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CASE REPORT

Persistent left superior vena cava with thrombus formed in the catheter lumen 4 h after dialysis catheter placed

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Abstract
Persistent left superior vena cava (PLSVC) is one of the most common thoracic venous anomaly and rarely noticed, because it is asymptomatic. However, for nephrologists, it is frequent enough to be encountered while placing hemodialysis catheters through the jugular vein. We report the case of 66-year-old patient with PLSVC presenting intrinsic thrombosis formation 4 h after dialysis catheter placed. Dialysis catheter was placed in the left internal jugular vein without resistance and any complication. PLSVC was detected after dialysis catheter insertion. We decided to remove the catheter, because the patient has other veins in which the catheter can be placed. When it was removed 4 h after catheter placing, thrombus was recognized in the catheter lumen. Transesophageal echocardiography was performed and no thrombus formation was observed in the heart chamber. For patients with PLSVC, if there were other veins in which the catheter can be placed, catheter replacement should be considered.

Keywords Catheter · Persistent left superior vena cava · Dialysis · Thrombosis

Introduction

Persistent left superior vena cava (PLSVC) is the most common thoracic venous anomaly [1]. It is important for nephrologists to be aware of the potential complications that can be experienced during catheterization in PLSVC patients.

Although the risk of thrombus formation in the coronary sinus is described by placing the dialysis catheter in patients with PLSVC [2], PLSVC catheterization has not been reported as a cause of intrinsic or extrinsic thrombosis.

We report the case of 66-year-old patient with PLSVC presenting intrinsic thrombosis formation 4 h after dialysis catheter placed.

Case report

A 66- year-old female with chronic heart failure and chronic kidney disease caused by hypertension and diabetes was admitted to our hospital for digitalis intoxication. She has diabetes and hypertension, but has no history of thrombosis.

Dialysis catheter was placed under ultrasound guidance in the right internal jugular vein and hemodialysis was started, because kidney function deteriorated due to urinary tract infection. Thrombus formation in the chamber during dialysis was not observed. Eleven days after starting dialysis because of suspected catheter site infection. Laboratory findings showed platelet count of $32.3 \times 10^4/\mu L$, international normalized ratio/prothrombin time of 0.95, activated partial thromboplastin time of 31.5 s, fibrin degradation product of $< 5.0 \mu g/mL$, D-dimer of 1.0 μg/mL, and C-reactive protein of 1.98 mg/dL. Catheter was replaced in the left internal jugular vein without resistance and any complication at 11 AM. Brisk dark blood return on aspiration of both lumen was noted. No thrombus formation was observed in the catheter that has been placed in the right internal jugular vein. However, routine post-procedure X-ray chest showed

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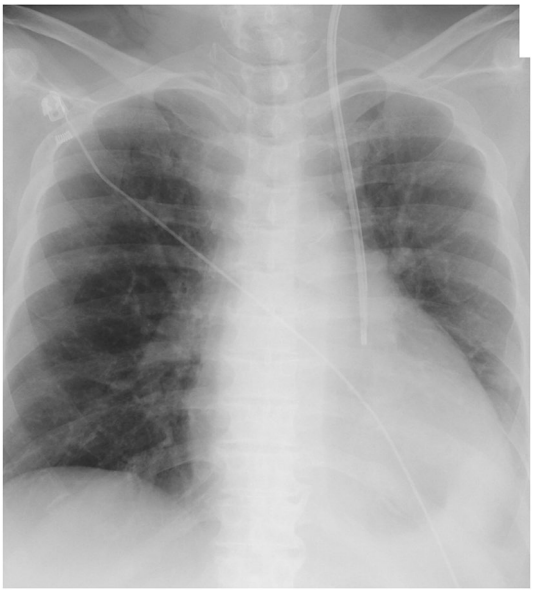

Fig. 1 Chest radiograph showing the hemodialysis catheter passing through a persistent left superior vena cava

that catheter followed a left paramediastinal course from the left neck (Fig. 1).

Computed tomography (CT) of the chest showed tip of the catheter was placed in the right atrium through the coronary sinus (Fig. 2). No deterioration of respiratory state and no arrhythmia were observed. When the catheter was withdrawn at 3 PM, thrombus formation was observed in the catheter lumen. No thrombus formation was observed in the both internal jugular veins.

The next day, dialysis was performed from the right femoral vein. Transesophageal echocardiography has not showed obvious thrombus formation (Fig. 3).

Discussion

The course of this patient suggested two important clinical suggestions.

First, thrombus occlusion was observed only 4 h after catheter insertion.

A thrombus formation problem causes in the placed dialysis catheter. Attachment of thrombus to the catheter not only causes luminal obstruction but also causes serious complications such as embolism and infection.

Cases which dialysis is performed without complications by placing a dialysis catheter in a patient with PLSVC are reported [2–6] and PLSVC catheterization has not been reported as a cause of coronary sinus thrombosis. Whereas serious complications including angina, arrhythmia, and cardiac arrest have been reported when a guide wire or catheter is manipulated via PLSVC [7–9]. In our case, any complications were not observed, but thrombotic occlusion in the catheter lumen was caused. As one risk of venous thrombus formation, the catheter caliber-to-vein ratio is 45% or more has been reported [10]. In our case, width of coronary sinus and the catheter was 5 and 4 mm, respectively, so catheter caliber-to-vein ratio was 80%.

We hypothesized that in addition to diabetes and infection condition, catheter tip manipulation when catheter is inserted and stagnation of blood flow due to a large catheter caliber-to-vein ratio are resulted in thrombus formation.

