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CASE REPORT

Malposition Of Hemodialysis Catheter: Double Superior Vena Cava

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ABSTRACT

Central venous catheter placement is a common procedure for physicians and interventional nephrologists. Left persistent superior vena cava (PLSVC) is an uncommon venous anomaly accounts for 0.3% to 0.5% of individuals in the general population; due to the failure of left anterior cardinal vein to regress during embryonic life. We described a regular hemodialysis patient with PLSVC that discovered incidentally after jugular vein catheterization. Patient was asymptomatic and the catheter was successfully used for hemodialysis. This case highlighted the importance on recognition of anatomical variation of the cervico-thoracic vessels to prevent unnecessary complications.

INTRODUCTION

Anatomical variation of superior vena cava is usually detected incidentally following central venous catheter insertion, cardiac devices implantation, during cardiopulmonary surgery or cardiovascular imaging. Patients with persistent left superior vena cava (PLSVC) are usually asymptomatic. Thus the diagnosis is usually made incidentally following central venous catheter insertion via the internal jugular vein or subclavian vein approach. PLSVC is a rare vascular anomaly occurring in 0.3% to 0.5% [1-4] in the general population and 1.3-4.5% in patients with cardiac congenital abnormalities [2-5]. It is due to the persistent patency of the left cardinal vein that usually degenerates during early fetal life. PLSVC usually drains into the right atrium via the coronary sinus in the absence of congenital heart disease. Knowledge of anatomical anomaly of thoracic great vessels is important to avoid complications during central venous catheterization. Serious complications such as cardiac arrhythmia, cardiogenic shock, angina and cardiac arrest have been described during catheterisation

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in patients with a PLSVC. The superior vena cava anatomical anomaly should be suspected when there is difficulty on central venous catheterization via the subclavian or internal jugular vein [6]. We described a case of PLSVC in an end-stage renal disease patient that detected incidentally after placement of haemodialysis catheter.

CASE PRESENTATION

A 45 years old lady, an end-stage renal disease patient on regular haemodialysis, was admitted to the ward with swelling and pain over the right arteriovenous fistula (AVF) for three days associated with fever. She was treated for fistula site infection and was started on intravenous ceftriaxone and required temporary rest of the fistula. A double lumen uncuffed hemodialysis catheter was inserted under ultrasound guidance through the left internal jugular vein (IJV) approach. The procedure was uneventful. Chest radiograph post procedure revealed an unusual position of the catheter tip at the left mediastinum (Figure 1). The catheter blood flows from both lumens, were good, and blood gas analysis revealed venous blood. Images from the computed tomography of the thorax (Figure 2a & 2b) revealed the presence of right and left superior vena cava. The dialysis catheter was used for hemodialysis without any complications.

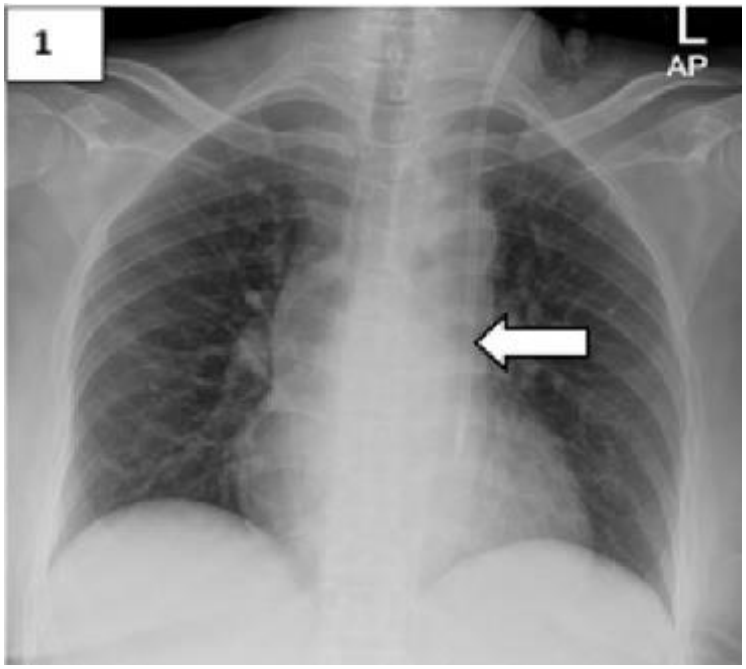

Figure 1: Chest radiograph revealed the position of the catheter tip on the left mediastinum (white arrow)

