CASE REPORT

# Successful management of septic patient with concealed left persistent superior vena cava: anaesthetic perspective

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## Abstract

Surviving sepsis guideline supports the placement of central venous cannulation (CVC) to target the deranged physiology. The placement of CVC is still challenging, which requires detailed knowledge of venous anatomy and orientation of congenital venous anomalies. Double or persistent left superior vena cava (PLSVC) is a common anomaly in thoracic venous system. Our patient had hidden PLSVC, though he was previously asymptomatic with no cardiac disease. We report the successful anaesthetic management of an adult male with septicaemia for emergency laparotomy. CVC was placed in left internal jugular vein under vision by ultrasonography for fluid and vasopressor requirement. The incidental PLSVC was initially diagnosed on routine post procedure chest X-ray. Later it was confirmed by transthoracic echocardiography with an agitated saline micro bubbles contrast media.We conclude that the routine post CVC chest X ray is mandatory not only to identify the correct positioning of CVC placement but also very helpful in identifying the underlying rare anomalies.

**Keywords:** Ultrasound, Central venous catheter, Persistent left superior vena cava, septicaemia, general anaesthesia.

## Introduction

The central venous catheter (CVC) placement is a known clinical recommended intervention by surviving sepsis campaign. It is a part of early gold therapy in septic patients to target the physiologic end-points.[1,2] The double or persistent left superior vena cava (PLSVC) is a common anomaly in thoracic venous system. Its incidence is 0.3-0.5% in general population and 3-10% in patients having congenital heart disease.[3] The failure of regression of left cardinal vein during embryological development[4] is the main etiology behind the defect. Ultrasound has changed the blind to a bright view; however, the anesthesiologist has to be aware of deformed anatomy and its clinical relevance to overcome the challenges.

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A successful placement of CVC in left internal jugular vein is presented, later it was found to be in PLSVC. Once ensured the benign anatomic anomaly, it was used uneventfully for the management of septic patients for peri-operive period and in the intensive care unit.

## Case Report

The case is of a 56 years old, Asian male seen in March 2015 and who developed abdominal sepsis due to large bowel anastomotic leakage. He was scheduled for emergency laparotomy. This patient had elective anterior resection for adenocarcinoma colon 10 days back with successful anaesthetic management alongside CVC placement in right internal jugular vein.

Pre-operative assessment was done for emergency surgery.Patient's clinical parameters and vital signs (heart rate: 140/min, BP: 100/53 mmHg, Temp: 37.8°C and RR of 25/min) were in favour of sepsis. The Broad-spectrum antibiotics were started in the ward as a management of sepsis plans. Patient was labeled American Society of Anaesthesiologists (ASA) grade 1V. Pre-induction monitoring ECG, NIBP, peripheral SPO2 were instituted and invasive left radial artery blood pressure monitoring was started. Patient's crash induction was done with ketamine, midazolam and succinylcholine. Trachea was intubated successfully. In view of inotropic, vasopressors requirement and to judge the fluid status, theultrasound guided CVC was placed in left internal jugular (IJ) vein. The left IJ was chosen because of redness on insertion point onright sided IJ. Along with this the right sided subclavian vein was also eluded due to peripherally inserted central catheter (PICC) line, which was already placed through right anticubital vein for total parenteral nutrition.

Surgery lasted for 90 minutes, abdominal wash out was done and drain was inserted. The intraoperative anaesthetic course was fairly stable except for the requirement of norepinephrine, which were tapered off by the time surgery finished. Patient was extubated at the end of the procedure and was shifted to surgical intensive care unit (ICU) for further management.

Post-operative investigations including the Chest X-ray were ordered. On chest radiograph, it was noticed that

