

## Successful percutaneous removal of retained J-tip guidewire: A report of two cases

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### ABSTRACT

Central vein catheterization using the Seldinger technique has long been utilized as an invasive procedure for vascular access. Possible complications associated with the procedure include hemothorax, pneumothorax, and vascular injury. Forgetting a J-tipped guidewire inside the vessel during the Seldinger procedure is a rare complication. Herein, we present two cases in whom a forgotten J-tipped guidewire was successfully removed under the guidance of angiography.

**Keywords:** Central venous catheterization, intravenous foreign body, percutaneous intervention, peripheral venous catheterization, retained guidewire.

Central venous catheterization (CVC) is a mandatory procedure for the measurement of central venous pressure and for the administration of drugs and fluids in selected critically ill patients that, although rare, may be associated with severe complications.<sup>[1]</sup> Forgetting to remove the guidewire from its intravascular position is a rare complication in CVC and, although the condition is usually noticed immediately, diagnosis may be delayed in rare cases.<sup>[2,3]</sup> Despite its rare occurrence, the number of reportedly lost guidewires during CVC has increased rapidly over the last decade. In addition to severe problems a patient may experience due to a forgotten guidewire, efforts to remove them can result in expensive investigations and procedures with the potential to harm the patient. Furthermore, associated complications may lead to medicolegal problems.<sup>[4]</sup>

Herein, we report two cases from whom retained intravenous guidewires were successfully removed via percutaneous interventions, one in the early period and one in the late period.

### CASE REPORT

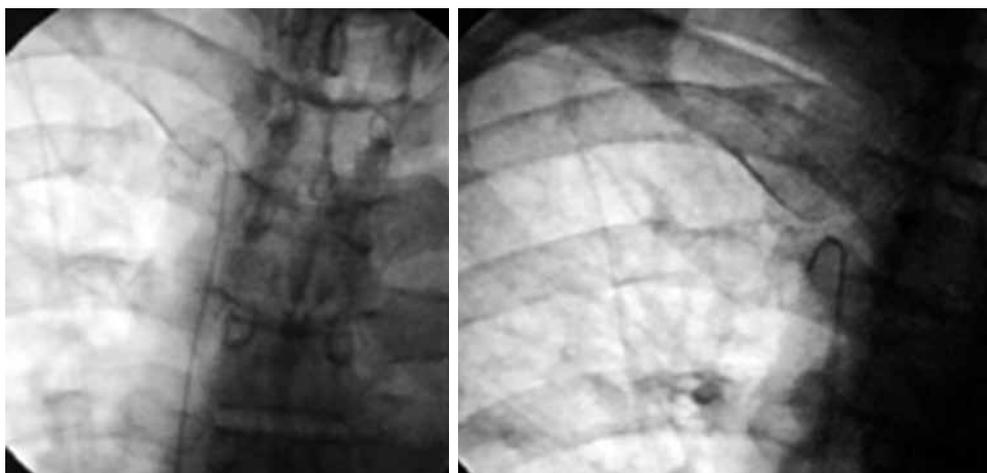
**Case 1-** A 49-year-old male patient lost consciousness after recurrent hypertensive cerebrovascular events and underwent CVC. The patient was referred to the palliative care unit and plain thoracic and abdominal graphs revealed a J-tipped guidewire extending from the inferior caval vein to the superior caval vein, the curved tip of which extended to the right subclavian vein. Removal was strongly recommended (Figure 1). After discussing the situation with the patient's relatives, the procedure was declined and a close follow-up was planned with medical treatment. The patient was treated with low-molecular-weight heparin (LMWH) and intermittent blood cultures were obtained over a period of six months, and infections were followed closely. During the follow-up period, fevers of up to 40°C were recorded and blood cultures showed growths of *Staphylococcus aureus*. Considering these findings, the patient's relatives were re-consulted, and a written informed consent was obtained from the patient for the removal of the guidewire.

