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# Innovative Method to Retrieve Misplaced Guidewires Using Guidewires and Balloons

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**Abstract**

Central venous catheters (CVC) are placed commonly for long-term access in critically ill patients for injecting medicines, including chemotherapy in oncology patients, and for total parenteral nutrition. We herein describe innovative method of snaring two misplaced guidewires using balloons and guidewires.

**Keywords**

- central venous catheters
- guidewires

## Introduction

Central venous catheters (CVC) are placed commonly for long-term access in critically ill patients for injecting medicines, including chemotherapy in oncology patients, and for total parenteral nutrition. Guidewires used in these procedures can accidentally get misplaced inside the body. Location of misplaced wires can be confirmed using X-rays. These are removed percutaneously using Gooseneck snares, endobronchial forceps, Dormia basket, or manually prepared snare using guidewires. We herein describe innovative method of snaring two misplaced guidewires using balloons and guidewires.

## Case 1

A 25-year-old male presented to Interventional Radiology (IR) clinic, with a request for the removal of misplaced guidewire. CVC placement was attempted by a Gastroenterology Resident under supervision, but during the procedure he lost access to the guidewire. On fluoroscopy, the guidewire was seen extending from superior vena cava (SVC) through right atrium into the inferior vena cava (IVC). Financial constrains limited the use of snare in this patient and a different approach was required. We first secured a 10-F vascular sheath in the right internal jugular vein and, thereafter, two hydrophilic J-tip Terumo guidewires (0.035″) and a $10 \times 40$ mm percutaneous transluminal angioplasty (PTA) balloon into the IVC. The J-tip Terumo guidewires and the PTA balloon were rotated to engage the misplaced guidewire. The whole assembly was gradually drawn into the sheath and then PTA balloon was partially inflated. The vascular sheath, along with the misplaced guidewire, PTA balloon, and two Terumo guidewires, was finally removed as a single assembly (►**Fig. 1**). Compression was applied at the puncture site for 5 minutes after removal of the sheath.

## Case 2

Left common femoral vein cannulation was attempted in a 32-year-old male, with known case of chronic kidney disease with thrombosed arteriovenous fistula, by a Nephrology Resident. A call was made to the IR department to retrieve the wire. On fluoroscopy, the misplaced guidewire was seen extending from the IVC through right atrium into the SVC. Unavailability of snare forced us to find a different approach for its retrieval. We accessed the right internal jugular vein and secured a 10-F vascular sheath. Snaring of

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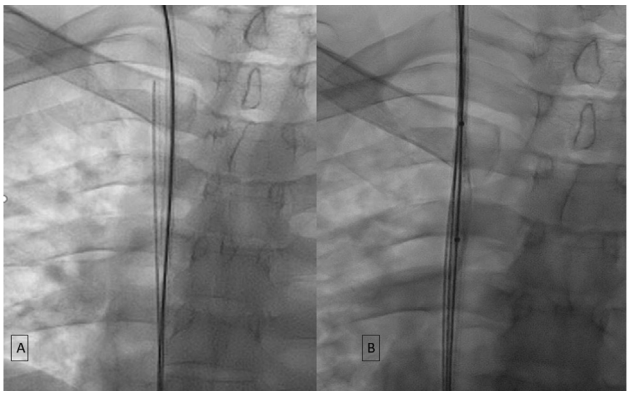


**Fig. 1** Case 1 of a 25-year-old man who presented with trauma with misplaced guidewire in superior vena cava (SVC). (**A**) Misplaced guidewire in SVC. (**B**) Assembly of guidewire, balloon, and misplaced wire that was gradually retrieved.

the misplaced guidewire was attempted with the help of two J-tip Terumo guidewires and $10 \times 40$ mm PTA balloon, but was unsuccessful. The PTA balloon was removed, followed by the introduction of Amplatz Super Stiff wire (Boston Scientific) (0.035″), which was rotated along with the two J-tip Terumo guidewires (0.035″); however, this was again with no success. Finally, a snare was prepared using Hi-Torque BMW (Abott) microwire (0.014) and the misplaced guidewire was gradually removed under fluoroscopic guidance, along with the sheath as well as the stiff and Terumo guidewires as a complete assembly (►**Fig. 2**). Compression was applied at the puncture site for 5 minutes after removal of the sheath.

## Discussion

Misplaced guidewire is a scenario faced by the clinicians and interventional radiologists in the following two situations: (a) when the CVC is placed by the residents in training, or (b) when the CVC is placed by the clinicians who are tired, lethargic, and not attentive.[1] Guidewire misplacement is detected immediately, or in some cases after few hours. Holding to end of wire is a good practice, as it drastically reduces the chance of misplacing guidewire. Removal of the misplaced guidewire within 24 hours is of utmost priority for the interventional radiologist, to prevent complications.[2,3] Till 1963, surgery was the only option left with the clinicians to remove the misplaced guidewire and other foreign bodies. Seldinger technique was first described in 1953 and in 1964, Dotter and Judkins first described a technique for percutaneous vascular access using Seldinger technique.[4,5] This drastically reduced associated morbidity, with the advantage that large-sized catheters could be placed percutaneously through a small-size hole in the skin using Seldinger technique.

