



Persistent Left Superior Vena Cava Incidentally Recognized Postoperatively After Venous Port Placement

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ABSTRACT

Persistent left superior vena cava is the most common congenital venous anomaly of the thoracic venous system, occurring in 0.3% to 0.5% of individuals in the general population. It may remain asymptomatic throughout life and be incidentally found in healthy individuals undergoing vascular procedures such as venous access device placements and endovascular cardiac interventions.

Here we present a case of persistent left superior vena cava incidentally realized during chemoport insertion in a patient with breast cancer.

Keywords: Persistent left superior vena cava, venous port placement, breast cancer, congenital

Introduction

The superior vena cava (SVC) in healthy adults is formed by fusion of right and left brachiocephalic trunks. Rare anomalies of the SVC mostly comprise left SVC and double SVC, which are reported to have an incidence of 0.3-4.0% (1). Embryology of the vascular system is mostly driven by the descent of the heart from its origin in the neck into the thoracic cavity with caudal rotation towards the left when the right aortic arc is reduced (1, 2). In this process, the left and right superior vena cava precursors tend to fuse via development of confluence of the left and right innominate veins (3). Persistent left superior vena cava (PLSVC) is a result of underdevelopment of the left innominate vein with failed regression of the left cardinal vein (1). In individuals without other cardiovascular anomalies, the risk of having double or isolated superior vena cava is low (1). Nevertheless, surgeons who undertake vascular interventions should be aware of such anomalies in order to be able to successfully manage possible technical difficulties or complications.

The aim of this case presentation was to present a patient with breast cancer whose persistent left superior vena cava was incidentally found during chemoport insertion.

Case Presentation

A woman aged 35 years who was diagnosed as having right breast carcinoma was admitted to our breast center. Right subcutaneous nipple-sparing mastectomy, axillary lymph node dissection, and expander placement were performed. She also required central venous catheterization for systemic chemotherapy. The patient was taken to the operating room, and a left subclavian guide was inserted. The guide and catheter were then seen on the left side of the mediastinum. A catheter angiography with water-soluble contrast medium was performed, which revealed a persistent left superior vena cava draining into the right atrium via coronary sinus (Figures 1-3).

On postoperative day 1, a routine morning chest X-ray performed for pneumothorax screening revealed that the catheter was unusually located. It was ascending by the left contour of the heart (Figure 4).

A quick test showed that port was functional and potent, which enabled blood sampling and injections at normal pressures. After necessary explanations to the patient, it was decided to further evaluate this probable vascular anomaly.

The patient was discharged without complications in order to have her chemotherapy in a routine manner.

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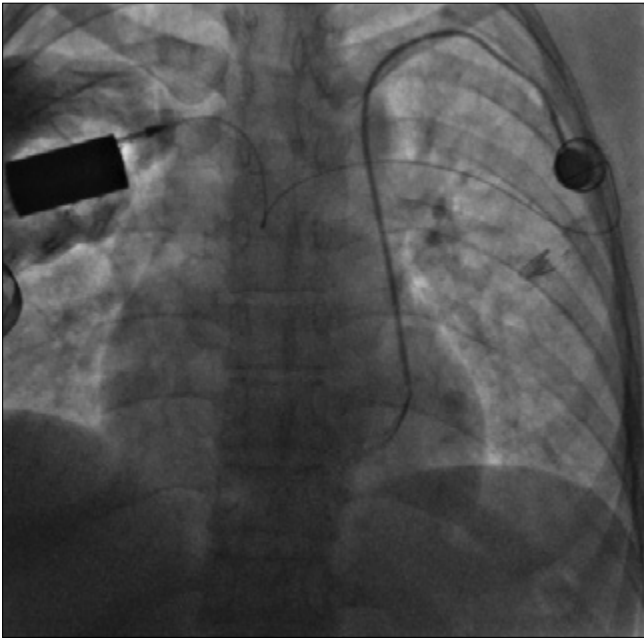


