



Malposition of Subclavian Vein Catheter: A case report and review of literature

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Abstract

The insertion of central venous catheter (CVC) is used for different purposes among the patients. Seldinger method is the most common percutaneous access method for CVC insertion. During this procedure, direction of the catheter to an unwanted vein is a rare, but a serious complication. In order to reduce complications, it is essential that the staff applying the central venous catheterization should be experienced; use the accurate technique and the location of the catheter be displayed by using radiological method after the procedure. We aimed to discuss the malposition of the CVC in two cases in the light of the information in the literature.

Keywords: Complication, central venous cannulation, malposition

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Introduction

The application of CVC is executed in various fields from operations and emergencies requiring blood and liquid transfusion to the conditions requiring parenteral nutrition in intensive care. For this purpose, internal jugular vein (IJV) and subclavian vein (SV) are frequently applied. Other veins such as femoral, external jugular can also be used rarely. In addition to the experience of the person performing cannulation and the quality of the material, the anatomic structure of the patient is also effective in the prevention of possible complications during CVC [1-3]. We aimed to discuss the misplacement of the CV catheter in two cases in the light of the information in the literature.

Case 1

Ascending Aortic Aneurysm repair was planned for a 76 year-old female patient, who had no history apart from hypertension and heart failure. We concerted to insert a catheter into the left internal jugular vein because of easier access at the operation and surgery cannulation would be performed from the right subclavian artery in the operation. The patient was taken to the operating room without premedication. After the routine electrocardiography (ECG), peripheral oxygen saturation (SpO₂), and local anesthesia under sterile conditions were carried out on the patient, the left radial artery was cannulised and the monitorisation of the invasive blood pressure was executed. The preoperative blood pressure was 136/58 mmHg, the heart rate (HR) was 53/min, and SpO₂ was measured as 92%. The anesthesia induction was made with 0.1 mg/kg midazolam (Zolamid, Defarma) 0.1 mg/kg vecuronium (Norcuron, Organon) and 20 µg/kg fentanyl (Fentanyl, Meditera). Following the intubation, the respiration parameters were adjusted as O₂ 50%-air 50%, sevoflurane 1.5-2 lt/min⁻¹ tidal volume 6-8 mL/kg and respiration frequency of 12-14 breath/min. After the patient was given the proper position for the left IJV catheterization, sterile conditions were provided and 7F injection was directed for three times to the nipple on the same side with an angle of 30-40 degrees, once the artery puncture was completed in one of those trials. We did not realise any hematoma and planned to perform catheterization from the left SV. By using 7F central catheter, left SV cannulation was performed successfully in one application. A complete blood, fresh frozen plasma, noradrenaline, adrenaline and nitro-glycerine infusion were made without facing any problem by using this catheter during the operation.

When the chest radiography was taken for the assessment of the patient in the postoperative intensive care unit, it was observed that the catheter was directed from left subclavian vein to left internal jugular vein (Fig 1). The catheter was removed and the catheterization was made from the right femoral vein.

