Case Report

Deep venous thrombosis revealed during ultrasound-guided femoral nerve block

K. M. Sutin\textsuperscript{1*}, C. Schneider\textsuperscript{2}, N. S. Sandhu\textsuperscript{1} and L. M. Capan\textsuperscript{1}

\textsuperscript{1}Department of Anesthesiology, New York University School of Medicine, 550 First Avenue, New York, NY 10016, USA. \textsuperscript{2}Huntington Hospital, Department of Anesthesiology, 270 Park Avenue, Huntington, NY 11743, USA

*Corresponding author: Bellevue Hospital, Department of Anesthesiology, Room 11N34, 462 First Avenue, New York, NY 10016, USA. E-mail: kensutin@yahoo.com

Ultrasound imaging used to facilitate performance of a femoral nerve block also affords imaging of adjacent anatomical structures. Following a fracture of the femur, an ultrasound guided femoral nerve block (UGFNB) was performed to provide analgesia; this led to the incidental finding of a previously undiagnosed femoral vein thrombosis (DVT), resulting in a change in patient management before surgery. An inferior vena cava (IVC) filter was placed before intramedullary nailing of the fracture.

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Case report

A 24-yr-old woman with a 1-yr history of a stage IV alveolar soft part sarcoma of the right mid-femur and multiple large pulmonary metastases bilaterally had severe right leg pain while walking, heard a loud crack, and fell to the ground. At Bellevue Hospital Center, a pathological fracture of the femur was suspected. Her medical history was significant for chronic shortness of breath and dyspnoea on exertion, and her symptoms had been stable over the preceding 2 months. Despite chemotherapy, however, there was progression of the primary and metastatic disease.

Because of severe leg pain that prevented transport to the radiology suite for diagnostic studies, we performed UGFNB. With the patient supine, a 4- to 7-MHz ultrasound transducer (Sonosite\textsuperscript{180} C 11; Bothell, WA, USA) was used to visualize the femoral nerve, artery and vein. The femoral nerve was visualized 1 cm lateral to the artery and deep to the iliacus fascia. After sterile preparation and local infiltration of the skin, a 17 G Tuohy needle was inserted 2 cm distal to the inguinal ligament at a 30° angle in a cephalad direction. The needle was continuously visualized by ultrasound until it perforated the fascia and its tip was immediately superficial to the femoral nerve. Lidocaine 1.5%, 10 ml with epinephrine 1:200 000 was injected and a 20 G catheter was threaded through the Tuohy needle to permit rebolusing. The right common femoral vein was non-compressible, echolucent and more pulsatile than the femoral artery. Extending distally from the common femoral into the femoral vein, there was an echogenic mass 8 cm long by 2 cm wide, consistent with a proximally evolving, free-floating, femoral DVT (Fig. 1). A formal venous duplex study performed by the hospital’s vascular technologist confirmed these findings and the Doppler study revealed bidirectional flow in the right and left common femoral veins. Arterial blood gas analysis while breathing room air revealed $\text{pH}=7.46$, $P_{\text{CO}_2}=30\ \text{mm Hg}$, $P_{\text{O}_2}=49\ \text{mm Hg}$, $\text{HCO}_3^-=21.7\ \text{mEq/litre}$.

Because of the risk of pulmonary embolism (PE) during surgery, and given the extent of pre-existing pulmonary compromise, a second bolus of local anaesthetic was given through the femoral nerve catheter. Instead of going directly to surgery, she was taken to the angiography suite, where a nitinol inferior vena cava (IVC) filter was placed under fluoroscopy via the left femoral vein.

The following day she underwent an uncomplicated general anaesthetic and repair of the fractured femur with an intramedullary nail. Her postoperative course was uneventful. She was transferred to the rehabilitation service 7 days after surgery and was discharged home on postoperative day 14. Eleven months after discharge, she died at home while under hospice care.
Fig 1 Ultrasound images (left) and cartoon view (right) of the relevant anatomical structures. Views extend from the common femoral vein (CFV) 2 cm below the right inguinal ligament (top) distally to the bifurcation (bottom). On the third ultrasound image, white arrows show the femoral nerve (FN); it is not well seen on other images. The clot is free-floating and evolving proximally; it extends from the common femoral vein into the femoral vein proper (FV). The proximal clot is recently formed and echolucent, whereas the body of the clot is older and echogenic. Also shown are the saphenous vein (SV) and the common, superficial and deep femoral arteries (CFA, SFA, DFA).

Discussion

Our patient had an alveolar soft part sarcoma; this is a rare tumour (0.5–1% of all soft tissue sarcomas) that carries a poor prognosis and often metastasizes to the lung. In one series, the 5-yr survival rate of patients with metastatic disease was 20%.1

Femoral nerve block is an accepted regional anaesthetic technique for providing pain relief after femur fracture, especially to assist with patient transport or fracture reduction.2 The block affords excellent analgesia, circumventing the need for opioids, which cause sedation and may impair the physical examination. Ultrasound has been used to reduce onset time3 and dose of local anaesthetic4 for femoral nerve block. In our patient, ultrasound visualization of the venous anatomy revealed a previously undiagnosed DVT. This was not an unexpected finding as long bone fractures of the lower extremity and malignancy are risk factors for DVT. In a patient with cancer, pulmonary metastases and pulmonary compromise, the mortality of perioperative PE probably exceeds 25%.5 For this reason, insertion of the IVC filter was justified as a prophylactic measure to reduce the likelihood of fatal thromboembolism during intraoperative femur manipulation.6 Although the filter would not prevent embolization of small particulate matter, air or fat during surgery.

The non-compressible proximal common femoral vein was echolucent, suggesting a clot several hours to several days in age, whereas the lumen of the more distal common femoral and femoral veins contained a well-formed echogenic mass, suggesting a clot of at least 7–10 days in age. Direct tumour extension into a vein can occur in some sarcomas; however, echolucency of the proximal femoral vein clot is most suggestive of newly formed thrombus.

Pulsations of the femoral vein associated with retrograde flow in synchrony with the cardiac cycle is not a common finding; however, they are associated with right heart failure, defined as a central venous pressure greater than 8 mm Hg (sensitivity 46%, positive predictive value 94%). In our patient, venous pulsations were probably caused by: (i) right heart failure probably secondary to pulmonary hypertension; (ii) tricuspid insufficiency; (iii) partial femoral vein occlusion (by clot); and/or (iv) high tumour blood flow (which can mimic an arteriovenous fistula). Pulmonary hypertension in our patient may have resulted from hypoxic pulmonary vasoconstriction, massive pulmonary tumour invasion and vascular compression, pulmonary venous hypertension, pulmonary thromboembolism, and/or pulmonary tumour micro- or macroembolism.

The UGFNB allowed incidental detection of a femoral vein thrombus and afforded excellent analgesia. If the nerve block had been performed with a nerve stimulator technique, the DVT would have gone undetected. Perioperative pulmonary thromboembolism in this patient with baseline dyspnoea and probable right heart failure carries a substantial mortality, and insertion of the IVC filter before surgery probably reduced this risk.

References