Retrieval of a Wire Lost During Central Venous Catheter Replacement

A case report using a new technique for wire retrieval and a review of the literature.

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Central venous catheters (CVCs) are often needed for critically ill patients as well as patients requiring long-term venous access. A rare complication associated with CVC placement is loss of the guidewire. Several techniques, often complex, have been described for the retrieval of intravascular foreign bodies. Currently, the most commonly used retrieval technique involves using a snare, most often an Amplatz Gooseneck Nitinol Snare (ev3 Inc., Plymouth, MN). However, if the complication is recognized immediately, the guidewire might still be trapped inside the lumen of the catheter. We present a simple, rapid technique that has not been previously described in the literature for removing the guidewire in this situation.

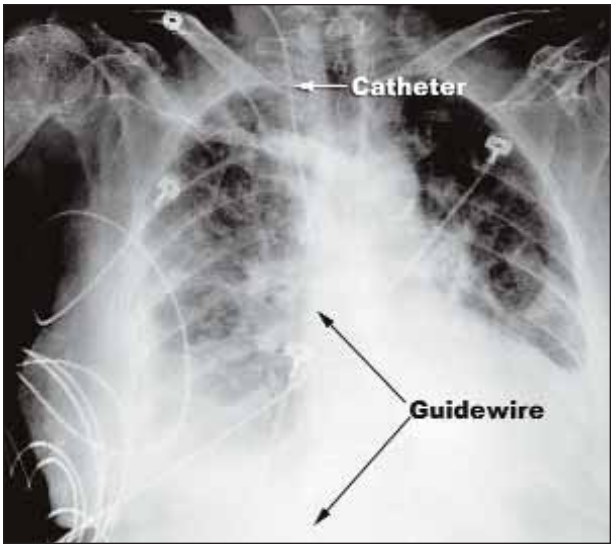

Figure 1. Immediate postprocedure portable chest radiograph showing the guidewire trapped within the catheter lumen, and the distal J tip is off the edge of the film.

CASE REPORT

A 72-year-old woman presented for repair of a 9-cm abdominal aortic aneurysm. Large-bore central venous access was obtained via the right internal jugular vein using a Cordis 8.5-F, 10-cm single-lumen sheath (Arrow AK-09803, Reading, PA). After successful open repair of the aneurysm, the patient was returned to the intensive care unit. Once large-bore access was no longer required,

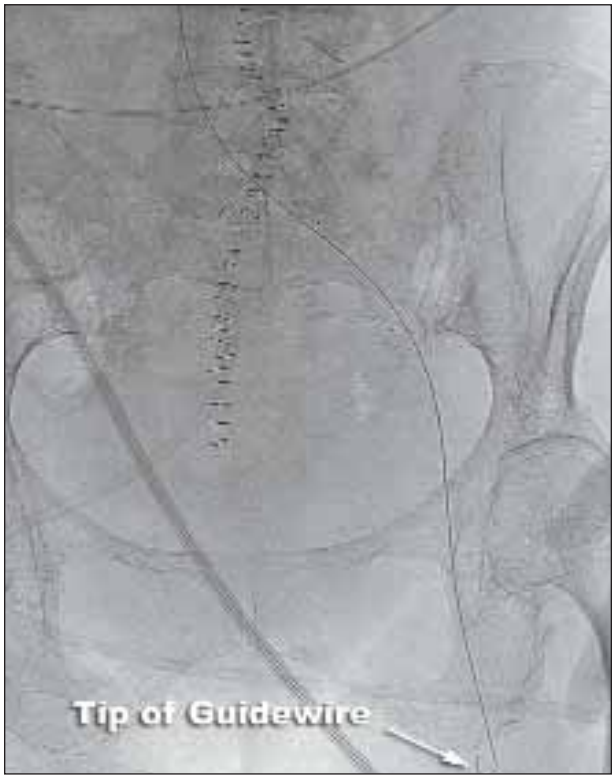

Figure 2. Scout image showing the end of the guidewire located in the left femoral vein.

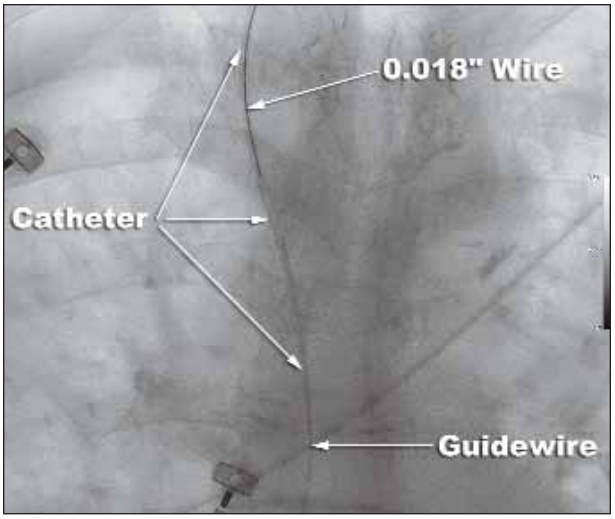

Figure 3. Fluoroscopic spot image showing the relationship of the catheter, .018-inch wire, and the lost guidewire.

