An unusual complication during femoral venous catheterisation: separation of spiral wire surrounding guide wire and its late diagnosis in a child

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Abstract

Introduction
The case of an unexpected complication in a 1.5-year-old patient during femoral venous catheterisation is presented.

Case report
During the procedure, the spiral wire got separated from the surrounding guide wire, and the spiral part remained in the femoral vein until it was noticed one day later. Such a complication has not been reported previously to the best of our knowledge.

Conclusion
The method of administration and defects originating from construction and production of the wire may have played a role in this rare complication.

Introduction
Central venous catheterisation is one of the most routine and basic interventional procedures used today in intensive care units, emergency rooms and operating theatres1,2. According to reports, more than 5 million central venous catheters are inserted annually in the United States3. The rate of complications may be as high as 12%4-6. For central venous cannulation, the subclavian vein and internal jugular vein are usually used, while the femoral, external jugular, basilica and cephalic veins are used less frequently7.

The Seldinger method is most commonly used in central venous catheterisation8,9. During this procedure, mechanical, infectious and thrombotic life-threatening complications may occur10. Rates of catheter-related complications, such as malpositioning, haemothorax, pneumothorax, cardiac tamponade, vascular erosion, chylothorax, air embolism, arrhythmia and death, have been reported to vary between 1% and 42% in different series11. The quality of the material, the experience of the person carrying out the procedure and the anatomical characteristics of the patient influence complication rates12. The duration of catheterisation also has an effect, with longer durations increasing the likelihood of complications9,11-13.

Various publications have reported complications associated with the guide wire, such as migration to the pulmonary artery14, breakage15, sticking in the vessel16 and loss17-18. In our case report, a 1.5-year-old girl was about to undergo ventricular septal defects (VSD) and total correction of a large VSD and aortic dextraposition at the second attempt with a 20G needle. Using the Seldinger method, a J guide wire was advanced to the femoral vein for the 9F femoral catheter (Certo-fix® Mono Paed S110 Braun) was inserted for monitoring the venous pressure, activated clotting time (ACT) follow-up, frequent blood sampling and administration of the blood and fluid. The skin entrance site was prepped and draped. Femoral vein puncture by an experienced surgeon succeeded at the second attempt with a 20G needle. Using the Seldinger method, a J guide wire was advanced to the femoral vein. Resistance was encountered while advancing the wire; therefore, the wire was withdrawn. It was thought that the J part of the guide wire prevented advancement and that the distal straight part advanced through the 20G needle. The 5F catheter was used to advance from the J part of the guide wire. As the catheter was stuck at the J part, that part was cut with wire scissors, and the catheter was advanced without encountering any additional resistance. Blood drained from the catheter, and fluid flow was good. The patient underwent the operation without any complications and was transferred to the intensive care unit. In the chest X-rays taken one day later, a wire corresponding to the length of the guide wire was observed in the radiology. To our knowledge, this is the first such case in the literature.

Case report
In the echocardiographic examination of a 1.5-year-old girl weighing 10 kg with the complaint of bruising, a large VSD and aortic dextraposition were observed. After administration of anaesthesia for surgery, a 5F femoral catheter (Certo-fix® Mono Paed S110 Braun) was inserted for monitoring the venous pressure, activated clotting time (ACT) follow-up, frequent blood sampling and administration of the blood and fluid. The skin entrance site was prepped and draped. Femoral vein puncture by an experienced surgeon succeeded at the second attempt with a 20G needle. Using the Seldinger method, a J guide wire was advanced to the femoral vein. Resistance was encountered while advancing the wire; therefore, the wire was withdrawn. It was thought that the J part of the guide wire prevented advancement and that the distal straight part advanced through the 20G needle. The 5F catheter was used to advance from the J part of the guide wire. As the catheter was stuck at the J part, that part was cut with wire scissors, and the catheter was advanced without encountering any additional resistance. Blood drained from the catheter, and fluid flow was good. The patient underwent the operation without any complications and was transferred to the intensive care unit. In the chest X-rays taken one day later, a wire corresponding to the length of the guide wire was observed in the radiology. To our knowledge, this is the first such case in the literature.

References

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femoral vein (Figure 1). The wire was assumed to be the filament wire from the inner part of the guide wire. It was removed from the femoral vein under general anaesthesia on the same day without any complications using a gooseneck snare obtained from the paediatric cardiology department (Figure 2). The patient was discharged the next day.

**Discussion**

The loss of a guide wire or a catheter during central venous catheterisation or leaving the wire in the patient is a preventable complication, and the mortality rate in such cases may be as high as 20%\(^\text{19}\). A number of articles in the literature have reported the loss of guide wire or wire left in a patient\(^\text{17,20,21}\). Other complications of central venous catheterisation have been discussed by many authors in the literature\(^\text{22,23}\). As far as we know, the complication we encountered has not been mentioned in the literature. Breaking of the J guide wire may be due to the wire not being strong enough to endure forces, such as stretching and pulling. An additional cause may be obstruction of the J guide wire by various anatomical structures due to the position of the patient. In the current case, the separation was due to a defect in the structure of the guide wire and the exertion of too strong a force on the wire. To prevent complications, such as breakage or separation of the wire, the force applied should not exceed the endurance capacity of the wire. In cases where the wire becomes stuck or when it is forced or pulled with extraordinary force, the structure of the wire can be impaired, in which case the condition and the anatomical position of the patient should be evaluated again\(^\text{24,25}\). Separation of the inner part of the guide wire or impairment of the guide wire, as in our case, may lead to breakage or separation. It should be stressed that these problems may originate from the weakness and the inadequacy of the materials used. The mortality rate associated with undetected guide wire parts may be as high as 20%\(^\text{20,26}\). However, in general, the patient does not display any symptoms, and the wire is detected incidentally. Lost guide wire may lead to arrhythmia, vessel injury, thrombosis and embolus. Lost guide wire must be removed as quickly as possible. If the patient shows no symptoms, removal of a catheter or part of a broken guide wire via interventional radiological methods is less risky than surgical removal\(^\text{27,28}\). The use of a dormier basket or endovascular forceps increases the risk of endovascular trauma. In our case, the fragment of guide wire was removed by paediatric radiology using

![Figure 1: The guide wire in the femoral vein.](image)

![Figure 2: The guide wire after removal from the femoral vein.](image)

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Conclusion
Each step of central venous cannulation may lead to serious complications. Before the procedure, the central catheter and the guide wire must be checked, and it should be borne in mind that they are fragile. Particular care should be taken with patients predisposed to thrombosis and those undergoing repeat catheterisation procedures. While passing the catheter through the guide wire, the proximal end of the wire should never be left loose. At the end of the procedure, the surgeon should check whether all the guide wire has been completely removed. After the procedure, the control film should be examined carefully. It should not be forgotten that fatal complications might be prevented by these simple measures and high awareness.

Consent
Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editor-in-chief of this journal.

Abbreviations list
ACT, activated clotting time; VSD, ventricular septal defects.

References

Case Report
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Competing interests: none declared. Conflict of interests: none declared. All authors contributed to the conception, design, and preparation of the manuscript, as well as read and approved the final manuscript.

All authors abide by the Association for Medical Ethics (AME) ethical rules of disclosure.

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