



ASH evidence-based guidelines: what is the role of inferior vena cava filters in the perioperative prevention of venous thromboembolism in bariatric surgery patients?

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A 38-year-old morbidly obese male (BMI > 50 kg/m²) presents for an elective gastric bypass surgery. He has no personal or family history of venous thromboembolism or hypercoagulability. You are asked by his primary team whether he should receive a retrievable inferior vena cava filter preoperatively for venous thromboembolism prophylaxis.

Patients undergoing bariatric surgery are at high risk of venous thromboembolism (VTE). Obesity, along with the added risk of surgery and a lack of clear guidance describing the dosing of pharmacologic prophylaxis, increases the risk of VTE compared with other patients undergoing surgery. VTE is the leading cause of preventable postoperative death in bariatric surgery patients.¹⁻³ The reported incidence of deep vein thrombosis (DVT) is 1% to 3% and pulmonary embolism (PE) is 0.3% to 2%; mortality in patients with PE is as high as 30%.⁴⁻⁸ In addition, certain high-risk features among bariatric patients such as BMI higher than 50 kg/m², immobilization, venous insufficiency, prior VTE, or known hypercoagulability are independent risk factors for perioperative mortality.⁹⁻¹³ Most PEs occur within 1 month after bariatric surgery and may occur despite pharmacologic prophylaxis.^{3,14} Therefore, many clinicians advocate the use of routine preoperative inferior vena cava filters (IVCFs) in select high-risk bariatric surgery patients. A survey of the American Society of Bariatric Surgery found that for high-risk bariatric patients the placement of IVCFs as VTE prophylaxis has increased from 7% in 1998 to 55% in 2007.^{5,15}

To examine current best evidence for the use of IVCFs in bariatric surgery we conducted a Medline search between 1950 and June 2009. Keywords “inferior vena cava filter” (2239 hits) and “bariatric” yielded 24 articles, from which two additional references were taken from the bibliographies. Fifteen articles were excluded: 4 included no original data, 5 did not report VTE outcomes, 1 was a preliminary report, and 5 were not relevant. In total, 11 studies were

included: 3 retrospective case series,^{13,16,17} 3 retrospective case-control,¹⁸⁻²⁰ 4 prospective case series,²¹⁻²⁴ and 1 combined retrospective review and prospective case-control studies¹¹ (see **Table 1**).

IVCF insertion and removal is safe and successful (98%) in bariatric patients, especially with ultrasound guidance.¹⁶ Vaziri et al present a prospective case series of patients undergoing retrievable IVCF placement with postoperative screening for DVT. Six of 29 patients (21%, 95% CI 8%-40%) had DVT. No PEs or mortality occurred. The authors concluded that IVCFs may (a) prevent PE and (b) increase DVT.²⁴ Piano et al described 59 high-risk bariatric surgery patients who underwent retrievable IVCF placement. Ninety percent were successfully retrieved. One patient developed a nonfatal PE, although this patient was not receiving pharmacologic prophylaxis.²³ Obeid et al conducted a retrospective analysis comparing all high-risk patients who received a prophylactic IVCF with a low-risk population who did not receive IVCFs prior to bariatric surgery. The odds ratio for DVT was 1.87 (95% CI, 0.526-6.7), for PE was 1.36 (95% CI, 0.3-6.19) in the high-risk group. The authors concluded that IVCF placement in high-risk patients reduced the risk of PE to a rate no different than patients believed to be of low risk.¹⁹ Gargiulo et al studied the incidence of PE after a BMI higher than 55 kg/m² was added as an indication for IVCF in their practice. The perioperative PE rate was reduced from 13% (95% CI, 1.1%-24.7%) to 0% (95% CI, 0%-8.7%). Fatal PE rate was reduced from 10% (95% CI, 0%-20%) to 0% (95% CI, 0%-8.7%). Neither comparison was statistically significant.¹¹

Table 1. Observational studies evaluating inferior vena cava filters (IVCF) in bariatric surgery.

Reference	Study type	Bariatric patient groups	Outcome
Frezza 2006 ²⁰	Retrospective case-control	High risk + IVCF, n = 9 High risk + intraop UFH, n = 15	No PE or DVT
Gargiulo 2006 ¹¹	Retrospective review and prospective case-control	1. High risk, not including BMI, n = 8 2. BMI >55 kg/m ² added to criteria for IVCF, n = 33	Decreased PE (13% vs 0%) and fatal PE (10% vs 0%) favoring IVCF
Halmi 2007 ²¹	Prospective case series	High risk, n = 27	No DVT or PE
Kardys 2008 ¹⁶	Retrospective case series	High risk, n = 31	DVT 1/31, PE 2/31
Keeling 2005 ¹³	Retrospective case series	High risk, n = 14	No PE
Obeid 2007 ¹⁹	Retrospective case-control	1. High risk + IVCF, n = 248 2. Low risk, no IVCF, n = 1851	No difference in PE (0.81% vs 0.59%), DVT (1.21% vs 0.65%), or death (0.81% vs 0.22%)
Overby 2008	Retrospective case-control	1. High risk + IVCF, n = 160 2. Low risk, no IVCF, n = 170	No difference in PE (3% vs 2%) or DVT (0.6% vs 3%)
Piano 2007 ²³	Prospective case series	High risk, n = 60	1/60 PE (no pharmacologic prophylaxis)
Schuster 2007 ¹⁷	Retrospective case series	High risk, n = 24	DVT 5/24, PE 1/24 (after IVCF retrieval)
Trigilio-Black 2007 ²²	Prospective case series	High-risk, n = 41	DVT 1/41, no PE
Vaziri 2008	Prospective case series	High risk, n = 30	DVT 6/30, no PE

PE indicates pulmonary embolism; DVT, deep vein thrombosis; UFH, unfractionated heparin.

IVCFs are associated with short-term and long-term complications such as insertion site thrombosis, DVT, caval occlusion, post-thrombotic syndrome, filter migration, and breakthrough PE, which are well described, of unknown frequency, and may result in long-term morbidity or death. Most importantly, however, the presence of an IVCF may delay institution of effective pharmacologic prophylaxis since the patient may be perceived to be “protected” from VTE by the IVCF. Based on these considerations we conclude that there is insufficient evidence to support the use of IVCFs at the time of bariatric surgery (Grade 2C recommendation against their use). This recommendation is based on the fact that data supporting their use are limited to retrospective and prospective observational studies without appropriate comparison groups—furthermore, the use of pharmacological prophylaxis has not been optimized in many studies, and other variables such as cost, inconvenience and the long-term outcome of patients with filters that were not removed has not been adequately described. Randomized controlled trials are needed to evaluate the safety and efficacy of IVCFs for prevention of PE in the bariatric population.

Disclosures

Conflict-of-interest disclosures: MAC is a consultant for Sanofi-Aventis, Leo Pharma, Pfizer, Bayer, Boehringer Ingelheim, and Artisan Pharma; receives honoraria from Sanofi-Aventis, Leo Pharma, Pfizer, Bayer, and Boehringer Ingelheim; receives research funding from Sanofi-Aventis, Leo Pharma, and Pfizer; and sits on advisory committees or

the board of directors for Sanofi-Aventis, Bayer, Boehringer Ingelheim, and Artisan Pharma. AR declares no competing financial interests.

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