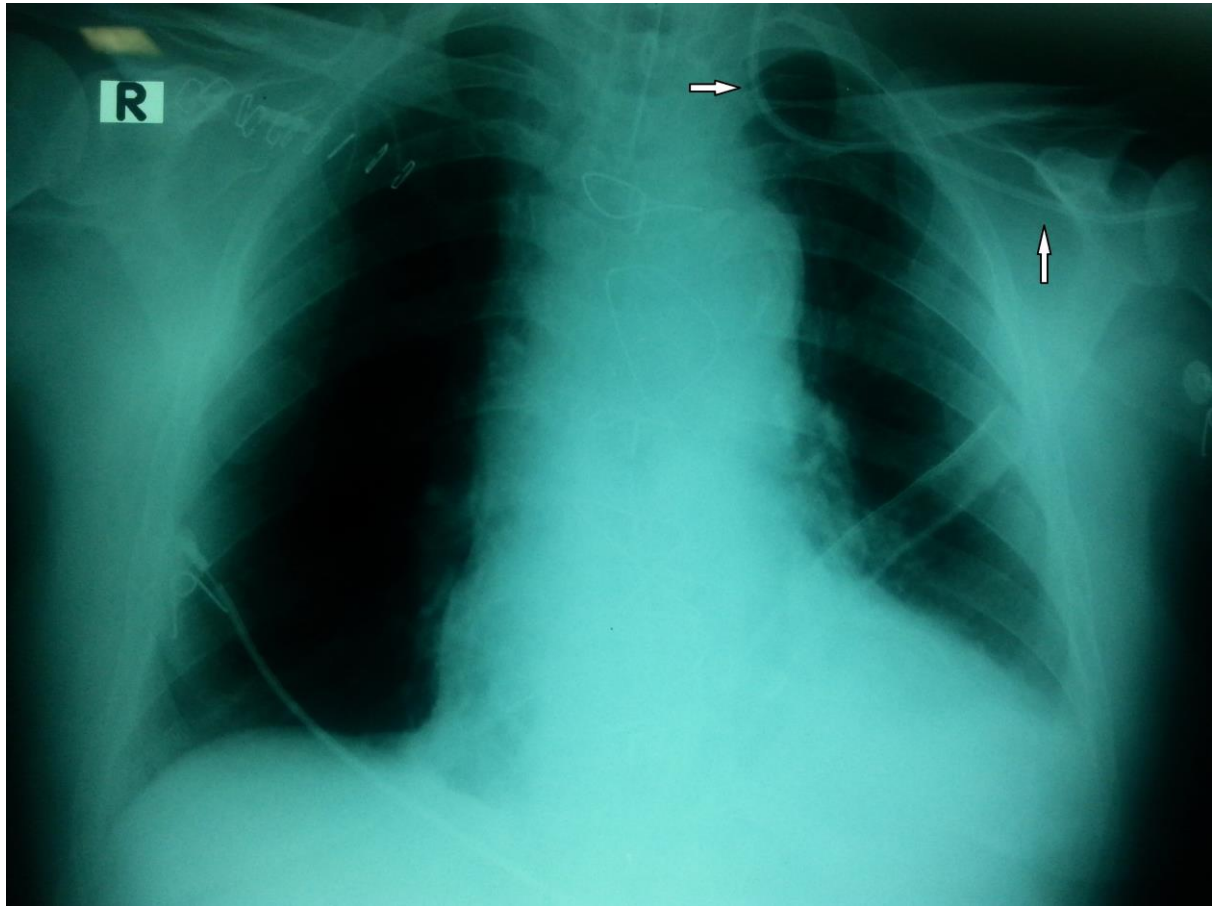


Figure 1. Lung anteroposterior view shows that central venous catheter is bent sharply to the cephalad in left internal jugular vein.

Case 2

The 35 year-old male patient with a spinal arteriovenous malformation (AVM) was hospitalized to intensive care unit due to gross haematuria. In the patient's history, there were a great number of angiographic interventions due to operated atrial septal defect (ASD) and spinal AVM and there was atrial fibrillation, heart failure, and acid in the abdomen. The heart rate was 123/min, the blood pressure was 80/20 mmHg, SpO₂ was 95%, and the body temperature was 36.4°C. In the laboratory examination, Hb: 5.8 mg/dl, creatinine: 2 mg/dl, BUN: 123 mg/dl, AST/ALT: normal, INR: 2.47, and PTT: 64.1. 7F catheter was planned to be inserted on the right subclavian vein to start the blood products, fluid replacement, and intravenous inotrope support in the patient with this picture. There was no vascular access and emergency for patient we have no time for improving the laboratory results. Immediately given the suitable position to the patient, local anesthesia was performed and sterile conditions were provided. Then, the procedure was performed by using Seldinger technique in such a way that would display sternal jugulum with an injection tip having a slope of 30° and 45°, 1 cm below the clavicle notch. ECG trace was carefully observed while sending in the guide wire in SV.

When the chest radiography was taken for checking after the procedure, it was seen that the catheter passed to the left subclavian vein (Fig 2). The catheter was removed and a recatheterization was made from the right internal jugular vein. The location of the catheter was verified with the control chest radiography.

