

## PHOTO QUIZ

## The inability to flush a central venous catheter

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### Case

We present the case of a 40-year-old female, admitted with shock caused by liver failure, as a complication of high-dose chemotherapy for symptomatic multiple myeloma. The patient became septic and developed progressive renal failure, for which a central venous catheter (CVC) for continuous venovenous haemofiltration was inserted. After initial successful placement of the CVC in the femoral vein, it was impossible to flush the catheter. An abdominal X-ray was taken.

### What is your diagnosis?

### Answer

You will find the answer on page 111 in this issue.



**Figure 1.** Abdominal X-ray, revealing a hyper-dense linear structure diagonally projecting over the head of the femur to the spinal column

## ANSWER TO PHOTO QUIZ

## The inability to flush a central venous catheter

### Diagnosis

The abdominal X-ray shows a radio-opaque foreign body in the pelvis, which is a retained guidewire. The inadvertently lost guidewire is located on the right side of the spinal column, in the inferior vena cava. During a percutaneous procedure, the interventional radiologist accessed the left femoral vein and removed the 60 cm long guidewire with a snare device. The patient's family was informed directly and the incident was evaluated thoroughly.<sup>[1]</sup>

Guidewires are used in accordance to the Seldinger technique for the placement of percutaneous central venous catheters and should be removed directly after the procedure. A wire left in situ can cause a variety of clinical signs, symptoms and complications. Direct suspicion of a retained intravascular guidewire can arise in case of inability to flush or aspirate fluids through the central venous catheter, or the absence of the guidewire in the equipment tray following the insertion. Clinical presentation of a retained guidewire as a complication of central venous catheterisation varies from up to 20 years of asymptomatic presence, discomfort or abnormal laboratory findings, such as unexplained prolonged elevated D-dimer or leucocytosis, to serious adverse events such as severe chest pain with palpitations, spontaneous transdermal migration, retroperitoneal haematoma, pulmonary embolism, vertebral artery thrombosis, cardiac tamponade and sepsis.<sup>[2]</sup>

Physicians should be focused on this complication while analysing routinely conducted X-rays, since 69% of the retained guidewires are not noticed directly although identified retrospectively in all cases.<sup>[2]</sup>

A survey amongst British cardiothoracic surgeons revealed that 44.9% of cardiothoracic surgeons were consulted for a retained guidewire at least once in their career. Conversely, a recent systematic analysis of published cases reported only 64 publications<sup>[2, 3]</sup> suggesting that retention of guidewires is an underreported problem.

Various factors have been identified to contribute to this avoidable complication.<sup>[2, 4]</sup> A lower level of experience with the procedure and a lower level of supervision are risk factors for inadvertent loss of a guidewire during the procedure. Previous authors identified distractions during the procedure and a high workload as important contributing factors; both factors were applicable in the presented case.<sup>[4]</sup> The current practice in our

centre is that every physician is directly supervised for at least three successful placements before being granted permission to insert a central venous catheter with supervision from a distance. With inexperienced physicians, we emphasise the importance of preventing distractions and limiting workload during the procedure. Also, we advise to routinely check the presence of the guidewire on the tray after each procedure.

### Disclosures

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### Reference

1. Wollersheim H. Responding to adverse events. *Neth J Med.* 2009;67:363.
2. Pokharel K, Biswas BK, Tripathi M, Subedi A. Missed Central Venous Guide Wires: A Systematic Analysis of Published Case Reports. *Crit Care Med.* 2015;43:1745-56.
3. Mariyaselvam M, Clare T, Wijewardena G, et al: The incidence and complications of retained central line guide wires. In: Abstracts of the AAGBI Annual Congress, 17–19 September 2014, Harrogate, UK. *Anaesthesia* 2014; 69(Suppl 4):11–88
4. Horberry T, Teng YC, Ward J, Patil V, Clarkson PJ. Guidewire retention following central venous catheterisation: a human factors and safe design investigation. *Int J Risk Saf Med.* 2014;26:23-37.



**Figure 2.** Abdominaal X-ray, the hyper-dense linear structure is a retained guidewire used for central venous catheter insertion.