

## Case Report

# Haemodialysis catheterization via type II persistent left superior vena cava

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## Introduction

Persistent left superior vena cava (PLSVC) is an anatomic variant of central veins, characterised by the persistence of a left-sided superior vena cava. Owing to the frequency of this anomaly, it is important for nephrologists to be aware of the potential per- and post-procedure complications that can be experienced during catheterization in PLSVC patients. We report the case of a 45-year-old patient presenting a rare type II PLSVC, detected after right internal jugular catheterization for haemodialysis. This article reviews the most frequent and clinically relevant abnormalities related to PLSVC and discusses their implications in haemodialysis practice.

## Case report

A 45-year-old woman with end-stage renal disease due to diabetic nephropathy was admitted for the pose of a central venous haemodialysis catheter. At that time, the patient was awaiting double kidney–pancreas transplantation and had failed on an attempt at peritoneal dialysis.

The catheter pose was initiated by a successful puncture of the right internal jugular vein. Progression of the metallic leader guide was followed by simultaneous radioscopic imagery. An unusual curve towards the left was noticed as the leader over-reached the right internal jugular vein. The procedure was stopped. A CO<sub>2</sub>-phlebocavography was performed, which diagnosed a type II PLSVC.

Subsequently, it was decided to insert two single-lumen haemodialysis catheters through the left internal jugular vein, the straightest route to the superior vena cava in our patient. Postoperative radiography is presented in Figure 1.



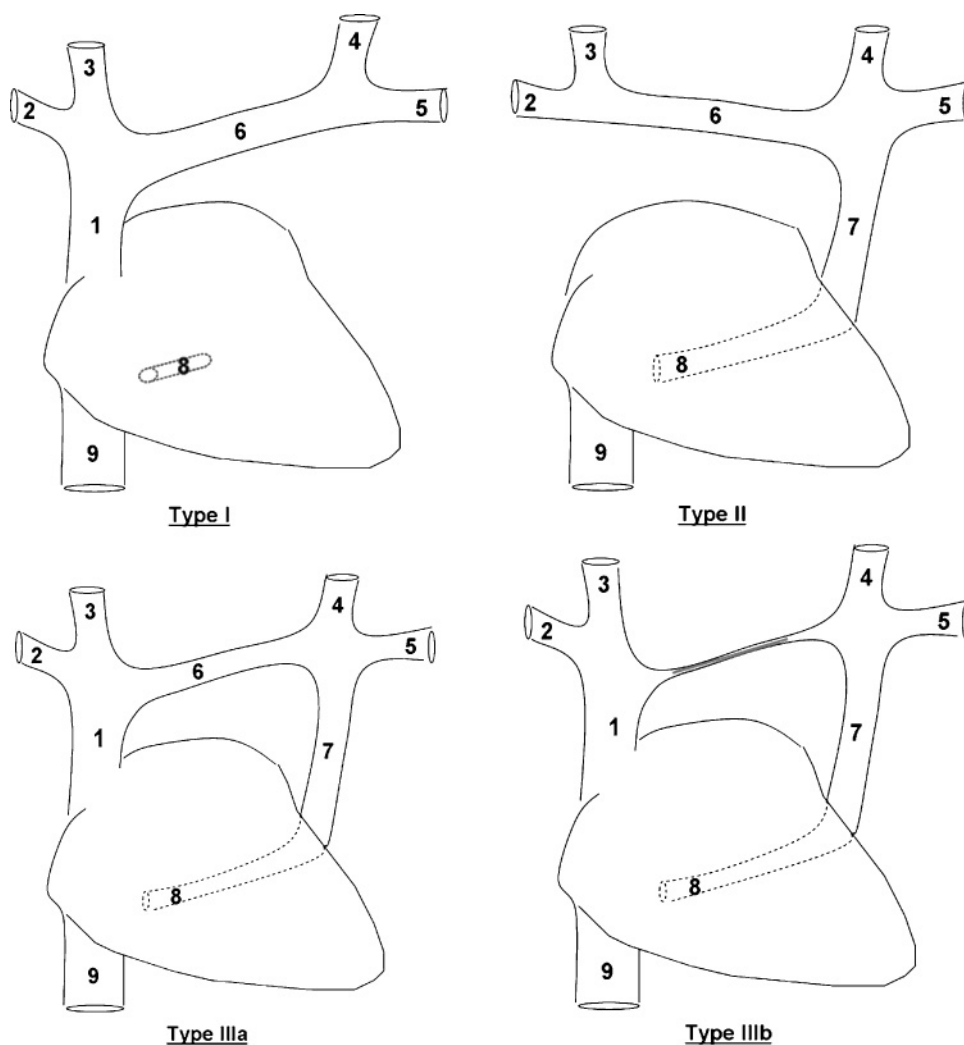
**Fig. 1.** Control thoracic radiography after pose of the left internal jugular haemodialysis catheter.