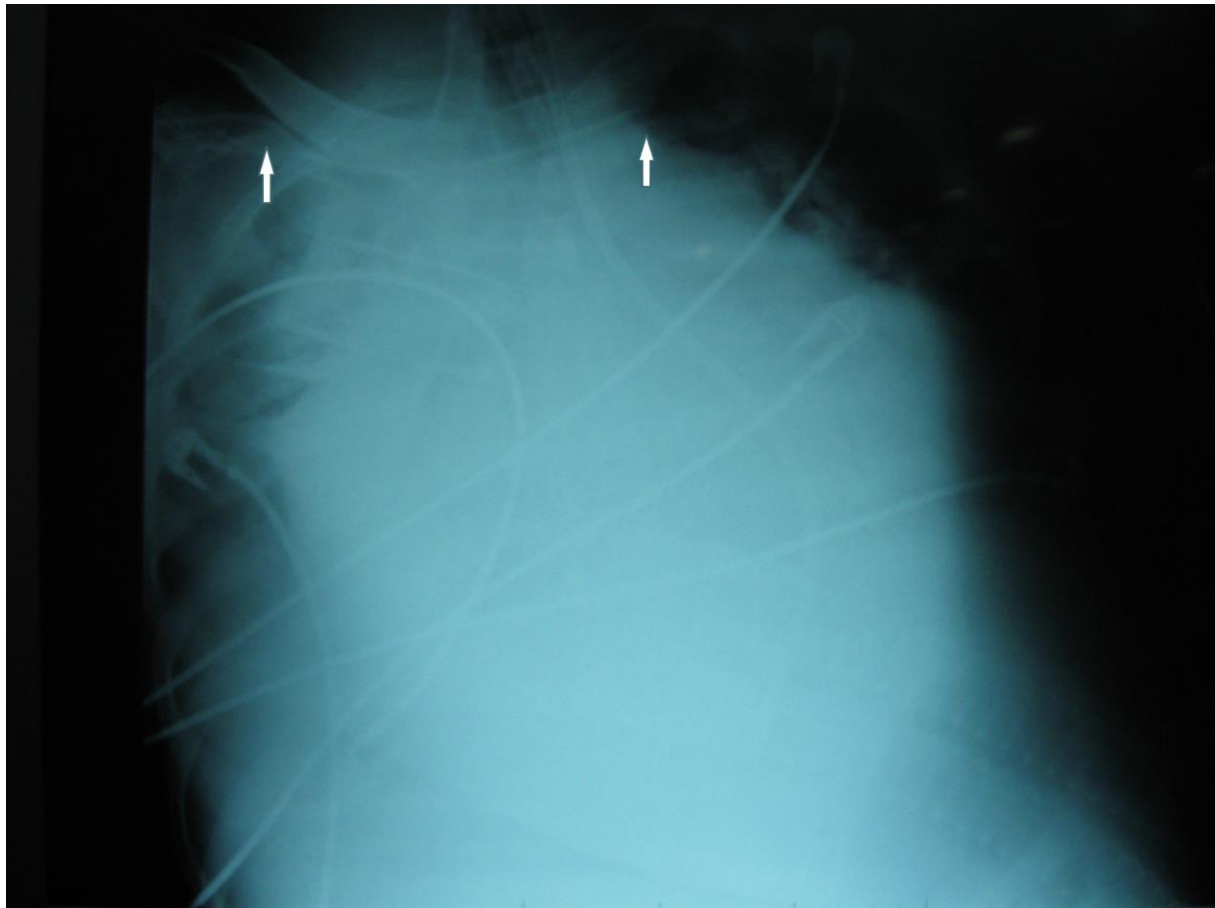


Figure 2. Lung anteroposterior view shows that central venous catheter reaches out from right subclavian vein to left subclavian vein.

Discussion

The CVC is frequently used in the intensive care units for hemodynamic follow-up, haemodialysis applications and parenteral nutrition. Furthermore, central venous' are used in operations such as hip prosthesis that pulmonary embolism is possibility and intraperitoneal and intrathoracic cases in order to provide hemodynamic stability. While inserting CVC and during the early stage, it is possible to see complications such as infection, air or thrombus embolism, heamothorax, hydrothorax, arrhythmia, hematoma, pneumothorax, cheilothorax, cardiac perforation, cardiac tamponade, trauma in adjacent nerves and veins [2]. Not frequently encountered complications such as pleural effusion [3], forgotten or to escape the guide wire into the vessel [4], along with rare complications such as the perforation of

superior vena cava, aortic injury, acute cardiac tamponade and catheter breakage which can be fatal were reported [5-7]. In the long term, depending on the application location and duration of the catheter, it is possible to encounter arteriovenous fistula, arterial and venous aneurisms, venous thrombosis, creation of fibrin sheath, infections [8] and the first rib osteomyelitis [9].

It is required for the catheter end to be inserted in the superior vena cava distal or superior vena cava - right atrium junction in SV and IJV catheterizations. The catheter end IJV can also be in the opposing subclavian vein, or in the axillar or azygos vein apart from this insertion. It can rarely be on the pericardiophrenic vein, internal mammary vein or the left superior accessory vein. In a person having anatomic changes, the catheter end can be seen in the superior vena cava, coronar sinus or superposed to the lung parenchyma in the partially anomalous pulmonary venous return. The catheter can rarely be inserted in the artery. If the inserted catheter is too long, it can be bent and looped in the subclavian vein or the right atrium. These complications can be determined and evaluated during fluoroscopy or ultrasonography-guided procedure, or through X-rays taken after the procedure [10]. The conjugation of right internal jugular vein with the right SV forms a plain central venous path on the right together with the innominate vein. For this reason, position problems and looping are rare in catheters in the right IJV [11]. These complications can be determined and evaluated during fluoroscopy or ultrasonography-guided procedure, or through X-rays taken after the procedure. In addition many researches have shown that these processes can be performed more reliably and more successfully by using ultrasonography [12,13].

Since the catheter was directed on the internal jugular vein in the first case and the opposing subclavian vein by means of the innominate vein in the second case, catheter malposition developed in both cases. In both cases, the development of the complication was prevented by exchanging the catheters upon the assessment of chest radiography.

In conclusion, CVC is an invasive procedure that can affect the patient's prognosis or cause complications resulting in death. This process is required to be carried out by experienced staff and it must be evaluated by using radiologic imaging method after the procedure. Moreover, we think that development of the complication might be prevented by using the required radiologic imaging methods during the procedure as well in situations, which it might be difficult to carry out the procedure.

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