

# Iatrogenic Right Heart Failure Due To Central Vein Catheterization: A Rare Complication

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## Abstract

**Introduction:** Central venous catheterization (CVC) is an invasive procedure used for many reasons in clinics such as hemodynamic monitoring, fluid and drug administration and hemodialysis. It is an unlikely problem to forget the central catheter wire (CW) in the intravascular area and this has dangerous consequences. Causes such as inattention, inexperience, time constraints due to workload, fatigue and the absence of accompaniment by a more experienced clinician are the main reasons for this complication.

**Case Report:** In this article, we present a case of forgotten CW starting from the subclavian vein and making a ring around the tricuspid valve in the right atrium, extending to the vena iliaca communis dextra. This prevented tricuspid valve closure and led to decompensated right heart failure. This complication was not reported previously.

**Conclusion:** CVC is a commonly used method. It provides great benefit in follow-up and treatment. It should be kept in mind that forgotten wires can cause right heart failure secondary to mechanical tension on the tricuspid valve as one of its complications.

**Key words:** Central venous catheterization, right heart failure, forgotten catheter wire

## Introduction

Central venous catheterization (CVC) is an invasive procedure that is frequently used in intensive care with many indications such as hemodynamic monitoring, total parenteral nutrition support, long inotropic and irritant drug administration and hemodialysis<sup>1</sup>. Besides the advantages of the CVC procedure, it can also cause different complications such as arterial puncture, catheter malposition, vascular erosion, air and thrombus embolism, pneumothorax, cardiac perforation, and cardiac tamponade<sup>2</sup>. In this article, we present a case of forgotten catheter wire (CW) starting from subclavian vein and making a ring around the tricuspid valve in the right atrium, extending to the vena iliaca communis dextra, preventing the tricuspid valve closure and leading to decompensated right heart failure. Also in this context, the reasons for forgetting the guide wire and the precautions to be taken to prevent it are discussed.

## Case

A 69-year-old male patient was admitted to the emergency department with complaints of increasing breathless-

ness, cold sweats and swelling in the feet for the last three months. On physical examination, general condition was moderate, conscious and agitated. Vital findings were blood pressure; 140/90 mmHg, pulse; 115 beats/min, respiratory rate 14 breaths/minute, body temperature; 36.5 C. Pulmonary sounds were natural. A 3/6 systolic murmur was heard at the tricuspid focus. Jugular venous fullness and bilateral 2 (+) pretibial edema was found. In laboratory tests; glucose: 82 mg/dl, BUN: 37 mg/dl, Cre: 1,1 mg/dl, AST: 51 U/L, ALT: 58 U/L, GGT: 38 U/L, ALP: 131 U/L, Na: 142 mmol/l, K: 2.6 mmol/l, troponin 0.01 n /ml, WBC: 9000 /UL, hemoglobin: 12.7 g/dl, Hct: 36.9% were found. Electrocardiography (ECG) had no features other than sinus tachycardia. Echocardiography was planned to evaluate the cardiac function of the patient. Echocardiography revealed an ejection fraction of 35%, fibrotic tricuspid valve, third degree tricuspid insufficiency with color Doppler, and foreign body obstruction which prevent the closing of the flaps. Contrast-enhanced thoracic tomography for advanced examination of the patient revealed a CW continuing to the superior vena cava from the subclavian vena cava, making a ring around the tricuspid valve and preventing the tricuspid valves closing with mechanical pressure, and advancing toward to inferior vena cava and vena iliaca communis dextra (Figures 1,2,3.). After this, the patient's anamnesis

was deepened and it was learned that the patient was hospitalized for one week in the intensive care unit due to acute renal failure and a hemodialysis catheter was inserted using subclavian vein for hemodialysis three months previous. The patient complained that his feet started to swell, shortness of breath evolved, and gradually increased after he was discharged. Decompensated right heart failure which developed secondary to hemodialysis catheter, which was forgotten in the patient. was diagnosed. The patient consulted with a cardiovascular surgeon to remove the catheter wire. With the recommendation of the cardiovascular surgery specialist, the patient was referred to the center for removal of the CW. The central catheter of the patient was organized and a frequent follow-up with antiaggregant and anticoagulant treatment was planned because of the risk of removal. The patient was called for check-up 2 times a year.