Thomas et al reported nonsurgical retrieval of a broken segment of a steel spring guide from the right atrium and IVC in 1964.[6] Watson described snare loop technique for the removal of a broken steerable wire in 1987.[7] Snares are commonly used to retrieve misplaced guidewires. But the

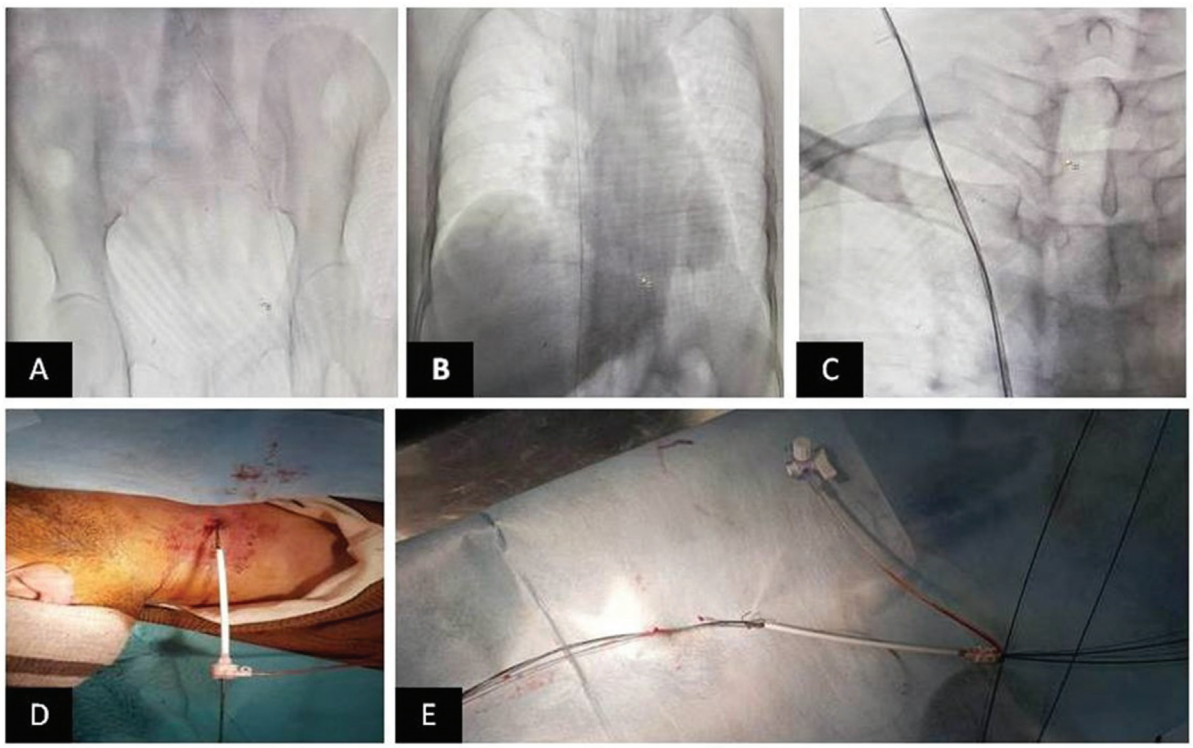


**Fig. 2** Case 2 of a 32-year-old female in whom guidewire was accidentally misplaced while obtaining central venous access through left common femoral vein. (**A, B**) Misplaced wire in the pelvis within the venous system reaching up to the superior vena cava through inferior vena cava and right atrium. (**C**) Engaged misplaced wire via Hi-Torque BMW microwire placed through a 10-F vascular sheath into right internal jugular vein. (**D**) En masse retrieval of entire assembly. (**E**) Retrieved misplaced guidewire along with other hardware used.

 

disadvantage of using snares is that these snares are costly and not afforded by many patients in India, as most patients are not covered by insurance. Moreover, it is difficult to maintain stock of differently sized snares, due to low usage rate. In our first case, snare could not be used due to prohibitive cost and in the second case, snare was not available in stock at that time. In the first case, we could successfully retrieve the misplaced guidewire in the first attempt using two guidewires and one PTA balloon. In the second case, we could retrieve the misplaced guidewire after multiple attempts, after manually making a snare using Hi-Torque BMW microwire. The hardware we used in both our cases was available in our digital subtraction angiography laboratory. Moreover, the hardware we used was cheaper than currently available snares in the market. Some interventional radiologists have advocated the usage of heparin as an anticoagulant, both before and during the procedure. However, we do not believe that our technique needed any additional anticoagulant.

Our both cases highlight the point that interventional radiologists have to use innovative techniques when faced with complex clinical situation, especially when the desired hardware is not available in their stock. Keeping cool and thinking about possible solutions can help the interventional radiologist tide over difficult situations.

## Conclusion

We hereby conclude that innovative methods like combination of guidewires and PTA balloon can be used successfully to retrieve misplaced guidewires, when snare is not available in our stock. Teaching our residents and fellows to successfully carry out IR procedures is our moral duty. But this should not be at the expense of affecting patient care services. Trainees should first be encouraged to learn the basics of IR from their seniors and guides. After these trainees have shown proficiency while assisting, they should be allowed to carry out IR procedures under guidance. Second, these trainees should be taught to call their seniors and mentors for help, in case of emergency. Most importantly, they should be taught never to hide their mistakes and to discuss important cases and complications with their seniors. Only then we can label our trainees as safe radiologists.

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Conflicts of Interest
There are no conflicts of interest.

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