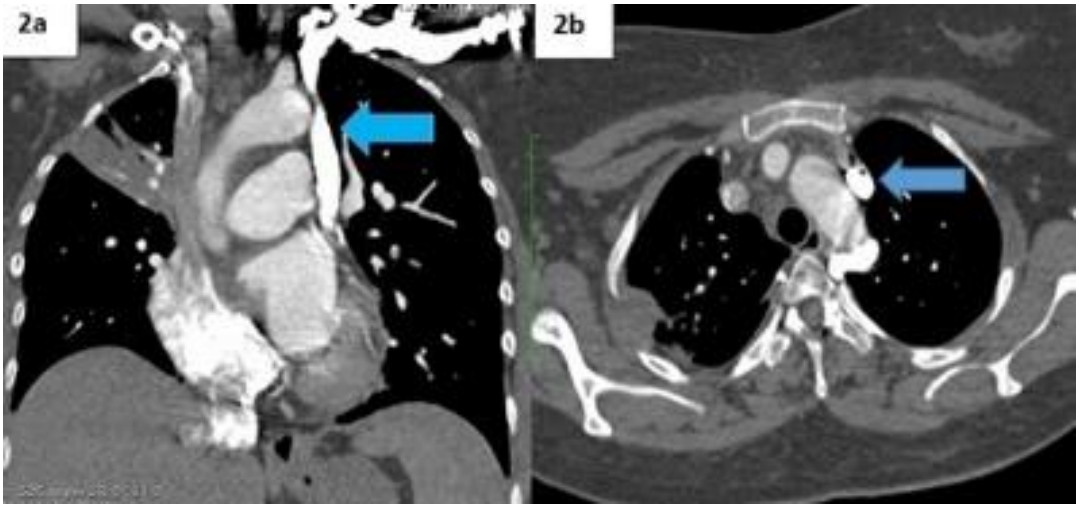

Figure 2a & 2b: CT thorax shown the presence of persistent left superior vena cava (grey arrow)

DISCUSSION

The congenital thoracic venous anomaly is very rare. The commonest congenital thoracic venous anatomical variation is persistent left superior vena cava (PLSVC) with the incidence of 0.3-0.5% in general populations [1-4]. Approximately 1.3-4.5% of these patients have associated congenital cardiac abnormalities such as atrial septal defect, bicuspid aortic valves, coarctation of the aorta or ostial atresia [2-5]. During the eighth week of embryo life, an anastomosis is formed between right and left anterior cardinal veins resulting in the innominate or brachiocephalic vein. The proximal part of anterior cardinal veins will form the internal jugular veins whereas the distal portion of right anterior vein forms the normal right-sided superior vena cava. The portion of the left anterior cardinal vein is normally degenerate to become "ligament of Marshall" [4, 7]. If there is a failure of the regression of the left anterior cardinal vein, a congenital malformation of the patent left anterior cardiac vein which later forms the persistent left superior vena cava that drains into the coronary sinus and subsequently into the right atrium.

PLSVC drains into the right atrium via coronary sinus in approximately 90% of cases without hemodynamic consequences. The remaining of patients without coronary sinus, it drains into left atrium causing left to right shunt. The most common variation of PLSVC is the presence of right and left-sided superior vena cava. Other uncommon types are the absence of right superior vena cava with PLSVC and the small or absent left brachiocephalic vein.

In our case, the patient has double (left & right) superior vena cava and she is asymptomatic. An abnormal location of dialysis catheter was detected incidentally on chest radiograph post internal jugular vein catheterization. The chest radiograph revealed the dialysis catheter tip in the left mediastinum, which was unusual as it is expected to cross the midline and lie on the right mediastinum. Placement of a catheter

into PLSVC commonly misinterpreted as malposition of the catheter into the arterial system such as a subclavian or carotid artery, aorta, internal thoracic vein or mediastinum [4, 8, 9]. Blood gas analysis is a useful test to confirm the placement of a catheter into the arterial or venous system. Diagnostic tests that are useful for confirmation of the catheter location in PLSVC are catheterogram, central venogram, agitated saline test and computed tomography [10, 11]. In some cases, echocardiogram shows dilated coronary sinus and a chest radiograph may reveal widening mediastinum with prominent aortic arch shadow [11, 12].

The right internal jugular vein is the commonly preferred site for central venous catheter insertion as compared to the femoral vein approach which has a higher risk of catheter-related bloodstream infection (CRBSI) [9]. Left internal jugular vein approach is also not an uncommon site of venous catheterization especially in cases of multiple failed attempts on the right internal jugular vein, or right-sided central venous occlusion.

In conclusion, clinicians should be aware of the existence of PLSVC as congenital venous anomaly especially when there is difficulty on catheterization via the left subclavian or internal jugular vein. It may prevent possible complications such as cardiac arrhythmia, shock, angina or cardiac arrest or vessel wall injury. Recognition of PLSVC can also prevent misinterpretation of the catheter position on chest radiograph thus avoiding unnecessary removal of the catheter.

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DECLARATIONS OF CONFLICTING INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this article.

CONSENT FOR PUBLICATIONS

Written informed consent was obtained from the patient for publication of this case report including publications of images.

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