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Case Report

A case of persistent left superior vena cava: an anatomical rarity with clinical implications

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ABSTRACT

Persistent left superior vena cava (PLSVC) is a rare congenital anomaly characterised by the presence of a persistent left-sided SVC in addition to the normal right-sided SVC. This case report presents a unique instance of PLSVC in a 13-year-old male patient who was incidentally diagnosed during routine cardiac imaging for an unrelated condition. The diagnostic journey, including imaging modalities such as echocardiography and computed tomography, revealed the presence of this anatomical variation. Despite being asymptomatic, the case highlights the importance of recognising PLSVC, as it can have clinical implications in various medical and surgical scenarios, particularly in cardiac catheterization, pacemaker implantation, and central venous access procedures. This report discusses the clinical significance, diagnostic challenges, and management considerations associated with PLSVC, emphasising the need for increased awareness among healthcare professionals to ensure safe and effective patient care.

Keywords: Abnormal systemic venous return, CT angiogram, Echocardiography, Persistent SVC

INTRODUCTION

Persistent left superior vena cava (PLSVC) is a rare congenital vascular anomaly that occurs during embryonic development when the left SVC, a large vein responsible for draining deoxygenated blood from the upper half of the body into the right atrium of the heart, does not decline as expected.[1] Instead of disappearing, this vessel persists alongside the normally developed right SVC. Condition is estimated to affect approximately 0.3-0.5% of population, making it a relatively uncommon but clinically significant anatomical variation.[2] PLSVC often remains undetected until clinical scenarios, such as cardiac procedures or imaging studies, bring its presence to light. Despite being largely asymptomatic, PLSVC can have important implications for medical and surgical interventions that require venous access. This condition poses both diagnostic challenges and opportunities for improving patient care, making it a subject of interest for healthcare professionals in various disciplines, including cardiology, radiology, and vascular surgery.[3] In this article, we delve into intricacies of PLSVC, discussing its embryological origins, diagnostic methods, associated clinical considerations, and management strategies. Through a comprehensive exploration of this anatomical anomaly, we aim to enhance awareness and understanding among healthcare practitioners, ultimately contributing to improved patient outcomes and safety in medical procedures involving venous system.

CASE REPORT

We present a case involving a 14-year-old male who was admitted to the paediatric ward with a three-month history of fever, chest pain for the last 15 days, and facial puffiness for the past 7 days. Further investigations were initiated since the patient had no prior history of similar illnesses. During the physical examination, the patient exhibited facial puffiness, mild lower limb oedema, hepatomegaly, and elevated jugular venous pressure. A

chest X-ray revealed cardiomegaly and an ECG displayed ST-T changes in the precordial leads. Subsequently, a 2D echocardiogram was performed, which identified pericardial effusion with an intrapericardial compartment containing high echogenic foci. Additionally, there was a thick echogenic contrast layer covering the pericardium with an incomplete septation. It was decided to drain the pericardial effusion, for which a preliminary CT cardiac angiography was planned. The CT angiography of the pulmonary vasculature was conducted using a 64-slice GE scanner, from the apex to the dome of the diaphragm, following the administration of 60 ml of nonionic intravenous contrast material. A timing bolus was utilised.

Observations

A dilated left SVC was visualised draining into the right atrium via the coronary sinus, measuring: 2.2 cm in diameter. There was no communication observed between the right and left SVC. (Figures 1 and 2) The right atrium appeared enlarged. Gross pericardial effusion with enhanced pericardial thickening (maximum thickness: 5.5 mm) was identified.

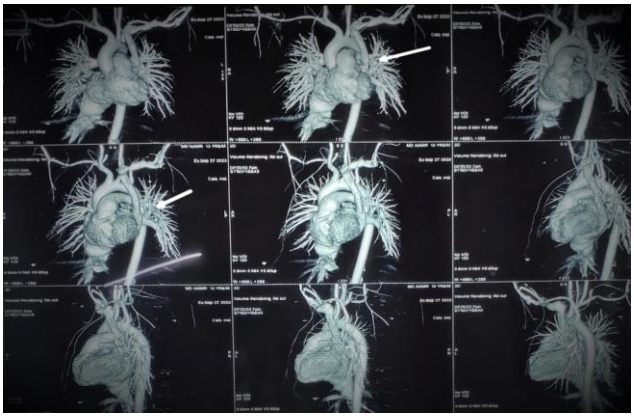

Figure 1: CT venogram of the chest shows a vascular structure following the left subclavian vein. this structure, descending along the left side of the aortic arch, is consistent with PLSVC.

