Should ultrasonography check be routinely done following removal of femoral vascular catheter in patients with end-stage renal disease?

Sir,

With the increasing use of femoral vascular catheter in intensive care unit (ICU), the insertion related complications of them are dealt seriously.\(^{1,2}\) But, scarcity of reports about complications following removal of femoral vascular catheter encourage us to report two interesting, potentially fatal complications of femoral vascular catheter removal in end-stage renal disease (ESRD) patients. The importance of bedside ultrasonography (USG) after femoral vascular catheter removal has been stressed in this communication.

CASE 1

A 22-year-old student was transferred to our ICU with hospital-acquired pneumonia with ESRD due to obstructive uropathy. On admission, he was conscious, haemodynamically stable, tracheostomised on mechanical ventilation and pale (haemoglobin 8 gm/dl). He had mildly deranged prothrombin time (3 seconds prolonged) and normal platelet count. He had left femoral dialysis catheter (DC) (12 Fr, 18 cm, Mahurkar) in situ. Since, the insertion site was erythematous, we removed DC. No oozing was visible. A new DC was placed in right femoral vein uneventfully under USG guidance. Two days later, patient complained of left thigh pain. His left thigh and groin area was found warm, tender and slightly swollen. Urgent bedside USG and Doppler of that region showed large haematoma (12×10 cm) just posterior to the femoral vessels with intact vascular flow [Figure 1]. The patient developed septic shock with haemoglobin drop (6 gm/dl) on next day. In view of increasing groin swelling and impending compartment syndrome, surgical drainage was arranged. A large haematoma and pus was removed. Microbiology revealed growth of *Staphylococcus aureus*-sensitive to vancomycin from the pus and contemporary blood cultures. He showed clinical improvement within 48 hrs of intravenous vancomycin therapy.

CASE 2

A 72-year-old obese retired nurse, with hypertensive heart disease and ESRD was referred to our ICU for extensive cellulitis of the left leg leading to septic shock. For invasive blood pressure monitoring, we put a right femoral arterial catheter (7 Fr, Certofix mono, B Braun) uneventfully under USG guidance. However, the patient recovered from septic shock within 3 days. Her haemoglobin, prothrombin time and platelet counts came to normal limits. Decision was made to remove the femoral catheter. After 2 days of removal of catheter, patient complained of right thigh pain. On palpation, some indurations were felt. A bedside lower limb USG showed a large haematoma anterior to common femoral artery, approximately 120-ml volume. A lower limb computed tomography angiogram [Figure 2] showed a pseudoaneurysm...
that a haematoma may be a source of sepsis and septic shock in addition to other pathways described by Jaber.[4]

Regarding our 2nd case, iatrogenic femoral pseudoaneurysm via the catheter track following femoral arterial catheter removal is very rare in reporting. Heparinization during haemodialysis, obesity, advanced age, and concurrent anticoagulant treatment for deep vein thrombosis prophylaxis may be important risk factors in our case. It is seen that ESRD patients are prone to bleed even with normal coagulation profile and platelets.[5]

Probably the haematomas were precipitated due to femoral venous wall breach by wide bore (12 Fr) dialysis catheter or force of blood flow of femoral artery in presence of narrow (7 Fr) breach in arterial wall. Dysfunctional Von Willebrand factor leading to unrecognized vascular shear, uremic toxins and Prostacyclin I2 leading to platelet aggregation dysfunction in ESRD can be the possible mechanisms.[5]

Both our cases are unique in the sense that we should be aware that catheter related complications can also occur at the time of removal in susceptible patients like patients with ESRD. Clinical examination of the site is essential and if required bedside USG and Doppler should be performed for early detection and management of life-threatening complications.