we elected to change the Cordis catheter to a 7-F, 20-cm triple-lumen Cook Spectrum Glide catheter (Cook Medical, Bloomington, IN). During the exchange, as the new triple-lumen catheter was being advanced into place over the guidewire, the wire slipped and was noted to float into the catheter. There were no immediate cardiac events. The CVC line was left in place. Immediate plain-film chest and abdomen x-rays revealed that the wire had traveled down the catheter, through the superior vena cava, extending into the inferior vena cava; the distal J end was located in the femoral vein. The proximal straight end of the wire was still within the lumen of the catheter, although completely inside the patient (Figures 1 and 2).

An interventional radiologist was immediately consulted for wire removal, and the patient was taken emergently to the interventional radiology suite. Fluoroscopy confirmed the position of the wire. The catheter and surrounding skin was prepped and draped in sterile fashion. A Cope Mandril .018-inch wire (Cook Medical) was advanced into the central lumen where the lost guidewire resided (Figure 3). Under fluoroscopic guidance, the Cope wire was advanced alongside the larger wire until there was a snug fit. The wires overlapped by approximately 2 cm (Figure 4). Once the smaller wire could not be advanced farther, the wire and catheter were carefully removed under direct fluoroscopic guidance. The friction created by the two wires inside the lumen of the catheter allowed the entire assembly to be removed until the larger guidewire could be grasped outside the patient. Using this same wire, a new identical triple-lumen catheter was readvanced so that the tip was at the level of the superior vena cava/right atrium junction, and the wire was removed (Figure 5).

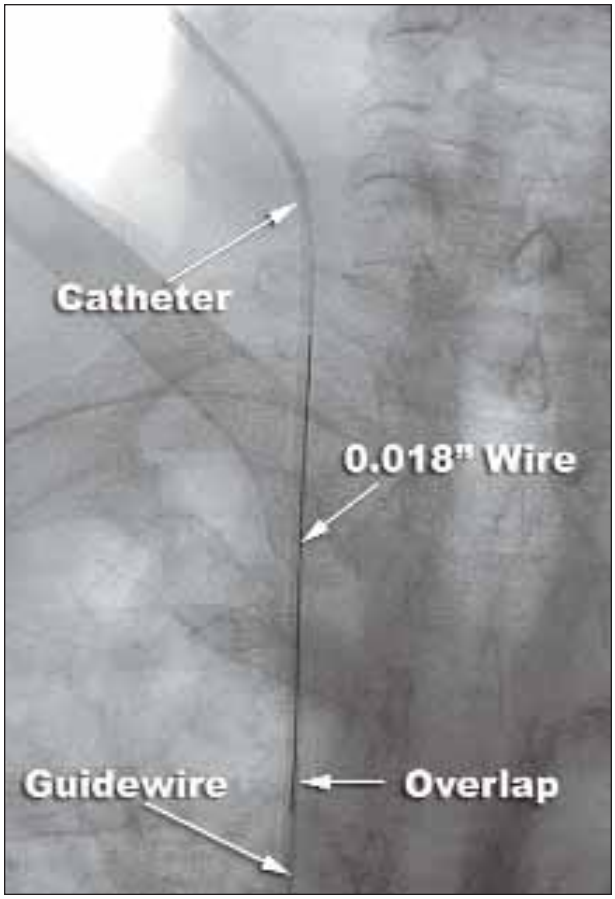

Figure 4. The .018-inch wire is overlapped alongside the guidewire within the catheter. The .018-inch wire is then held in place and the wire, catheter, and trapped guidewire are carefully removed.

After the wire was retrieved, the patient was returned to the intensive care unit. She did well with no adverse events from either the lost guidewire or from its retrieval. The CVC was successfully used with no evidence of infection or thrombosis, and there was no swelling in the left leg. The rest of her hospital stay was complicated by prolonged ventilator requirement. She was discharged on postoperative day 28 with no further complications.

DISCUSSION

With advancing technology, we encounter advancing complications. Central line placement is often a necessity during intensive care management or in patients with difficult peripheral access. Seldinger originally described his technique using a guidewire in 1953,[1] and complications were soon to follow. Loss of the guidewire is a serious and potentially life-threatening complication with reports of fatalities in up to 20% of cases when the complete wire is lost.[2] Unlike the fracture and dislodgement of a portion of a CVC