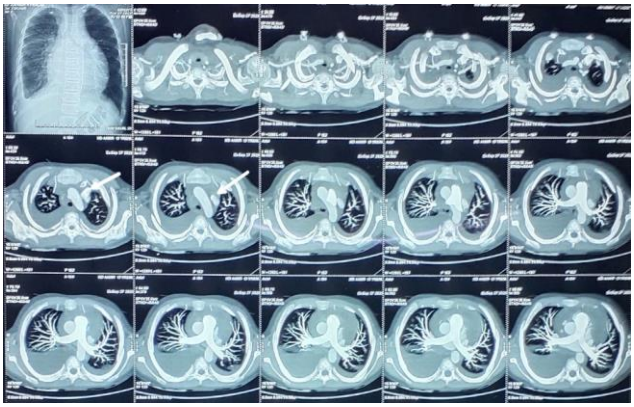

Figure 2: CT venogram of the chest in the mediastinal window, in the axial section showing PLSVC.

DISCUSSION

The management of PLSVC largely depends on the individual patient's clinical context. In asymptomatic cases like the one presented in this report, no specific treatment is necessary solely for the presence of PLSVC. However, healthcare providers must be aware of its presence and consider it when planning procedures requiring venous access. Careful catheter placement, device implantation, and imaging guidance are essential to prevent complications.

In cases where PLSVC is associated with other cardiac anomalies, a multidisciplinary approach involving pediatric cardiologists, cardiac surgeons, and interventional radiologists may be necessary to address the underlying heart condition.

PLSVC is a rare congenital anomaly with important clinical implications. This discussion focuses on various aspects of PLSVC, including its embryological origins, diagnostic challenges, clinical significance, and management considerations.

Embryological origins

During early embryonic development, the SVC system forms from a complex network of veins. The development of the SVC involves the regression of certain venous connections, while others persist to create a mature venous drainage system. In the case of PLSVC, a failure of regression of the left anterior cardinal vein leads to the persistence of the left-sided SVC in addition to the normally developed right-sided SVC. This rare anomaly occurs in approximately 0.3-0.5% of the population.[4]

Diagnostic challenges

PLSVC often goes unnoticed until clinical situations necessitate imaging of the cardiovascular system. It may be incidentally discovered during echocardiography, computed tomography (CT), magnetic resonance imaging (MRI), or other diagnostic procedures. The rarity of PLSVC can pose diagnostic challenges, as healthcare providers may not be familiar with its presence or potential implications.[3]

Clinical significance

While PLSVC is usually asymptomatic and does not affect overall health, it carries clinical significance due to its association with certain congenital heart anomalies. For instance, PLSVC can be linked to atrial septal defects, ventricular septal defects, and other cardiac anomalies. In cases where cardiac surgery or interventions are required, the presence of PLSVC may complicate procedures that involve venous access, such as catheterizations or pacemaker implantation.

Table 1: Review of literature summarizing case reports of PLSVC.

Year	Author	Age/ sex	Clinical features
2008	Goyal et al[5]	19 year/ male	Multiple injuries, including sternum fracture in a motor vehicle accident
2014	Sirin.json et al[6]	1 month/ female	Vomiting, diarrhoea, with decrease per oral intake, hypoactivity and decreased urine output
2018	Faliouni et al[7]	15 year/ female	Atypical chest pain, without abnormal tonic-clonic movement
2018	Tan et al[8]	56 year/ male	Acute left-sided chest pain associated with dyspnoea
2022	Laasri et al[9]	22 year/ female	right lung pneumectomy for a chronic lung infection
2022	Russell et al[10]	29 year/ female	Breathlessness, dizziness and recurrent syncope

CONCLUSION

PLSVC is a rare but clinically significant congenital anomaly that underscores the importance of comprehensive cardiac evaluation, particularly when planning cardiac procedures. Early recognition and awareness of PLSVC are essential for ensuring the safety and effectiveness of medical interventions, ultimately contributing to improved patient outcomes. Additionally, further research into the genetic and developmental factors contributing to PLSVC may provide insights into its aetiology and potential preventive measures.

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