**REFERENCES**

1. Prabhu MV, Juneja D, Gopal PB, Sathyanarayanan M, Subhramanyam S, Gandhi S, et al. Ultrasound-guided femoral dialysis access placement: A single-center randomized trial. Clin J Am Soc Nephrol 2010;5:235-9.
2. Hind D, Calvert N, McWilliams R, Davidson A, Paisley S, Beverley C, et al. Ultrasonic locating devices for central venous cannulation: Meta-analysis. BMJ 2003;327:361.
3. Katneni R, Hedayati SS. Central venous catheter-related bacteremia in chronic hemodialysis patients: Epidemiology and evidence based management. Nat Clin Pract Nephrol 2007;3:256-66.
4. Jaber BL. Bacterial infections in hemodialysis patients.
Catheter malposition in infants: A preventable complication

Sir,

Catheter malposition is a known complication of central venous catheterisation, with incidence of less than 1% to above 60%.[1] Misplacement is more frequent after the right subclavian (SCV) than the right internal jugular vein (IJV) approach. However, catheterisation via the left IJV results in more malpositions and vascular perforations than catheter placement through the right IJV.[1]

We discuss a case of a 1-month-old baby (length 57 cm, weight 4.8 kg) undergoing decompressive craniotomy for acute subdural haematoma. A 4.5 Fr multicath (Vygon Gmb H and Co. KG, Germany) central line was inserted in the right IJV for intra-operative central venous pressure monitoring. The catheter was inserted using the anatomic landmark technique and was fixed at the 7 cm mark on the skin after confirming backflow in all the lumens. Post-central line, chest roentgenogram (CXR) showed the tip of the catheter in the right subclavian vein by about 2.5 cm [Figure 1a]. Because it was difficult to reposition the original line, we planned ultrasound (USG)-guided left IJV cannulation. The J-tip of the guidewire was directed caudally and towards the right. The catheter was fixed at the 6 cm mark on the skin. Check CXR showed the catheter going to the right innominate vein by 1 cm [Figure 1b]. The catheter was refixed after pulling it out by 1 cm, and a repeat CXR confirmed its correct placement.

Image-guided (USG) vascular access technique increases the likelihood of achieving access, especially in the obese and in the paediatric populations, where anatomic localisation may be difficult.[2] It is associated with fewer complication rates and a probable improvement in long-term venous patency rates. In paediatric patients, meticulous attention in catheter positioning is important to ensure that the lines are kept functional for longer periods. Although the USG-guided technique is useful for initial localisation of the vein, it does not guide about the length of the catheter to be inserted. Directing the J-tip of the catheter caudally increases the correct placement of the central venous catheters into the right atrium. [3] But, this is more useful in SCV than in IJV cannulation.

Overinsertion of the catheter may be the cause of misplacement in our case. This is especially important in small children where increased intravascular catheter length may result in complications like vascular erosions and pericardial tamponade. Various techniques described for guiding the depth of insertion include transesophageal echocardiography (TEE) and formulas using patient characteristics (age, height, weight). However, TEE is not feasible in such small infants and ECG-guided central venous cannulation is cumbersome. The optimal size of the catheter in our case would be 3 or 4 Fr, and the optimal length of insertion should have been 4.5 cm according to height (catheter length=height in cm/10-1) and 5 cm according to the weight (<4.9 kg).[4] This must be followed by a radiological confirmation of the position of the catheter tip.

Ira Balakrishnan, Manpreet Kaur, Chhavi Sawhney, Nita D’Souza
Department of Anaesthesia and Critical Care, JPNA Trauma Centre, All India Institute of Medical Sciences, New Delhi, India

Address for correspondence:
Dr. Manpreet Kaur,
426 Masjid Moth Resident Doctor’s Hostel,
AIIMS, New Delhi - 110 029, India.
E-mail: manpreetkaurrajpal@yahoo.com

Pathogenesis and prevention. Kidney Int 2005;67:2508-19.
5. Hedges SJ, Dehoney SB, Hooper JS, Amanzadeh J, Busti AJ. Evidence-based treatment recommendations for uremic bleeding. Nat Clin Pract Nephrol 2007;3:138-53.