Second, catheter replacement was promptly carried out and no adverse events have not occurred.

In our case, because the patient has other veins in which the catheter can be placed, the catheter was replaced promptly.

Transesophageal echocardiography is considered to be useful for evaluation of thrombus formation in the coronary sinus of PLSVC [11]. It was confirmed that there was no clot formation by transesophageal echocardiography.

An effective method for preventing thrombus formation in the dialysis catheter has not been established. The effectiveness of antiplatelets and anticoagulants is unknown and low volume warfarin is also reported to be ineffective [12].

For patients with PLSVC, especially under conditions of diabetes and infection, even if there is no obvious side effect such as arrhythmia if there were other veins in which the catheter can be placed, catheter replacement should be considered.

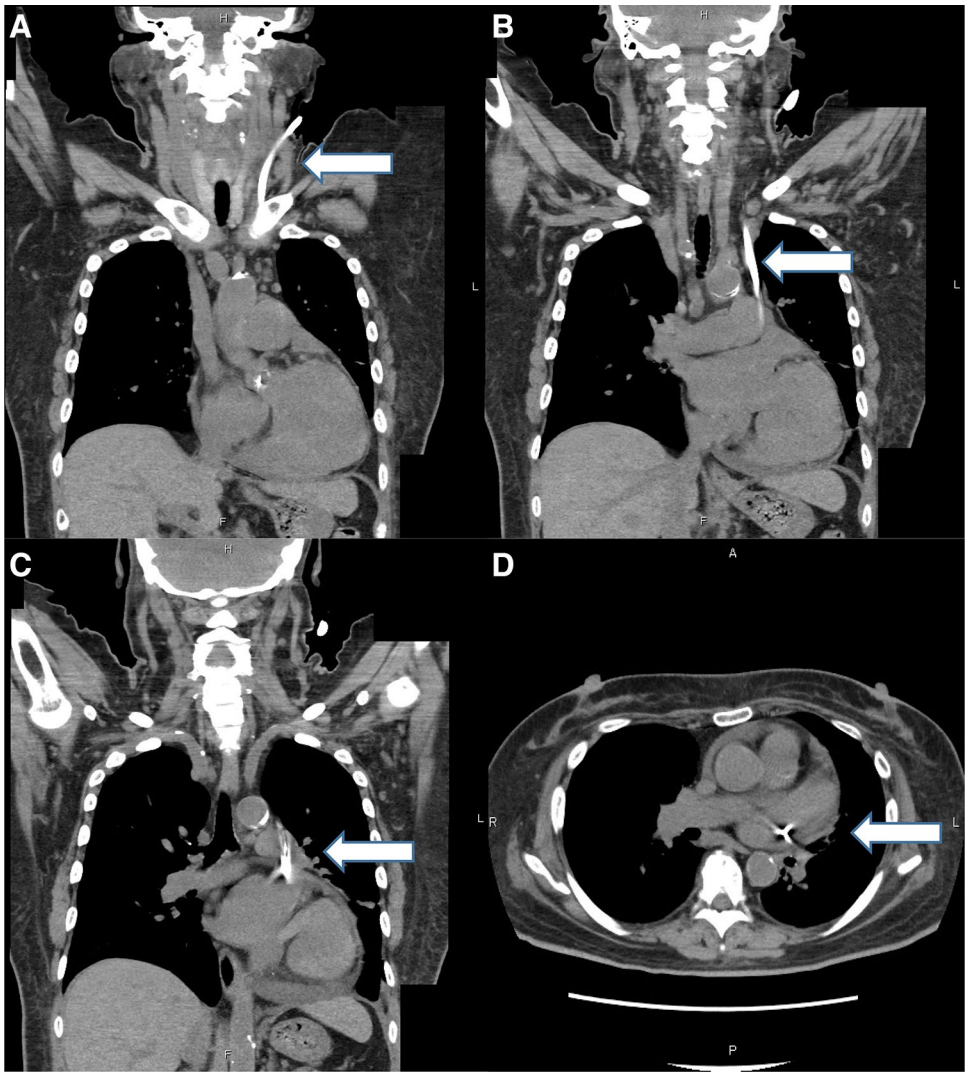

Fig. 2 Chest CT in axial view showing the hemodialysis catheter (arrows) in left jugular vein (**a**) and in persistent left superior vena cava (**b**), and in right atrium (c, **d**)

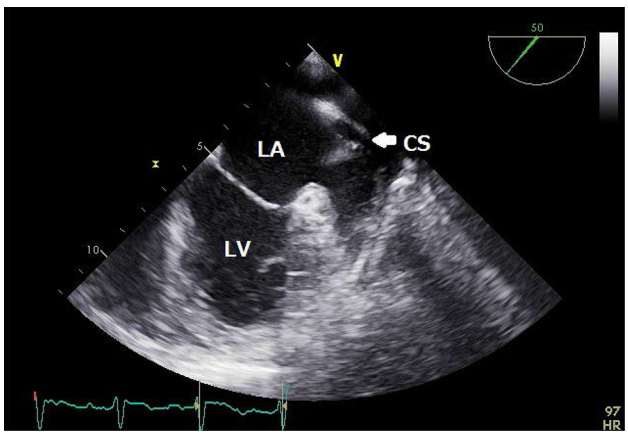

Fig. 3 Transesophageal echocardiography showing a dilated coronary sinus (CS). *LA* left atrium, *LV* left ventricle

Compliance with ethical standards

Conflict of interest The authors have declared that no conflict of interest exists.

Human and animal rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent Informed consent was obtained from the patient in this case.

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