## Discussion

CVC is a frequently-used invasive procedure, especially in patients monitored in intensive care. Internal jugular vein, subclavian vein, and femoral vein are the anatomic structures used for CVC. Many factors such as local skin lesions, coagulopathy, infection, anatomical integrity, and edema play a role in the choice of the anatomy to use by the clinician<sup>3</sup>. However, if the correct technique cannot be

applied, it can cause serious complications. Complications such as arterial puncture, pneumothorax, hemothorax, hydrothorax, chylothorax, catheter malposition, air and thrombus embolism, arrhythmia, hematoma, cardiac perforation, and trauma to neighboring nerves and vessels may develop during central venous catheterization. In addition, there may be catheter-related thrombosis, coagulopathies, and catheter-related infections after administration<sup>4</sup>. Risk factors that facilitate the development of complications include, poor technical use, poor quality of the material used, a body mass index less than 20 kg/m<sup>2</sup> or more than 30kg/m<sup>2</sup>, presence of coagulopathy, hemodialysis catheter with large lumen,

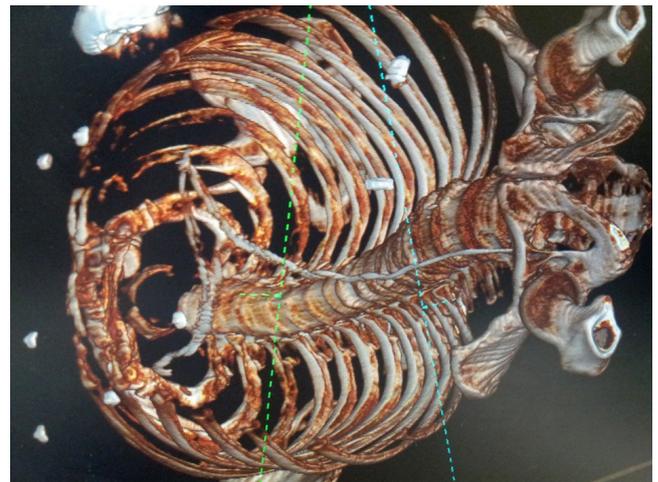


Figure 2:

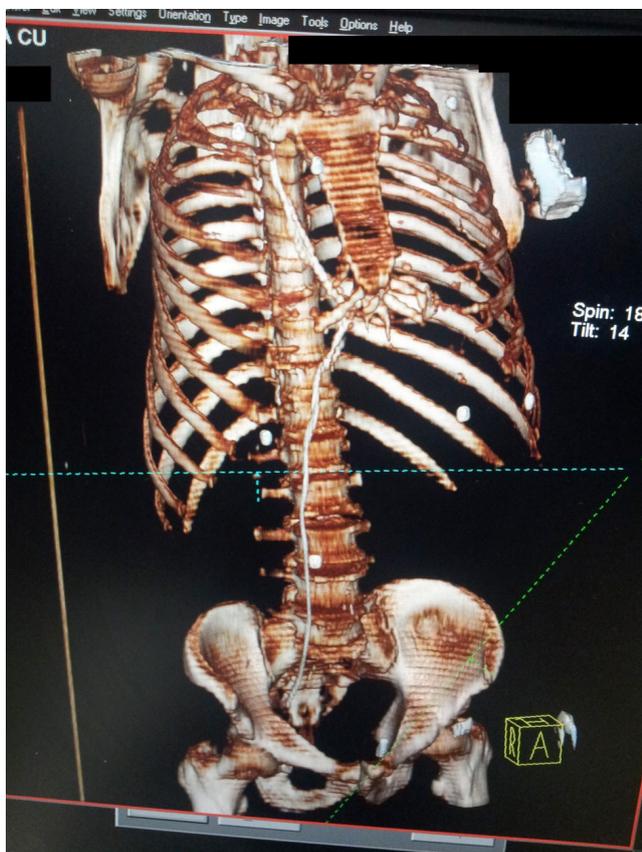


Figure 1:



