insufficiency, and pregnancy. **Echo:** RV dysfunction with regional wall motion abnormalities=*McConnell sign*=severe hypokinesia of the RV free wall combined with preserved systolic contraction of the RV apex.

Pulmonary angiography=gold standard.

Management: LMWH or unfractionated heparin as a bridge to warfarin; dabigatran; rivaroxiban; thrombolytics for severe cases.

Prognosis: Shock, hypotension, and RV dysfunction by TTE are associated with a higher risk of death from acute PE.

Search Strategy

Database: Pubmed. Search query: permanent vena cava filter pulmonary embolism prevention.149 results.

Article chosen:

Eight-Year Follow-Up of Patients With Permanent Vena Cava Filters in the Prevention of Pulmonary Embolism : The PREPIC (Prévention du Risque d'Embolie Pulmonaire par Interruption Cave) Randomized Study The PREPIC Study Group. *Circulation*. 2005;112:416-422.

*This is the only long-term randomized study of filter placement in the prevention of pulmonary embolism.



Group	Criteria or definition	n
Study population.	400 patients hospitalized for acute proximal DVT at 44 centers in France with baseline mean age 72.5 years, 47.5% male, 35.5% with history of VTE, 22% with cardiac or respiratory insufficiency, 14% with cancer, 60% with idiopathic thromboembolism, 36% with symptomatic PE at presentation, and 26.5% with venous insufficiency.	400
Inclusion criteria	Age >18 years, acute proximal DVT confirmed by venography, considered by their physicians to be at high risk for PE.	
Exclusion criteria	Placement of a previous filter, contraindication to or failure of anticoagulant therapy, curative anticoagulant therapy lasting >48 hours, an indication for thrombolysis, short life expectancy, allergy to iodine, hereditary thrombophilia, severe renal or hepatic failure, pregnancy, or likelihood of nonadherence.	
Treatment group	Anticoagulant therapy with IVC filter	200
No treatment group	Anticoagulant therapy with NO IVC filter	200

Primary endpoint: Symptomatic PE within 8 years.

Secondary endpoints: Recurrent DVT within 8 years, death due to any cause within 8 years.

Are the Results of the Trial Valid?: Yes.

1. Patients were **randomized** to either receive or not receive a filter in addition to standard anticoagulant treatment for at least 3 months. The groups are similar in demographic and clinical features as shown in Table 1 of the article.
2. Among the 400 patients initially recruited in the study, **outcome data** were available for 396 (**99%**).
3. All analyses were performed on an **intention-to-treat** basis. Of note, 19 patients among 200 assigned to the no-filter group subsequently received a filter during the study period.
4. All documented events were reviewed **blindly** by an independent committee.
5. All patients received standard anticoagulant therapy and either received or did not receive an IVC filter.

Are the Results of the Trial important?: Yes.

Cumulative rate of **symptomatic PE** at 8 years, filter versus no filter: Hazard ratio = 0.37 (95% CI 0.17-0.79) p=0.008; cumulative rate of **symptomatic recurrent DVT**: 1.52 (1.02-2.27) p=0.042; **post-thrombotic syndrome** (chronic leg pain with edema, varicose veins, and ulcers): HR=0.87 (0.66-1.13) p=0.30 (not statistically significant; **Death**: 0.97 (0.74-1.28) p=0.83 (not statistically significant).

Endpoint	Result	Significance	ARR	NNT
Symptomatic PE at 8 years	HR=0.37 (0.17-0.79) p=0.008	Reduced risk of PE	0.075(7.5%)	13.3
Symptomatic recurrent DVT	HR=.52 (1.02-2.27) p=0.042	Higher risk of recurrent DVT	AttR=0.08	NNH=12.5

Can I apply these results to my patient?: Yes.

Ms. MM is similar to the patients in the study in terms of their baseline demographics and clinical features. She is 70y/o with prior DVTs, heart failure, venous insufficiency, and she presented with idiopathic proximal LE thrombosis.

Conclusion:

Likely benefits outweigh potential harms and cost: IVC filters protect against the long-term development of PE while increasing the risk for DVT without a higher incidence of post-thrombotic syndrome. Vena cava filters are most beneficial in selected patients with a significant risk of fatal PE, such as patients with cardiorespiratory disease or advanced cancer. Given Ms. MM's diastolic heart failure, it would be reasonable to consider an IVC filter to protect her against long-term PE.

SOURCES:

1. Eight-Year Follow-Up of Patients With Permanent Vena Cava Filters in the Prevention of Pulmonary Embolism: The PREPIC (Prévention du Risque d'Embolie Pulmonaire par Interruption Cave) Randomized Study. The PREPIC Study Group. *Circulation*. 2005;112:416-422.
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