Figure 1. Subtraction image of the first image showing contrast spreading from the catheter end

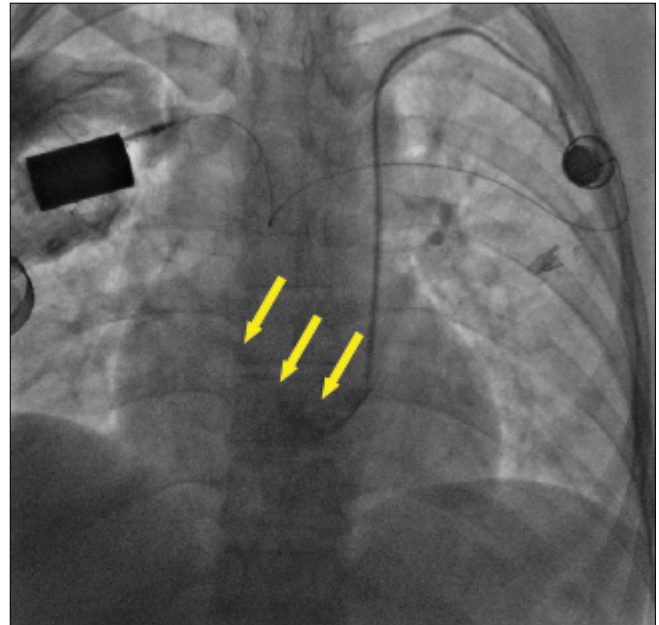


Figure 3. Further spread of the contrast medium marked with yellow arrows (it is more obvious on video sequence)

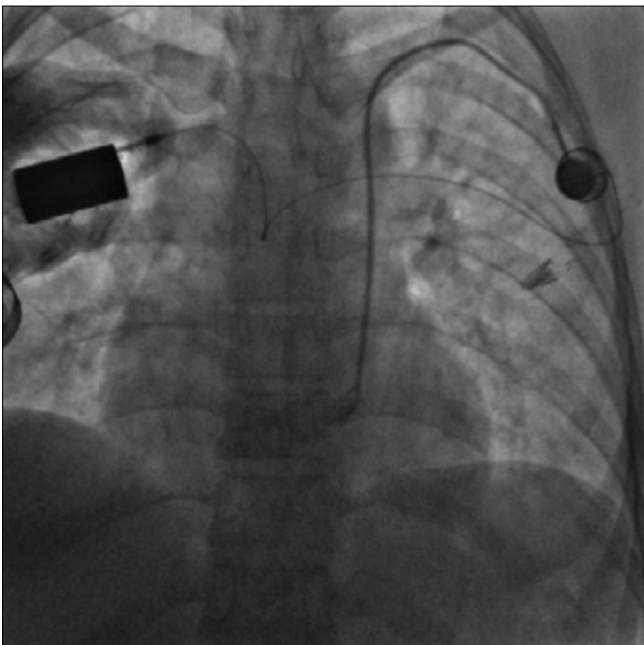


Figure 2. This image shows further spread of contrast to the coronary sinus. Note the catheter's visual displacement as PLSVC moves with heart's contraction



Figure 4. Left subclavian venous port is visualized with a catheter following the left cardiac edge

A retrospective evaluation of positron-emission tomography – computerized tomography (PET-CT) scan approved above findings (Figure 5).

Discussion and Conclusion

Persistent left superior vena cava is a rare anomaly that can be isolated or accompanied by other minor or major cardiovascular anomalies (1). Webb et al reported that PLSVC in most cases was associated with regress of the left innominate vein (3). Our patient demonstrated this type of vascular feature with PLSVC draining into the right atrium along with potent right SVC. Expectedly, the left

innominate vein was not found on CT scan images obtained pre-operatively before admission to our unit. More rarely, there is total regression of the right superior vena cava (2); in our case, both venae cavae were present.

