

# Lost wire? Ultrasound can find it for you!

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**Abstract:** The use of ultrasound (US) in clinical practice is becoming increasingly popular. This unique case highlights the importance of this technology in management of a complication arising from a central line placement in an intensive care unit (ICU).

**Keywords:** Central line; guidewire; ultrasound (US)

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## Case presentation

A 60-year-old female was admitted to intensive care unit (ICU) with septic shock. During her stay in the ICU she required placement of a central line for infusion of vasopressors and measurement of central venous pressure. For this purpose the right internal jugular (RIJ) vein was selected and real time ultrasound (US) guidance was employed for vein identification and patency. The operator experienced difficulty threading the wire but ultimately was successful. A 20 cm triple lumen central venous catheter was then placed utilizing modified seldinger technique. All three ports were aspirated and flushed. Post-procedure chest X-ray delineated a linear opacity extending beyond the length of the catheter and the diaphragm into the abdomen. US of the inferior vena cava (IVC) using lateral abdominal view (rescue view) revealed the presence of mobile hyper dense mobile object in the IVC consistent with retained guide wire which was inadvertently not pulled out during placement. It was then decided to pull the catheter with direct real-time visualization of the distal end of the guide wire using the US and the rescue view. The real time US guidance helped us monitor removal as wire was pulled out (see *Figures 1* and *2*). The catheter and the guide wire were removed *en bloc* without any complications.

## Discussion

Retention of a guide wire can lead to variety of clinical

dilemmas in an ICU patient and is potentially life-threatening. Cardiovascular morbidities associated with retained guidewire range from arrhythmia (3), conduction abnormalities (4), thrombosis, entanglement, kinking of the wire itself (5), vascular damage due to perforation (6) to even cardiac tamponade due to myocardium perforation which is associated with circulatory collapse and often fatal outcomes (7,8). Hence prompt removal is of paramount importance to avoid these complications and requires a degree of suspicion when taking care of ICU patients especially when linear opacities are witnessed on routine imaging.

With the increase in the total number of central lines that are placed in United States every year, it is reasonable to assume that the incidence of retained guide wire is also increasing. According to one study the incidence of retained guide wire was calculated to be 0.05% (9). There are multiple reasons that have been cited in medical literature for guide wires retention. In one study staff inexperience and limited training were the most common reasons (~25%) behind guide wire retention (10). In the same study other factors that were implicated were distractions, interruptions, uncooperative patient, placing central line during emergencies, equipment malfunction, inadequate supervision and poor communication between providers (10).

US can be used in a variety of clinical settings in ICU. One of the most common uses of this technique is placement of central lines to locate the target vessel. With



**Figure 1** Removal of the guide wire can be seen in this video using the rescue view (1).

Available online: <http://www.asvide.com/articles/1218>



**Figure 2** Removal of the guide wire. The collapse of inferior vena cava (IVC) can also be seen in this video (2).

Available online: <http://www.asvide.com/articles/1219>

the use of real time US central line placement has become safer as compared to the landmark technique. Other uses of bedside US include placement of arterial lines, sampling and removal of fluid from thoracic and abdominal cavities, volume assessment and responsiveness by evaluating IVC size and collapsibility, evaluation of pneumothorax and bedside echocardiography. Through this case report we aim to present another interesting and unique use of US in an intensive care setting which is locating the lost guidewire! The data on this use is unfortunately scarce and there is only one case report that commented on the use of bedside US in locating guidewire previously (11). Through this technique we can reliably locate and remove the guidewire. It is also worth mentioning that we can delineate the guidewire on the US in its entirety and also able to remove it using real time US which gives us the ability to witness entire removal.

Earlier removal of guide wire is important as this can prevent endothelialization as once endothelialized the removal becomes more difficult and increases the morbidity and mortality associated with the removal process. Force should never be used when resistance is encountered during removal as this can be an indication of endothelialization and can result in fracture of the wire and tissue damage. In one instance a guide wire was recognized in patient who had central venous cannulation done 1 year ago. Percutaneous approach was unsuccessful in removing the guidewire and ultimately patient needed a sternotomy and cardiopulmonary bypass (11).

Guide wires can be retrieved through a less invasive percutaneous method with the use of loop snare catheters, hook tip guidewires, basket retrievers and grasping forceps or catheters (12). This is a preferred method of removal and is usually employed by most physicians. If this method is unsuccessful then an open approach is the next option.

## Conclusions

Through this case we present a novel approach to guide wire removal. The approach involves using real time US guidance while attempting to remove the catheter. However, it should be noted that this can only be employed when guide wire actually is attached or is within the central line. Furthermore as we continue to withdraw the central line along with guide wire, we did it in small increments of 0.5–1 cm and continue to pinch the central catheter so that we hold the central catheter along with the guide wire while we are removing it. Real time US also helped us in deciding that the guide wire was not endothelialized as it was a free floating structure in the IVC. We propose that all cases of lost guidewires should be approached by using the US to evaluate for location and endothelialization before embarking on more definite and invasive strategies.

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## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

*Informed Consent:* Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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