Figure 3:

and false anatomical site selection. Rarely, central CW can be seen to be twisted, knotted, broken, forgotten or not retracted<sup>5</sup>. But this complication was not reported previously. The complication of the wire continuing to the superior vena cava from the subclavian vena cava, making a ring around the tricuspid valve and preventing the tricuspid valves closing with mechanical pressure, and advancing toward the inferior vena cava and vena iliaca communis dextra may occur, as reported in our case. The reason for forgetting the CW in the vascular area is carelessness, inexperience, haste, fatigue, multiple failed attempts and inadequate supervision by experienced clinicians<sup>5</sup>. In a study conducted by Taylor et al., it was reported that the presence of an experienced person reduced the complication rate by half. In the same study, the complication rate increased sixfold in cases of continuing the procedure after three and more unsuccessful attempts<sup>6</sup>. Complicated cases of forgotten CW in the vascular area which can be removed with noninvasive methods using Dormier basket and endovascular forceps under local anesthesia or with invasive methods such as venous exploration, laparotomy, thoracotomy under general anesthesia were reported<sup>5</sup>. Resistance should not be encountered during insertion of the CVC, and it should be withdrawn and retried if encountered. In addition, the catheter should never be advanced without seeing the distal lumen of the guide wire. After the process, the guidewire should be checked so it is completely removed and has no broken parts, and the CW should never be left until the end of the process. Inability to find the CW after the procedure, resistance to injection in the distal catheter lumen and poor venous return show that the CW was forgotten in the intravascular area<sup>7</sup>. Ultrasonically guided catheterization and checking the radiological accuracy of the catheter site after the procedure are among the recommended methods to reduce complications<sup>8</sup>.

In conclusion, CVC is a commonly-used method. It provides great benefit in follow-up and treatment. It is an inva-

sive application that increases the morbidity and mortality of the patient if it is not implemented correctly. It should be kept in mind that the forgotten wire can cause right heart failure secondary to mechanical tension on the tricuspid valve as one of its complications. For this reason, the CVC procedure should be done carefully and any probable previous procedure should be questioned in the presence of suspicious symptoms. Anamnesis should be taken in this way and with great care. Further investigation should be planned in case of doubt.

## References

1. Doğan N, Becit N, Kızılkaya M, Ünlü Y. A rare complication due to central venous cannulation. *Turkish Thoracic and Cardiovascular Surgery* 2004; 12: 135-7.
2. Kusminsky RE. Complications of central venous catheterization. *J Am Coll Surg* 2007;204:681-696.
3. Batra RK, Guleria S, Mandal S. Unusual complication of internal jugular vein cannulation. *Indian J Chest Dis Allied Sci* 2002;4:137-9.
4. Morgan GE Jr, Mikhail MS, Murray MJ. Patient monitors. In: Morgan GE Jr, Mikhail MS, Murray MJ, editors. *Clinical anesthesiology*. 4th ed. New York: McGraw-Hill Companies Inc; 2006 p. 100-2.
5. F. Gümüş, H. Yeter, M. K. Erol, N. Şanlı, B. Özkaynak, A. Alagöl. A Forgotten Guidewire: Complication of Central Venous Catheterization. *Journal of the Turkish Society of Intensive Care* 2011;9:64-7.
6. Taylor RW, Palagiri AV. Central venous catheterization. *Crit Care Med* 2007;35:1390-6.
7. Schummer W, Schummer C, Gaser E, Bartunek R. Loss of the guidewire: mishap or blunder? *Br J Anaesth* 2002;88:144-6.
8. Rando K, Castelli J, Pratt JP, Scavino M, Rey G, Rocca ME, Zuni-G. Ultrasound-guided internal jugular vein catheterization: a randomized controlled Trial. *Heart Lung Vessel*. 2014;6:13-23.