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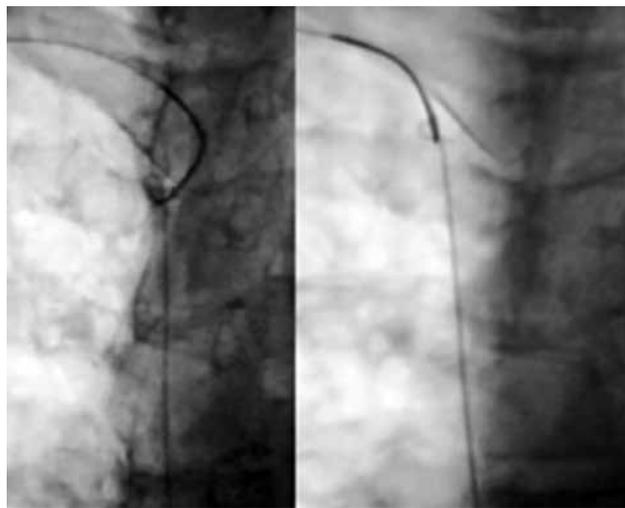
**Figure 1.** A forgotten J-tip guidewire on X-ray.

The patient was subsequently taken to the catheterization laboratory and the position of the guidewire was assessed under fluoroscopy. Under the guidance of cardiac movement patterns, the distal tip of the guidewire was detected to be in the right iliac position. Further investigation revealed that the guidewire advanced into the right subclavian vein, and the J tip of the guidewire fused to the interior wall and became immobile. A right subclavian vein puncture was performed and sheathed with a 6 French gauge (F) catheter. An Amplatz Goose

Neck snare kit (LifeTech SeQure, Shenzhen, China) was sent through the sheath in an attempt to snare the guidewire at the point at which it fused to the interior wall (Figure 2). After successfully catching the guidewire, compression was applied and cautious traction was exercised. Based on the presence of significant resistance to traction, rotation was applied to free the J tip from the vascular compartment. After several attempts during manipulation, the guidewire was successfully released (Figure 3). The guidewire was finally pulled out through the right subclavian vendor sheath (Tianck Medical Co. Shenzhen, China). After removal, it was observed that the extracted guidewire became epithelialized (Figure 4). After the procedure, a contrast agent was administered through the sheath to evaluate any venous wall rupture, cardiac rupture and/or tamponade. The procedure



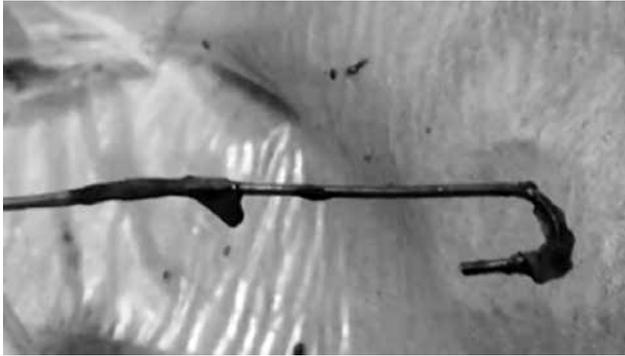
**Figure 2.** Snaring guidewire at the point of its adherence to vascular wall.



**Figure 3.** Freeing and removal of guidewire from vascular wall.

was completed successfully without any complications occurring either during or afterwards.

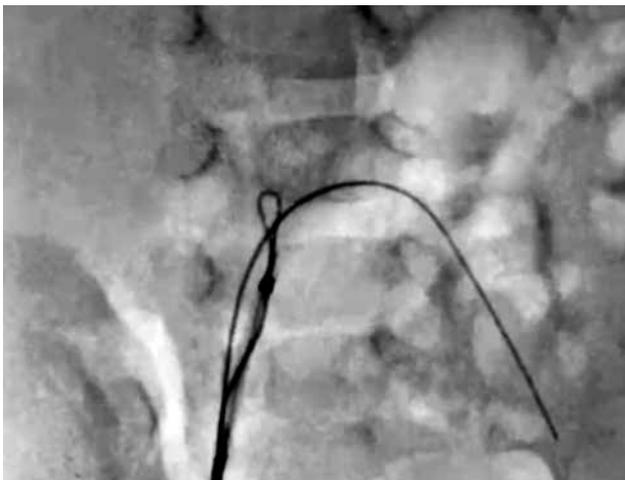
**Case 2-** A 3.5-month-old female baby weighing 5 kg who was being followed with a yet-undiagnosed



**Figure 4.** A close-up image of guidewire immediately after removal.



**Figure 5.** Capturing guidewire with a snare.



**Figure 6.** Withdrawal of guidewire together with snare through sheath (the other end of guidewire can be observed inside iliac vein).