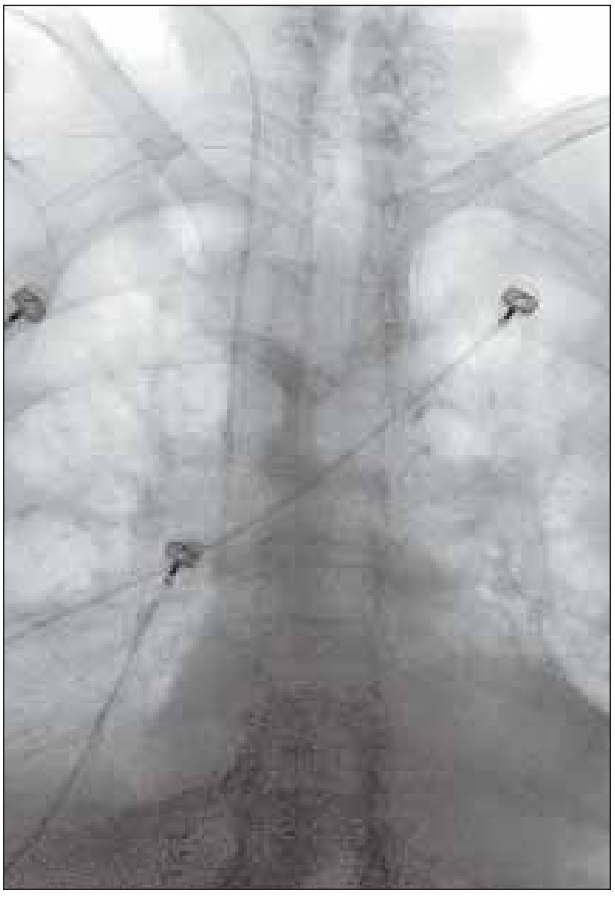

Figure 5. Final spot fluoroscopic image showing the new catheter in the appropriate position.

or migration of a vascular stent, loss of the guidewire is often immediately noticed, and if the wire tip stays within the catheter, it is amenable to our described technique. Complications pertaining to the guidewire include complete loss of the wire, injury to the vessel from the wire, fracture of the wire with uncoiling, the J end snaring on the end of the needle,[3] and the wire becoming entangled in previously inserted intravascular devices, such as an inferior vena cava filter.[4]

Reported complication rates from central venous catheterization range from 0.3% to 12%, and they often depend on the experience level of the physician.[5] Potential complications include failure to locate or cannulate the vein, puncture of the subclavian artery, misplacement of the catheter (defined as placement of the catheter tip in the contralateral subclavian vein or in either jugular vein), pneumothorax, mediastinal hematoma, hemothorax, and injury to adjacent nerves.

Retained or fractured guidewire or catheter fragments may lead to thrombosis, emboli, or infection. Fisher et al reported 16 deaths in 73 patients with embolized catheters.[6] The percutaneous retrieval of intravascular foreign bodies was first described in 1964.[7] With currently available methods and the assistance of interventional radiologists, most broken or misplaced intravascular objects can be retrieved.[8,9] There are numerous techniques described in the literature.[10-12] The majority of these techniques involve a Gooseneck snare,[13] Dormia basket,[14] the two-wire technique, a 6-F biopsy forceps, or even surgical intervention.

Today, the most commonly used retrieval technique involves using a snare,[6,15] with the first documented use of the ev3, Inc. Gooseneck Nitinol Snare in 1991.[13] However, these can be difficult to master and require high-quality fluoroscopy or specialized instruments. The use of the Dormia basket is associated with an increased risk of endovascular trauma.[16] Some interventionists have contended that before and during the time of removal of the misplaced wire, that the patient should be anticoagulated, usually with heparin.[16] Given the speed and minimal increased trauma to the patient in the procedure we describe in this article, we do not believe that our technique needs any additional anticoagulation.

Bessoud et al[8] reviewed their institution's experience with endovascular treatment of central venous access device complications. Although their most commonly used device was the snare, the investigators noted that if the loop snare failed, then the likelihood of success with other tools was low. Our method of using a .018-inch wire is considerably less expensive than some of the other techniques described in their report.

One concern was that the .018-inch wire would not slide alongside the existing wire but push the wire out of the catheter. If this occurred, we could have reverted to a snare. The newly freed end of the wire could be snared in the superior vena cava and pulled out of the neck access. Another method for retrieval of this wire that was considered was snaring the end of the wire in the left femoral vein. However, that would entail creating a new access in either groin. Our method involved using existing right internal jugular access and eventually replacing the access with the intended catheter.

Our technique involved transporting the patient to the interventional radiology suite. However, unlike other advanced methods described elsewhere in the literature, our minimalist approach could be employed with a C-arm. This approach allows applicability at the bedside for patients in the intensive care unit who are too ill to travel. This can also be used should guidewire loss occur while the patient is under general anesthesia. The case does not have to be abandoned to travel to the interventional radiology suite.

CONCLUSION

Our technique is applicable to all types of patients, especially critically ill patients who may not tolerate prolonged procedures. This technique is simple, rapid, and has broad applicability across all institutions in attempting to retrieve a lost CVC guidewire still residing inside the catheter. ■

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