An 81-year-old male presented to the emergency department with acute cholecystitis and septic shock. He underwent catheterization of left internal jugular vein for hemodynamic monitoring and a central venous catheter (CVC) was inserted smoothly. The post-procedural chest x-ray showed an abnormal course of the CVC (Fig. 1). Emergency physicians suspected that the CVC had perforated left internal jugular vein. However, withdrawal of blood was smooth and blood gas analysis confirmed the tip was in a vein. Computed tomography (CT) scan (Fig. 2) revealed that the CVC tip was in a persistent left superior vena cava (PLSVC). Maximum intensity projection image (Fig. 3) confirmed the CVC tip was in a vascular channel. Three-dimensional reconstructed images using the volume-rendered technique (Fig. 4) clearly demonstrated the PLSVC drainage into right atrium via a dilated coronary sinus.

PLSVC is a defect of the embryological development that left superior vena cava does not obliterate and transform into the ligament of Marshall in a human embryo. PLSVC is one of the commonest anomalies of the venous circulation with an incidence of 0.3-0.5% in healthy patients and 1.3-4.5% in those with congenital heart disease 

Techniques reported to confirm the diagnosis of PLSVC include venogram, two-dimensional transthoracic echocardiography, transesophageal echocardiography, radionuclide angiography, and magnetic resonance imaging (MRI). In our case, we confirmed the exact and detailed position of CVC using a multi-slice spiral CT scan.

The introduction of the multi-slice spiral CT scan has changed the choice of image studies frequently in many resuscitation conditions, as it is a rapid, noninvasive and useful imaging modality. Especially the blooming of three-dimensional reconstruction techniques makes non-invasive CT-angiography possible and practical. Emergency physicians should be aware the possibility of PLSVC. Multi-slice spiral CT scan with three-dimensional reconstructed images is recommended for demonstrating this anomaly, especially in the emergency department patients.
Fig. 1  Chest radiograph (antero-posterior view) showing the abnormal course of a central venous catheter (CVC) passing along the left para-mediastinal course from the left neck (arrow)

Fig. 2  Computed tomography (CT) confirmed the tip (arrow) of the central venous catheter (CVC) was in a vascular channel
Fig. 3  A multi-slice spiral CT scan with reconstructed sagittal images and maximum intensity projection (MIP) also demonstrated the CVC tip (arrow) was in a vascular channel.

Fig. 4  The three-dimensional reconstruction demonstrates the anomaly of the venous circulation. Ao: aorta, LS: persistent left superior vena cava (PLSVC), RS: right superior vena cava (RSVC), I: inferior vena cava (IVC), RA: right atrium, LA: left atrium, RV: right ventricle, LV: left ventricle, T: tip of central venous catheter, PV: pulmonary vein, PA: pulmonary artery, B: brachiocephalic trunk, CS: coronary sinus.
References

放置中央靜脈導管於永存左位上腔靜脈中

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隨著多層次電腦斷層及重組的技術的普及，我們用以診斷置於永存左位上腔靜脈中的中央靜脈導管。所有從事急重症的臨床醫師，都應當知道這個血管變異的存在。我們也提供了一些用以診斷這個血管變異的經驗及參考文獻。

關鍵詞：永存左位上腔靜脈，中央靜脈導管，心血管畸形，多層次電腦斷層