metabolic disease was admitted to the pediatric ward for further treatment after contracting pneumonia. The patient was transferred to the intensive care unit due to respiratory failure and connected to a mechanical ventilator after intubation. Medical treatment was initiated and intravenous infusions were performed through a peripheral vascular line. A CVC was planned due to the failure of the peripheral line. After three weeks in the intensive care unit, an unsuccessful CVC was attempted through the right femoral vein. The central venous catheter was advanced through the left femoral vein, but was subsequently withdrawn due to the failure to administer fluids through the lumen during catheter control. Due to vascular problems, a central venous catheter was inserted through the subclavian vein. Direct X-rays obtained to confirm the catheter position and to check for possible complications incidentally revealed a J-tip guidewire extending from the right subclavian vein to the left iliac vein. The attending physician consulted the patient with our department, and the patient's relatives were informed of the condition. A written informed consent was obtained from each parent.

In the catheterization laboratory, the position of the intravenous guidewire was evaluated under fluoroscopy, and the J tip of the guidewire was found to be located at the intersection of the right subclavian vein with the jugular vein and to have a free-floating tip. Following local anesthesia, a 4F sheath was inserted after puncturing the right femoral vein. An Amplatz Goose Neck snare kit (LifeTech SeQure, Shenzhen, China) was advanced through the sheath and the J tip of the guidewire was captured at the level of the right subclavian vein (Figure 5). The guidewire was, then, withdrawn through the sheath inside the right femoral vein (Figure 6). The procedure was completed successfully without any complications occurring either during or afterwards.

## DISCUSSION

Central vein catheterization is an invasive procedure which provides vascular access in the operating room, intensive care unit, and emergency setting, and dialysis units. The more common mechanical complications include artery puncture, nerve injury, hematoma, air embolism, hemothorax, pneumothorax, arrhythmia, and artery malposition.<sup>[5]</sup> Forgetting a guidewire is another rare complication which can be avoided through a careful check of surgical instruments through a count before and after intravascular operations.<sup>[6]</sup> Forgetting a guidewire in the intravascular space is an

unacceptable malpractice that should not be allowed to occur.<sup>[7]</sup> A retained intravascular guidewire is usually noticed early, but in very rare cases, it can be identified only after a delay.<sup>[2,3]</sup> Previous literature related to this topic suggests that most late diagnoses of a retained guidewire are made incidentally.<sup>[4]</sup> Even in cases where the intravascular foreign body is asymptomatic, removal is absolutely necessary, as the foreign body may result in such life-threatening complications as cardiac injury, endocarditis, vasculitis, vessel dissection, vessel laceration, vessel perforation, and intravascular thrombus.<sup>[8]</sup>

Open surgical methods may be feasible, if the guidewire has not become affixed to the vessel wall and is extending to the jugular or femoral vein, at which point the guidewire can be controlled with an incision. Surgical interventions are planned depending on the type of complication, but when the guidewire and its fixation is localized in the vena cava superior, a possible surgical intervention would involve safe access to the vena cava superior and atrium through the J-sternotomy, and the removal of the guidewire by venotomy or atriotomy, and the repair of venous injuries, if any. Such venous injuries are associated with high mortality rates and require the highest level of readiness and teamwork. The removal of intravascular foreign bodies via an endovascular intervention rather than a surgical procedure is highly advantageous for both the patient and the surgeon.<sup>[7]</sup> In both of our presented cases, the endovascular method of guidewire removal was selected. Despite the reduced risk associated with endovascular interventions, serious complications may still occur during and after interventions and, therefore, close hemodynamic monitoring was performed in the presented cases, the patient blood was cross-matched, and an operating room with a surgical team was kept on stand-by. As presented in the first case, the removal of an epithelialized and fixed guidewire can be difficult, and the maneuvers performed in such cases are the main factor affecting procedural success. Prior to the intervention, it was considered that the guidewire became epithelialized and affixed to the vascular wall due to long-term stasis.

In conclusion, to avoid such complications, it is necessary to establish a standard protocol and check list and to utilize patient-oriented teaching, and the procedure should be performed by - or at least under the guidance of - experienced physicians. This requires a team of at least two clinicians, a supervisor, and an assistant who are all able to communicate effectively during the procedure to avoid the retention of guidewires or other such malpractices. We suggest that endovascular interventions should be considered safe and the procedure of choice for the removal of intravascular foreign bodies.

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