Most PLSVC cases that were identified clinically already had a cardiac anomaly or symptoms, which led to invasive vascular interventions (2, 4-6). Some cases are detected when echocardiography reveals dilated coronary sinus, which could be an indicator of the presence of PLSVC (4). In our case, there was no previous medical record of this category, the patient had no cardiac comorbidities.

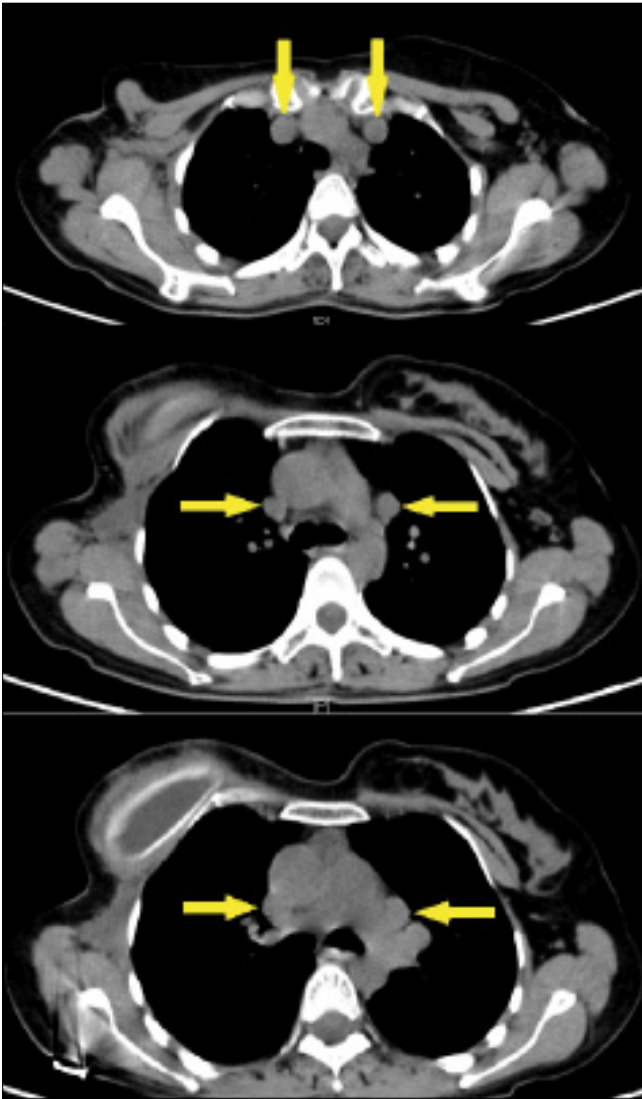


Figure 5. CT cross-sections showing right and left brachiocephalic veins following their own paths without connection between innominate veins. Note that even on the level of carina and further brachiocephalic veins are still apart

A significant portion of cases are revealed due to failed right heart catheterization attempts (1, 2, 4-8). Our case, being incidental, was revealed postoperatively in spite of having contradictory intraoperative imaging. The gold standard for imaging of PLSVC is thought to be invasive angiography (6). We also used angiography for verification, which allowed us to assess the dynamics of contrast spread through the cardiac chambers. In a case reported by Ucar et al. (8), 3D reconstruction of CT images was used for better visualization of the vasculature. However, in our case we preferred not to use too much contrast because we were only aiming to establish whether the catheter was placed into a major vein with high debit. The latter was perfectly

seen on angiography. CT scan exposes patients to a much higher dose of radiation but represents a more advanced technique that provides anatomic details rather than functional insights. In our case, location-based compromised functionality of the port was tested in the most cost effective and patient-friendly way.

Persistent left superior vena cava is a rare venous anomaly mostly seen in combination with other cardiovascular anomalies. However, it should not be neglected in high volume centers that deal with central venous access because this anomaly can be overlooked, leading to postponed excessive investigations. In similar situations, radiologic investigations should be undertaken with caution and consideration towards the best possible combination of patient safety and clinical value.

Informed Consent: Informed consent was obtained from patients.

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