

Peripartum Primary Prophylaxis Inferior Vena Cava Filter Placement in a Patient with Stage IV B-Cell Lymphoma Presenting with a Pathologic Femur Fracture

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Abstract

Keywords

- ▶ inferior vena cava filter
- ▶ pregnancy
- ▶ pulmonary embolus
- ▶ prophylaxis
- ▶ metastatic lymphoma

Background Pulmonary embolus (PE) remains a leading etiology of maternal mortality in the developed world. Increasing utilization of retrievable inferior vena cava (IVC) filter placement currently includes pregnant patients.

Case A 22-year-old woman at 27 weeks' gestation was diagnosed with Stage IV high-grade malignant B cell lymphoma following pathologic femur fracture. Significant risk factors for PE led to placement of primary prophylaxis IVC filter before cesarean delivery, open reduction and internal fixation of the fractured femur, and chemotherapy.

Conclusion This case supports that primary prophylaxis placement of IVC filters in highly selected pregnant patients may assist in decreasing PE-associated maternal mortality.

Pulmonary embolus (PE) remains a leading cause of maternal death in the United States and the developed world.^{1–3} According to the recent U.S. vital statistics, PE contributed to 19.6% of maternal deaths or 2.3 pregnancy-related deaths per 100,000 live births.¹ The incidence of PE is reported to be higher after cesarean than after vaginal delivery, by a factor of 2.5 to 20, and the incidence of fatal PE by a factor of 10.² According to the Confidential Enquiry into Maternal Death in the United Kingdom, more than three-fourths of the postpartum deaths caused by thromboembolism were associated with cesarean delivery.³

Placement of retrievable inferior vena cava (IVC) filters in the management of patients with deep venous thrombosis (DVT)/PE, especially in cases in which

anticoagulation is contraindicated, is increasing and currently includes pregnant patients.^{4–6} We report an unusual case of a pregnant patient at 27 weeks' gestation diagnosed with Stage IV B cell lymphoma, following pathologic fracture of her left femur. Significant risk factors for PE led to peripartum primary prophylaxis placement of an IVC filter before cesarean delivery, open reduction and internal fixation of the fractured femur, and chemotherapy.

Case

A 22-year-old gravida 2, para 0 at 27 weeks' gestation was transferred to State University of New York (SUNY),

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Downstate Medical Center, from a local community hospital following the diagnosis of a pathological fracture of her distal left femur, and radiograph imaging depiction of a lytic lesion in the fractured femur which was considered suspicious for malignancy.

Her medical history was unremarkable and her current pregnancy uneventful, other than increasing distal left thigh pain during the 4 weeks before her admission. She denied fever, weight loss, chills, night sweats, fatigue, respiratory symptomatology, cough, breast changes, trauma, or the presence of masses. The night before her admission, her left leg collapsed spontaneously while she was entering a motor vehicle.

On admission, she was noted to be awake, alert, and oriented, in good general health, and in no acute distress. Temperature was 101°F, blood pressure was 120/70 mm Hg, pulse was 80 bpm, and respiratory rate was 20 bpm. Her physical examination did not reveal any abnormalities other than findings consistent with a closed displaced fracture of her left distal femur (→Fig. 1). Her abdomen was soft and nontender, fundal height was 27 cm. Her cervix was long and closed.

Laboratory examinations revealed hemoglobin to be 10.2 gr/dL, hematocrit 32.5%, white blood cell count 11.4×10^9 /dL, platelets 178×10^9 /dL, and creatinine, blood urea nitrogen, electrolytes, prothrombin time, partial thromboplastin time, and fibrinogen were normal. Liver function tests were normal. Urine and blood cultures were negative. Transabdominal ultrasound depicted a singleton, breech-presenting fetus with an estimated fetal weight of 990 g. Amniotic fluid volume and umbilical artery Doppler velocimetry values were normal. Electronic fetal heart rate (FHR) monitoring revealed a reassuring tracing with a baseline FHR of 150 bpm. Color Doppler imaging of the lower extremities was negative for DVT. Radiography of the left lower femur revealed a displaced complete transverse pathologic fracture with a permeative lytic lesion (→Fig. 1).