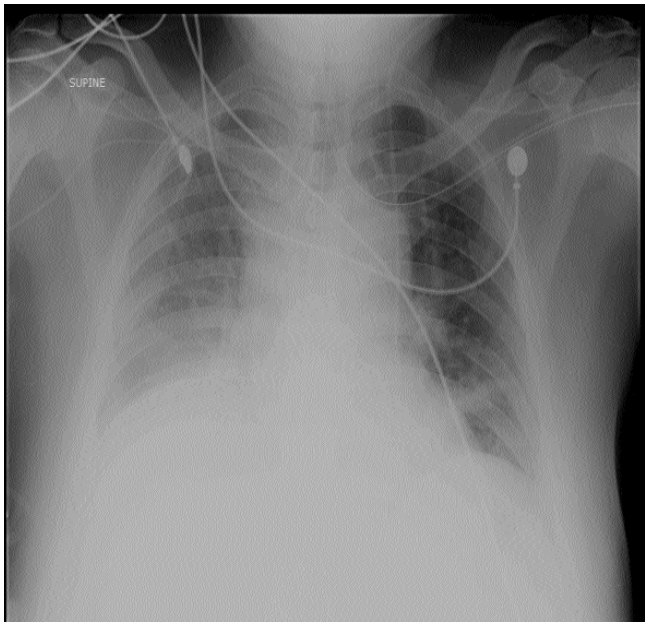


**Figure:** CVC is showing in left internal jugular vein and peripheral central catheter in right subclavian vein.

the CVC was tracking towards the carotid artery, subclavian artery, aorta or in left internal mammary vein (Figure). As the CVC placement was done under ultrasound guidance and the venous flow and tracing were not in favour of incidental arterial placement, it was assumed that it might be because of some anatomical variation. The radiologist's provisional diagnosis was that the CVC is in PLSVC. The CVC was stopped till the exact variation in venous anatomy was confirmed and more importantly the location of the PLSVC opening identified if it was in right or left side of the heart. Cardiologists opinion was taken as he had performed bedside transthoracic echocardiography. The Agitated saline micro bubbles contrast media was introduced through the CVC in left IJ. The contrast was seen in the coronary sinus, which was draining towards the right atrium. This depicted the persistent left superior vena cava to a dilated roofed coronary sinus. The study also showed normal configuration of the right superior vena cava into the right atrium. The CVC was restored after confirmation of benign anomaly and patient was managed successfully and shifted on 3rd day from ICU to ward.

## Discussion

The presence of persistent left superior vena cava (PLSCV) is a congenital venous anomaly, due to regression failure of left anterior cardinal vein at eighth gestational week. Its incidence is 0.3-0.5% in general population and 3-10% in patients with congenital heart disease.[3] The absence of the right superior vena cava is very rare (0.09-0.13%) and the presence of both right and left superior vena cava is about 90%.[5] The PLSVC has been found incidentally as an asymptomatic lone variation with coexistent cardiac anomalies such as Tetralogy of Fallot, septal defects and situs inversus.[5] The ancient anaesthesiology literature is evident for incidental PLSVC findings during anaesthesia management. However, the other specialties like oncologists, radiologists, cardiologists, and cardiac surgeons have encountered incidental cases with variable presentations.[6] It is a benign anomaly in 92% of cases due to its opening towards the right atrium via marshal vein and coronary sinus, however in the remaining 8% of patients, it drains into the left atrium creating the right to left shunt. This variant is highly suspicious for development of paradoxical embolisms (air or thrombus) and it may end up with catastrophic picture of cerebral, myocardial, renal and mesenteric and peripheral perfusion deterioration. Patients with benign PLSVC are mostly asymptomatic; however, the distorted venous anatomy can cause difficulties in catheter manipulation that may increase the risk of catheter misplacement, vessel injury and development of arrhythmias and even cardiac arrest. The PLSVC can be diagnosed by chest X-ray, venography, contrast CT scan, trans-thoracic and trans-esophageal echocardiography. In our case the patient was in abdominal sepsis and treatment strategy was the early goal directed therapy. Ultrasound guided CVC was successfully placed in left internal jugular vein to monitor the fluid requirement and to start the norepinephrine to keep the mean arterial pressure above 90mmHg. Our institutional policy is to monitor CVC position and to monitor the development of unwanted sequel by post procedure chest X-ray. The routine post CVC chest X-ray (Figure) was alarming, which showed CVC line in arterial (aorta, subclavian, carotid), venous (superior intercostal or left internal mammary), mediastinum, pericardium or in pleura but it was not tracking towards internal jugular vein. CVC was stopped till to confirm the CVC placement. Radiologist and Cardiologist opinions were taken and safest diagnostic tool availed for our patient was the transthoracic echocardiography with an agitated saline micro bubbles contrast media. This tool is labeled as non-invasive due to its easy applicability and not requiring sedation, radiation and rarely causing haemodynamic variability. The Agitated saline micro bubbles contrast media was introduced through the CVC in left IJ. The contrast was seen in the coronary sinus, which was draining towards the right atrium. This depicted the persistent left superior vena cava to a dilated roofed coronary sinus. Echocardiogram was also evident for the normal configuration of right superior vena cava into the

right atrium. The CVC was reinstated once the benign anomaly ensured. Our patient had no CVC insertion complications and there was no adverse effects observed for the direct installation of vasopressor norepinephrine on coronary vasculature.

## Conclusion

This case presents a successful placement of CVC in left internal jugular vein, later it was found to be in PLSVC, which was confirmed by using the transthoracic echocardiography with bubble study. Once the anomaly confirmed and safety ensured, it was used uneventfully for the management of septic patient. It is recommended that the routine chest X-ray is mandatory after the insertion of CVC, not only to evaluate the proper positioning but it may also be helpful in diagnosing the rare congenital anomalies. Furthermore, it is significant to highlight that the transthoracic echocardiography with bubble study is a safe method to diagnose the PLSVC in perioperative period and especially for the septic patient.

**Patient Consent:** Patient consent was taken in writing for publication of case report.

**Conflict of Interest:** Authors have no conflict of interest.

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**Disclosure:** The submitted case report is the original and we only have submitted in JPMA.

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