Loss of the guide wire: mishap or blunder?

W. Schummer1 2*, C. Schummer2, E. Gaser2 and R. Bartunek3

1Klinik für Neurologie, Universitätsklinikum Eppendorf, Hamburg, 2Klinik für Anästhesiologie und Intensivtherapie, Friedrich-Schiller Universität Jena, Jena and 3Institut für Diagnostische und Interventionelle Radiologie, Friedrich-Schiller Universität Jena, Jena, Germany

*Corresponding author. Present address: Klinik für Anästhesiologie und Intensivtherapie, Friedrich-Schiller Universität Jena, Bachstrasse 18, D-07743 Jena, Germany

We describe four cases of lost guide wires during central venous catheterization. Although percutaneous catheterization of central veins is a routine technique, it is a procedure requiring advanced operating skills, expert supervision, and attention to detail in order to prevent adverse effects.

Br J Anaesth 2002; 88: 144–6

Keywords: equipment, catheter, central venous; complications

Accepted for publication: August 27, 2001

Percutaneous catheterization of central veins is a routine technique. The complication rate of central venous cannulation may be as high as 12%.1–3 The Seldinger technique, originally used to cannulate vessels for radiographic procedures, is frequently used for central venous cannulation.4,5 We report four cases of lost guide wires. Each represents a typical scenario.

Case 1
A 63-yr-old female underwent an uncomplicated anterior resection of the rectum. After surgery, an anaesthetist in his first year of training inserted a central venous catheter via the right internal jugular vein. He was not familiar with central venous catheterization or the Seldinger technique and was not supervised. When he encountered resistance while advancing the guide wire, he became nervous but continued with the placement of the catheter. No further problems were noted, but the catheter was then accidentally withdrawn. A second cannulation was performed under supervision, with no problems. The catheter tray was not checked for guide wires after either of the procedures. A check chest x ray was reported to show no problems, and postoperative recovery was uneventful. One week later a routine radiograph of the abdomen displayed a guide wire at the right border of the spine (Figs 1 and 2). The frontal and lateral chest x ray confirmed the suspicion. The first chest x ray was not available for comparison. The guide wire was removed easily by exploration of the right internal jugular vein under general anaesthesia.

Case 2
A 62-yr-old male was scheduled for elective major vascular surgery but the start was delayed. A consultant supervised a first-year trainee. Induction of general anaesthesia was straightforward but draping the patient for surgery impeded access to the neck. The surgeon started the procedure before completion of central venous cannulation via the right internal jugular vein. The vein was identified easily and cannulation was performed without problems. Both trainee and supervising consultant were distracted from the cannulation procedure when the surgeon started the operation. The consultant anaesthetist concentrated on the management of the anaesthesia while the junior anaesthetist continued with central venous catheter placement. No right atrial ECG could be detected despite sinus rhythm. While flushing the catheter, undue resistance was met, but this caused no suspicion. On the postoperative chest x ray a guide wire was seen extending from the inferior part of the vena cava to the right internal jugular vein (Fig. 3). The guide wire was removed using a Dormier basket.

Case 3
A 68-year-old male in septic shock and multiple organ failure after resection of the rectum was receiving intensive care. During a busy night-shift, a fifth-year trainee cannulated the patient’s left femoral vein to establish venous access for haemofiltration. Information about another sick patient distracted him from holding on to the
guide wire. The next morning he remembered no problem with the venous catheterization. On the routine chest x ray the guide wire is clearly visible, but was not reported by the radiologist. A day later, after placement of a multiple lumen catheter via the right internal jugular route, the guide wire was noted and removed.

Case 4
An experienced physician passed a cannula into the left jugular vein of a 43-yr-old man with a subarachnoid haemorrhage using the Seldinger technique for the first time. He had been taught the technique, in particular the handling of the guide wire, but carried out the procedure without supervision. No problems with catheterization were recorded. A check chest x ray showed the distal end of the guide wire within the catheter. The guide wire could be held within the catheter by two clamps, and catheter and guide wire were removed together by careful traction.

Discussion
Other complications of central venous cannulation are discussed elsewhere.6-8 We report the unnoticed intravascular insertion of a complete guide wire. This is a rare and completely avoidable complication of central venous catheterization. The guide wire should be held at the tip at all times to prevent passage into or out of the vessel. If this rule is followed, the guide wire cannot get lost. These four cases show that standard operating procedure may be overlooked. Predisposing factors for an intravascular placement of the guide wire include:
- inattention (all cases);
- inexperienced operator—either in method (i.e. Seldinger technique) or actually central venous cannulation per se (Cases 1, 2 and 4);
- inadequate supervision of trainees (Cases 1, 2 and 4);
- overtired staff (Case 3).
The signs of guide wire loss include:
- the guide wire is missing;
• resistance to injection via the distal lumen;
• poor venous backflow from the distal lumen;
• guide wire visible on a radiograph.

Consequences of guide wire loss include embolism from fragments of catheters or guide wires which can be fatal in up to 20%, but no data exist on lost guide wires. In contrast to such emboli, the loss of a complete guide wire usually does not cause symptoms. In general, the guide wire is found by chance on a radiograph and has not been missed previously. There are no data on the complications of lost guide wires, but such a foreign body could cause arrhythmias, vascular damage, thrombosis and embolism. Guide wires should be removed as quickly and completely as possible.

Interventional radiology is the method of choice. With modern devices a lost catheter, guide wire fragment, or entire guide wire should be able to be removed in most cases. During the intervention the patient should be heparinized. Usually the foreign body (e.g. the guide wire) is caught by a gooseneck snare passed via the femoral vein using radiographic control. The use of endovascular forceps or a Dormier basket increases the risk of endovascular trauma. If the foreign body is captured, it is usually necessary to remove it along with the vascular sheath. If the vascular sheath is twice the size of the lost catheter or the lost guide wire it may be possible to withdraw the foreign body through it. If heparinization is contraindicated, extraction should be attempted by careful surgical exploration.

Each single step of central venous cannulation can cause serious complications. These complications should be understood by the operator and continuous attention during the procedure is vital. With the Seldinger technique, the following precautions should be taken.

• Inspect the wire for defects before insertion.
• Consider a guide wire to be a delicate and fragile instrument.
• When resistance to insertion is met, remove and inspect the wire for damage, reposition the introducer so that no resistance to its passage is felt.
• Particular caution should be used when attempting central catheter placement in patients who are predisposed to thrombosis or have had repeated catheterizations of a particular vessel.
• If multiple manipulations are needed, reinsect the wire and replace it if necessary.
• Pass catheter over wire into the vein.
• Make sure that the wire is visible at the proximal end, before the catheter is advanced.
• The catheter should be ‘railroaded’ over the guide wire into the vein, holding the wire, and not pushing catheter and wire together into the vein.

Always inspect the wire for complete removal at the end of the procedure [13].

Hold onto the wire at all times until removal from the vessel.

Conclusion

Percutaneous central venous puncture is a procedure requiring advanced operating skills, expert supervision, and meticulous attention to detail. To prevent adverse effects we must abandon the practice of ‘See one—Do one—Teach one’ and must make sure that trainees are aware of all possible complications. The loss of a guide wire is a completely preventable complication provided that one always holds on to the tip of the wire.

References