Fig. 1 AP radiograph of the left distal femur demonstrating a displaced transverse pathologic fracture. Note the permeative lytic lesion adjacent to the left lateral margin of the fracture (arrows). AP, anteroposterior.

In anticipation of the potential for iatrogenic prematurity with delivery because of maternal indications, intramuscular antenatal steroids were administered to decrease prematurity-associated neonatal morbidities. In addition, subcutaneous heparin DVT prophylaxis (5,000 units every 8 hours) was administered.

Histopathology (both morphology and immunohistochemistry) findings of tissue obtained at open biopsy of the fracture disclosed high-grade malignant B cell lymphoma. Chest computed tomography performed because of unexplained transient maternal tachycardia was negative for PE, yet revealed an expansile lytic lesion of the posterior right fifth rib (→Fig. 2).

With the diagnosis of Stage IV high-grade malignant B cell lymphoma, multidisciplinary consultations were conducted with hematology oncology, orthopedic oncology, interventional radiology, anesthesiology, maternal fetal medicine, neonatology, and the institutional ethics committee. Following extensive counseling, the patient and her family chose immediate cesarean delivery, open reduction and internal fixation of the fractured femur, followed by chemotherapy.

Before the surgical procedures, given the multiple factors placing the patient at significant increased risk for PE, which included: pregnancy, cancer, long bone (femur) fracture, prolonged immobility, anticipated extensive surgeries, and the risks of perioperative anticoagulation should PE occur, she was counseled regarding risks versus benefits of placement of a retrievable primary prophylaxis retrievable IVC filter. With her consent, a retrievable IVC filter (Cook Celect, Cook Medical Inc, Bloomington, IN) was placed uneventfully by interventional radiology.

Under continuous spinal epidural anesthesia, and with lower extremity graduated compression stockings and pneumatic compression device activated, a vigorous female neonate weighing 1,075 g with Apgar scores of 8 and 8 at 1 and 5 minutes, respectively, was delivered through a transverse lower uterine segment incision. Umbilical artery pH was 7.37 and base excess was -1.2 . The infant received surfactant and did well. Following the cesarean delivery, open reduction and internal fixation of the fractured femur were performed.



Fig. 2 Maximum intensity projection image generated from data acquired during a computed tomographic scan of the chest demonstrating an expansile lytic lesion of the posterior right fifth rib.

On postoperative day 3, weekly chemotherapy cycles with rituximab, cyclophosphamide, hydroxydaunorubicin (doxorubicin), Oncovorin (vincristine), and prednisone (R-CHOP) were initiated. The patient was discharged on postoperative day 6, with plans for continued weekly chemotherapy and subsequent removal of the IVC filter. Histopathology of the placenta revealed no evidence of metastases. The infant was discharged at 8 weeks of life. The patient received a total of six chemotherapy courses. Eleven months after delivery, positron emission tomography scan was negative for tumor activity confirming complete cure for her disease. During this period, the patient was noncompliant with interventional radiology, missing numerous scheduled appointments for IVC filter retrieval beginning at 6 months after placement. Twelve months after IVC filter insertion, an attempt by intervention radiology to retrieve the filter was unsuccessful. At 18 months of age, the infant is healthy and is meeting developmental milestones.

Discussion

Placement of a prophylaxis IVC filter in a patient at 30 weeks' gestation has been reported in a patient considered at high risk for thrombosis (multiple thrombophilia and current DVT), in whom anticoagulant therapy low-molecular-weight heparin was not associated with clinical improvement.⁷ Subsequent uncomplicated vaginal birth was accomplished at 37 weeks' gestation.⁷

Recently, placement of retrievable IVC filters for primary prophylaxis has been advocated in patients considered at a significantly increased risk of PE.^{8,9} Main indications for primary prophylaxis IVC filter placement include trauma, bariatric surgery, neurosurgery, cancer, intensive care unit populations, and patients with a relative contraindication to anticoagulation.⁸ In a recent systematic review, literature findings were supportive of the use of prophylactic IVC filters in polytrauma patients who may have contraindications to DVT prophylaxis.⁹ Filter-associated complications are uncommon and when they do occur they tend to be of limited clinical significance.⁹ Notwithstanding, patient populations most likely to benefit from prophylactic IVC filter placement have not been well defined, and randomized studies demonstrating efficacy have not been conducted.⁸

Placement of retrievable IVC filters as prophylaxis for PE in pregnant patients at term with DVT before cesarean delivery has been described recently by Liu et al.⁵ In their study, 15 patients with DVT of the lower extremity (diagnosed clinically and by color Doppler) received retrievable IVC filters 1 day before cesarean delivery. No placement-related complications occurred and in 14 patients the filter was successfully retrieved without difficulty. In the remaining patients, the filter was left in-situ because the captured thrombus within the filter was not eliminated after thrombolytic therapy.

