

## Case Study

# ENTRAPMENT OF A GUIDE WIRE: AN INCIDENTAL COMPLICATION OF CENTRAL LINE CATHETER PLACEMENT

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**Abstract:** *Seldinger's technique is widely used to place central venous and arterial catheters and is generally considered safe. This technique does have multiple potential risks. Guidewire-related complications are rare but potentially serious. We describe a case of an entrapped guidewire during central venous catheter insertion followed by a review of the literature on this topic. Measures which can be taken to prevent such complications are explained in detail as well as recommended steps to remedy errors should they occur.*

**Keywords:** *Medical terms: central venous catheter; Seldinger technique; guide wire; Subclavin vein; entrapment; knot*

## Introduction

Central venous catheterization is a commonly performed procedure in the intensive care unit that is technically challenging, and associated with several risks and complications. Guide wires are routinely used in the Seldinger technique during central venous catheter placement [1]. Catheter looping and knotting are known complications of central venous catheterization; however, there are few reports of guide wire-related complications. The most common known complication of a guide wire is cardiac arrhythmias. Other complications also include looping and knotting, vascular perforation, fragmentation and embolization, and intravascular entrapment of the wire. We present a case in which a guide wire was stuck beneath the skin while cannulation the Subclavin vein.

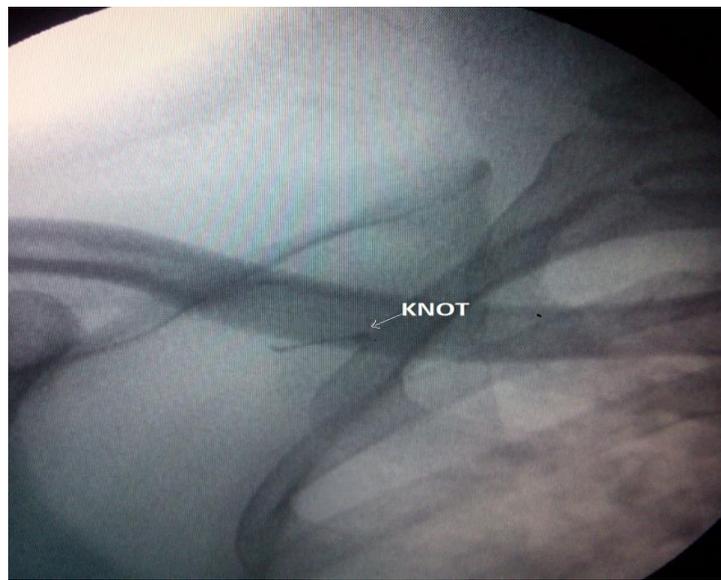
## Case report

A 60-year-old male patient with diabetes mellitus and left-sided nonsmall cell lung cancer was admitted to the Intensive Care Unit with progressive shortness of breath and hypotension. He was put on noninvasive ventilation which he tolerated well. In view of haemodynamic instability central venous cannulation was planned. After ensuring appropriate coagulation status, right-sided subclavin vein was chosen for cannulation. A seven French percutaneous Seldinger type 15 cms length catheter was used. Under all aseptic precautions right Subclavin vein was punctured by introducer needle on very first attempt.

After aspiration of blood, guide wire was introduced, but it could not be introduced more than ten centimeters. Thus, we tried to remove the guide wire, to reconfirm the backflow of blood in the introducer needle. But guide wire was stuck near its tip and many attempts to remove it with gentle traction failed. During this traction the introducer needle slipped and only the guide wire was left in place, which stretched out to the extent that it may break with further traction [Figure- 1]. We immediately shifted the patient to the operation theatre and got a C-Arm image done, which revealed that only J-tip of guide wire was entrapped and a knot was formed [Figure-2]. Immediately surgeons were informed and they widened the puncture site with nick and after doing some fine dissection guide wire came out with gentle traction [Figure-3]. After removal of guide wire local pressure was applied. USG was done to reveal any vascular injury or local haematoma.



**Figure 1:**



**Figure 2:**



**Figure 3:**

## Discussion

Although this case ended without significant harm being caused to the patient, guidewire-related complications with accompanying morbidity and mortality do occur during the insertion of central venous catheters. The high frequency of such Central Venous Catheterisation placement procedures in emergency rooms, operating rooms, and intensive care units makes the likelihood of seeing an occasional complication quite high. Central Venous Catheterisation placement is an extremely common procedure performed at virtually every institution by a variety of specialists. Central Venous Catheterisation is traditionally done blindly by skin landmarks. However, National Institute for Clinical Excellence (NICE) has published its recommendations for use of ultrasound locating devices for placing central venous catheters. Ultrasound reduces the incidence of complications related to venous puncture [2, 3]. Complications can still occur after the safe venous puncture including, the guide wire, the dilator or the catheter insertion complication.

Catheter related complications are well known, but there are very few reports in which guide wire has been involved. Most common guide wire related complications include entrapment of guide wire in the Sternocleidomastoid muscle and Inferior Venacava Filters [4-6]. Kinking or looping of the wire itself is an occasional guidewire complication. Applying force to thread a guidewire through the introducer needle despite significant resistance is likely to cause such a problem [7]. Kinking can also result if the dilator is forced in a direction that diverges from the original path of the wire [7]. If a clinician does not recognize this scenario there is potential for cutting through the vein with possible fatal complications [8]. This type of complication can be avoided by intermittently moving the wire gently in and out as the dilator is being advanced through the subcutaneous tissue. Application of increasing force after looping or kinking sometimes results in knot formation. Both intravascular as well as extravascular knotting have been reported [7]. It is almost exclusively described following the subclavian approach which may be due to the curved path the vein takes as it loops over the first rib to descend into the Superior Vena Cava [7]. This complication should be suspected when the guidewire cannot be pulled out after successful catheter insertion. In this situation, no force should be used to pull the catheter and wire out, and an immediate X-ray or C-Arm image (if possible) should be ordered. Once the diagnosis is established, interventional radiology should be consulted, and sometimes surgical intervention is necessary.

Most of the Clinical reports published mentions initial difficulty with the passage of guide wire. Any resistance felt during guide wire insertion should prompt needle withdrawal several millimeters. If the guide wire cannot be passed easily without resistance, procedure should be stopped; needle and guide wire should be removed as a single unit and pressure applied. In our case the needle was withdrawn and guide wire pulled thereafter. Probably, the J-tip of guide wire got stuck just underneath the skin at some depth which required surgical exploration.

Here we want to emphasize that even though central venous catheter placement is common, execution of details is imperative. We should be aware of potential entrapment of guide wire during central venous catheterisation. Central Venous Catheterisations often are placed by personnel who are in training; closer supervision by more senior person may help identify and prevent similar complications. Considering the wire to be a delicate instrument with inherent areas of structural weakness [9], on encountering any resistance while advancing or retrieving the wire, force should not be used as this may result in fracture of the wire and damage to the internal structures

## Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

## Conflict of Interests

The authors declare that they have no conflict of interests related to this manuscript.

### Authors' Contributions

Dr. Gaurav Dwivedi was the main anaesthetist on the case. Dr. Lalit Gupta was the co-anaesthetist and took the pictures. Dr. Gaurav Dwivedi and Dr. Lalit Gupta reviewed the literature and wrote the manuscript.

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