

Unusual site of guide-wire entrapment during Central Venous Catheterization

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Abstract

We are reporting a case of possible entrapment of guide wire in the region of tricuspid valve, which made it impossible to remove the guide wire from internal jugular (IJ) vein for a short while. Awareness about this rare complication is emphasized.

Introduction

The placement of central venous catheter, a commonly performed procedure in the intensive care unit, is technically challenging with known risks and complications. Although catheter looping and knotting are well recognized complications of central venous catheterization, there are few reports of guide wire related complications. The most common complication of the passage of a 'J' wire is the induction of cardiac arrhythmias.¹ Other complications include looping and knotting², vascular perforation³, fragmentation and embolization⁴ and entrapment of the wire in another intravascular device such as a Greenfield filter⁵ and sternocleidomastoid muscle³. On literature search, we could

not find any report of guide wire entrapment around the site of the tricuspid valve.

We are reporting a case of possible entrapment of guide wire in the region of tricuspid valve, which made it impossible to remove the guide wire from internal jugular (IJ) vein for a short while.

Case Report

A 26 year female patient who was a known case of bipolar disorder for last 10 years was admitted to intensive care unit through the emergency room with a short history of unresponsiveness. Her past history was otherwise unremarkable except for some involuntary movements related to her medications.

In the emergency room, she was found to be unconscious, febrile, hypotensive and tachycardic. Her breathing was also laboured and was not maintaining airway. Her initial management included endotracheal intubation and ventilation, aggressive fluid resuscitation and use of dopamine to support the haemodynamics. She also had

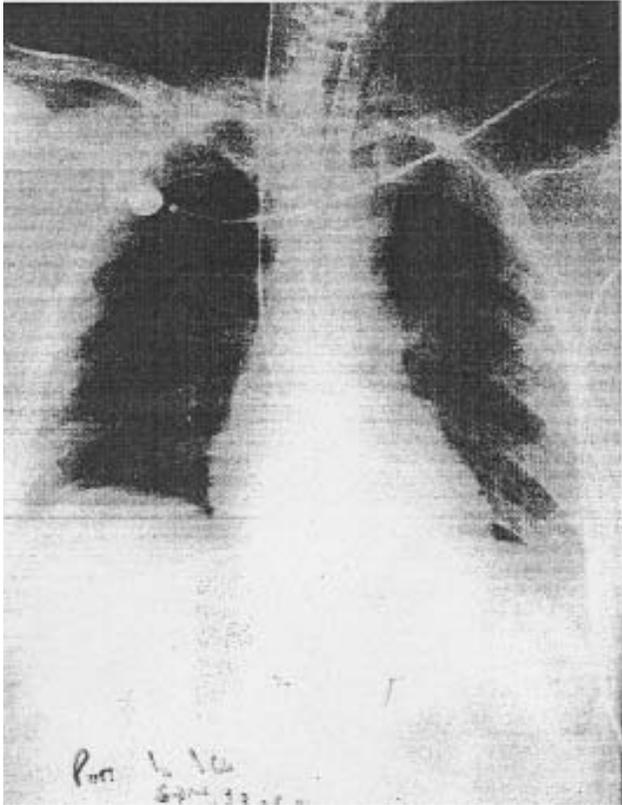


Figure. Guidewire tip near the region of tricuspid valve

had two generalized tonic clonic seizures which were settled by injection midazolam and sodium valproate. Her laboratory investigations including cerebrospinal fluid examination and CT scan of brain did not reveal any abnormality.

Patient was shifted to the ICU for further management. In view of haemodynamic instability and unresponsiveness to aggressive fluid resuscitation and ionotrope, central venous cannulation was planned. After ensuring appropriate coagulation status right internal jugular (RIJ) vein was selected for cannulation. A 8 Fr. percutaneous Seldinger-type Swan sheath introducer (Product No. SI-09808, Arrow International USA) was used. Under aseptic conditions and after confirming the landmarks, RIJ vein was first located with 21 gauge needle, followed by introducer needle which punctured the vein on first attempt. After confirming good backflow of blood on aspiration, the guide wire was introduced without any resistance, followed by swan sheath assembly. On trying to remove the guide wire, difficulty was encountered despite several attempts with gentle traction and it seemed to be stuck. It was then decided to leave the guide wire in place along with swan assembly and obtain an immediate portable chest X-ray. The X-ray revealed the J-tip of the guide wire in the right ventricle near the region of tricuspid valve (Figure 1). After excluding the knotting

of guidewire on chest X-ray, removal of wire was re-attempted gently and surprisingly it came out without any resistance. A transthoracic echocardiogram was done to rule out any pre-existing pathology or damage/trauma to vessels or heart, specially tricuspid valve, which turned out to be negative. The patient gradually improved over the course of next three days and was successfully shifted to the ward and eventually discharged home.

Discussion

Central Venous Catheterization has traditionally been achieved blindly by "landmark method". The National Institute for Clinical Excellence (NICE) has published its recommendations for the use of ultrasound locating devices for placing central venous cannulae.^{6,7} This has the potential to reduce the incidence of complications related to initial venous puncture, which is the first stage of central venous catheterization. Complications may still occur at any other stages of the procedure including the guide wire, the dilator, or the catheter insertion.

Although catheter related complications including looping and knotting are well recognized, there are few reports in which guide wires have been involved. Most of the guide wire related complications include entrapment of guide wire in the sternocleidomastoid muscle and IVC filters.³⁻⁵ Some of the guide wire related complications may be due to insertion of inappropriately excessive length. In our patient the guide wire was inserted more than the recommended distance as there were no distance markings on the guide wire. The chest X-ray also confirmed this, as the J-tip was lying in the ventricle probably near the tricuspid valve where it got stuck and was difficult to remove. The question which is difficult to answer is that what makes it easier to remove the guidewire later on? One possible explanation could be that, the continuous flow of blood and dynamic movement of tricuspid valve might have subsequently freed the entrapped guidewire.

The practice of introducing only that length of guide wire necessary to secure vascular access "safe length", is one way which may reduce or eliminate the risk of entrapment resulting from looping or knotting of the guide wire or entrapment by IVC filters. This has been demonstrated by Andrew et al in their study,⁸ who concluded the upper limit of 18cm as appropriate in most adult patients from RIJ venous entry point to caval atrial junction (CAJ). This finding was also supported by some earlier studies.^{9,10}

The design of some of the central venous catheterization packs may increase the potential for guidewire complications as these do not have distance markings on the guide wires. Also some central venous catheterization packs have a huge catheter to wire length discrepancy with

excessively long guidewires. Many operators assume that taller and heavier patients have longer distances to the CAJ, and introduce more guidewire accordingly. Introducing guidewire length >18 cm would, of course, increase the likelihood of reaching into or below the atrium and tricuspid valve.

This case report emphasizes the importance of awareness of potential entrapment of guide wire during CVC. Guidewire complications specially entrapment and arrhythmias during CVC placement can be reduced or avoided if the operating physician introduces only the amount of wire necessary for safe placement of catheter, catheter manufacturers should provide guidewires with specific length appropriate for specific catheters. This would not only reduce the possibility of excessive wire insertion but will also facilitate the management of the exposed portion during dilator and catheter exchanges.

The 18 cm distance could be indicated on the guidewire as a visible mark or alternatively distance markings could be placed at 1-2 cm increments over the entire length of guidewire.

It is also important that force should never be used to withdraw a guidewire when unexpected resistance is encountered, as this may result in fracture of the wire and damage to internal structures.

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