Percutaneous insertion of central venous catheters (CVCs) is routine hospital practice. Complications of this procedure have been well documented. Most arise from problems encountered during insertion (cardiovascular side-effects and bleeding) and during maintenance (infection, thrombosis and mechanical risks). One of the mechanical complications of CVC use is breakage, with the risk that the distal remnant is dislodged as an embolism while a stuck catheter is being removed. We describe an unusual cause of this complication in a fairly common clinical scenario.

Case report
MF, a 48 yr-old female patient with chronic myeloid leukaemia, was admitted with sepsis several weeks after a
bone marrow stem cell transplant. Ultrasound scanning of her upper thorax and neck revealed thrombosis in both the right internal jugular and subclavian veins, because of previous catheter insertion for multiple courses of chemotherapy. On the day of admission a 20 cm long, 8.5 Fr, quadruple-lumen CVC (Vygon, Cirencester, UK) was placed in the left internal jugular (LIJ) vein by a Seldinger technique and under ultrasound guidance. The catheter was inserted up to the 15 cm mark, with the remaining proximal portion external to the patient. The position was checked in the usual manner by a chest radiograph (Fig. 1). Seven days later, we decided to replace the existing CVC because of a suspicion of line-related sepsis. Using the same technique, the left subclavian vein was easily cannulated but the guide wire met resistance after advancing several centimetres. A further two attempts were made in a similar manner, with similar results and the procedure was abandoned. Central venous access was obtained without difficulty via the right femoral vein.

Some time later, the nurse caring for the patient reported difficulty removing the LIJ catheter. Resistance was met after 13 cm of the catheter had been withdrawn, with 2 cm of the catheter still within the vascular lumen. Gentle traction was applied to no avail. Close inspection after the entry site had been extended to 1 cm suggested that the catheter had been partially sheared and that complete fracture was imminent. An emergency cut-down procedure was performed along the site of the LIJ vein; the catheter remnant was identified and was found to be connected to the body of the catheter by one remaining intact lumen of the original four. The remnant was secured with an artery clip and was successfully removed (Figs 2 and 3); the incision site was sutured. After removal it was seen that the cause of the catheter being stuck was the ridge caused by the fracture in the external material of the line becoming stuck in the vessel wall on removal (Fig. 4).

No immediate complications arose from this procedure but the patient died with overwhelming sepsis a week later.

**Discussion**

Shearing or fracturing is a recognized complication of CVC use. One centre reports an incidence of 2.5% over a 5 yr period; however, these incidents were all in neonates. Causes that have been described include shearing by the
introducer needle during insertion, high pressure within the catheter caused by bolus infusions, fracturing of the external portion by the patient’s body movements (mostly infants), during removal of a stuck catheter (mostly by fibrin sheath formation around the catheter), and weakening of the catheter tip by movements of the tricuspid valve and right ventricular motion or mechanical forces between the clavicle and first rib. In our case, shearing of the LIJ catheter was probably caused by repeated cannulation attempts from the introducer needle in the left subclavian vein, both from the cutting edge of the needle and by blunt trauma from the metallic guide wire. The tip of the LIJ catheter was in the appropriate position for this to have occurred (Fig. 1). In view of this experience, we feel that cannulation of a central vein on the same side as an existing CVC requires caution. When inserting a new CVC the operator should be aware of the position of the tip of an existing CVC in relation to the site of cannulation. Furthermore, resistance to the passage of the introducer needle or guide wire, as we experienced, should be an absolute contraindication to further attempts at cannulation before the other cannula is removed.

Various methods of dealing with a sheared or fractured CVC have also been explored. Most authors advise against applying tension. In contrast, slow gentle traction (up to 36 h) has been used with some success, but usually in cases with intact CVCs that have become entangled in fibrin sheaths. Cutaneous cut-down followed by distal venotomy to remove stuck catheters that have not fractured completely has been described previously as safe, simple and easily performed at the bedside. Once complete fracture with subsequent embolization has occurred, however, more complicated approaches have been used, including radiological loops, snares and coils, and occasionally surgical exploration as a last resort. Hence, once shearing of a catheter is suspected, we advocate very cautious handling of the CVC. In particular we believe our case highlights that forceful traction on any stuck catheter should be avoided and a cause sought as soon as possible.

In summary, we have described an unusual cause of shearing of a CVC. In critically ill patients, changing a CVC is a common procedure if the existing catheter is possibly infected. Careful handling and immediate bedside attention can prevent more serious sequelae, such as embolization of a fragmented catheter tip. Clinicians should be aware of this previously unreported hazard of CVC use.

References