Four weeks later, the catheters were replaced because of a systemic infection. A temporary double-lumen central venous haemodialysis catheter was posed through the right internal jugular vein. The control radiography showed the atypical route of the catheter, through the innominate vein and the PLSVC towards the coronary sinus. Our patient experienced no immediate or secondary cardiovascular effect attributable to the placement of catheters in the type II PLSVC.

PLSVC is a thoracic venous anomaly described in 0.3% to 0.5% of the general population [1–3]. Eighty-five percent of PLSVC have persistence of both the left and right superior venae cavae (type IIIa and IIIb PLSVC) and originate from an abnormal development of the innominate vein during embryogenesis [2,3]. Our patient had a rare type II PLSVC with persistence of a unique left superior vena cava, responsible for the atypical route during both right- and left-sided procedures. Variants of the superior vena cava are presented in Figure 2.

Fortuitous discovery of PLSVC after central venous catheterisation can cause dangerous misinterpretation of post-operative radiography. Per-procedure x-ray assistance

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**Fig. 2.** Anatomic variations of superior vena cava: 1, right superior vena cava; 2, right subclavian vein; 3, right internal jugular vein; 4, left internal jugular vein; 5, left subclavian vein; 6, innominate vein (type IIIb: vein is obliterated or missing); 7, left superior vena cava; 8, coronary sinus; 9, inferior vena cava. Redrawn from various sources, including [2].

used by informed physicians may prevent short-term complications due to repeated catheterization attempts, delayed dialysis or use of contrast media. PLSVC usually remains asymptomatic and has no significant haemodynamic adverse consequence. Its role in the pathogenesis of atrial fibrillation and organized arrhythmias related to abnormal distribution of cardiac conduction tissue has been described [4–6]. Cases of coronary sinus thrombosis, supraventricular arrhythmia and cardiac arrest are reported in PLSVC patients after central venous catheterization [7,8]. It has been hypothesized that these dramatic arrhythmias were attributable to the drugs administered via the catheter, rather than to the catheter itself.

According to some authors, central venous catheters should not be systematically contra-indicated in adults with PLSVC [9,10]. To date, the safety of haemodialysis via central catheters in type II or type III PLSVC has not been accurately evaluated. Owing to the potential complications, we believe that haemodialysis through PLSVC should remain an exceptional and short-term therapeutic alternative in dialysis patients.

In our case, the decision was taken to further explore upper arm veins. A left humero-basilic fistula was created, the dialysis catheter removed and our patient finally received a double kidney–pancreas graft.

This case illustrates the importance for nephrologists, anaesthesiologists and critical care intensivists to be aware of the existence and complications of PLSVC variants, for a safer practice of central venous catheterization.

*Conflict of interest statement.* None declared.

## References

1. Campbell M, Deuchar DC. The left-sided superior vena cava. *Br Heart J* 1954; 16: 423–439
2. Schummer W, Schummer C, Frober R. Persistent left superior vena cava and central venous catheter position: clinical impact illustrated by four cases. *Surg Radiol Anat* 2003; 25: 315–321
3. Winter. Persistent left superior vena cava: survey of world literature and report of 30 additional cases. *Angiology* 1954; 5: 90–132

4. Hsu LF, Jais P, Keane D *et al.* Atrial fibrillation originating from persistent left superior vena cava. *Circulation* 2004; 109: 828–832
5. Morgan DR, Hanratty CG, Dixon LJ *et al.* Anomalies of cardiac venous drainage associated with abnormalities of cardiac conduction system. *Europace* 2002; 4: 281–287
6. Pak HN, Lim HE, Kim YH. Atrial tachycardia originating from the coronary sinus ostium dissociated with fibrillatory activity inside persistent left superior vena cava. *Heart Rhythm* 2005; 2: 333
7. Bass SP, Young AE. Paediatric cardiac arrest during Hickman line insertion. *Paediatr Anaesth* 1997; 7: 83–86
8. Kiely EM, Spitz L. Persistent left superior vena cava and central venous feeding. *Z Kinderchir* 1984; 39: 133–134
9. Kim YO, Choi EJ, Jeon HK *et al.* Persistent left superior vena cava detected by hemodialysis catheterization. *Nephron* 1999; 83: 87–88
10. Laurenzi L, Natoli S, Pelagalli L *et al.* Long-term central venous catheterization via persistent left superior vena cava: a case report. *Support Care Cancer* 2003; 11: 190–192

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