A recent assessment of success and safety of IVC filter retrieval techniques by Al-Hakim et al in 217 patients indicated success rates of 73.2% and 94.7% for routine and advanced filter retrieval techniques, respectively.¹⁰ Mean filter dwell time was 134 days (range, 0–2,475 days). The

overall filter retrieval complication rate was 1.7%. Complications (multiple in some cases) included filter dissection, intussusception, thrombus/stenosis, filter fracture with embedded strut, IVC injury with hemorrhage, and vascular injury from complicated venous access.¹⁰ These authors concluded that IVC filters can be retrieved with a high overall success rate (98.2%) and a low complication rate (1.7%) with utilization of advanced techniques when the routine approach has failed. However, application of advanced techniques was associated with a significantly higher complication rate.¹⁰

It is difficult to precisely assess the risk of PE versus the risk of IVC filter-associated complications in this patient with multiple predisposing factors for PE. Notwithstanding, PE clearly carries considerable inherent morbidity/mortality risks,^{1–3} while in contrast, uncommon IVC filter-associated complications appear of limited magnitude.⁹

A systematic English literature search (PubMed, MEDLINE) between 1966 and 2015 utilizing the search terms “pregnancy,” “inferior vena cava filter,” “pulmonary embolism,” “deep venous thromboembolism,” and “prophylaxis” reveals that this is the first report of peripartum primary prophylaxis placement of a retrievable IVC filter in a patient without existing DVT.

In summary, our case describes potential advantages of peripartum primary prophylaxis placement of IVC filters in selected patients decreasing DVT/PE associated maternal morbidity/mortality, yet also highlights the concern that for a myriad of reasons, the filter may become permanent.

References

- 1 Chang J, Elam-Evans LD, Berg CJ, et al. Pregnancy-related mortality surveillance—United States, 1991–1999. *MMWR Surveill Summ* 2003;52(2):1–8
- 2 Marik PE, Plante LA. Venous thromboembolic disease and pregnancy. *N Engl J Med* 2008;359(19):2025–2033
- 3 Bonnar J. Can more be done in obstetric and gynecologic practice to reduce morbidity and mortality associated with venous thromboembolism? *Am J Obstet Gynecol* 1999;180(4):784–791
- 4 Angel LF, Tapson V, Galgon RE, Restrepo MI, Kaufman J. Systematic review of the use of retrievable inferior vena cava filters. *J Vasc Interv Radiol* 2011;22(11):1522–1530.e3
- 5 Liu Y, Sun Y, Zhang S, Jin X. Placement of a retrievable inferior vena cava filter for deep venous thrombosis in term pregnancy. *J Vasc Surg* 2012;55(4):1042–1047
- 6 Gupta S, Ettles DF, Robinson GJ, Lindow SW. Inferior vena cava filter use in pregnancy: preliminary experience. *BJOG* 2008;115(6):785–788
- 7 Valadares S, Serrano F, Torres R, Borges A. Inferior vena cava filter placement during pregnancy: an option when medical therapy fails. *Case Rep Obstet Gynecol* 2013;2013:821635
- 8 Wehrenberg-Klee E, Stavropoulos SW. Inferior vena cava filters for primary prophylaxis: when are they indicated? *Semin Intervent Radiol* 2012;29(1):29–35
- 9 Kidane B, Madani AM, Vogt K, Girotti M, Malthaner RA, Parry NG. The use of prophylactic inferior vena cava filters in trauma patients: a systematic review. *Injury* 2012;43(5):542–547
- 10 Al-Hakim R, Kee ST, Olinger K, Lee EW, Moriarty JM, McWilliams JP. Inferior vena cava filter retrieval: effectiveness and complications of routine and advanced techniques. *J Vasc Interv Radiol* 2014;25(6):933–939, quiz 940