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Case Report

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Association of a Persistent Ductus Arteriosus and a Persistent Left Superior Vena Cava: A Case Report and Review of the Literature

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Abstract

Introduction/Purpose: The persistence of a left superior vena cava (LSVC) is a rare malformation characterized by an absence of involution of this one. We report a syncope revealing a persistent left superior vena cava.

Clinical observation: A 27-year-old patient with no cardiovascular or thromboembolic risk factors was admitted for syncope with rest dyspnoea. The clinical evaluation showed desaturation to 90% on room air, good haemodynamic stability, an arrhythmia with a continuous left latero-sternal systolo-diastolic murmur of intensity 4/6thassociated with a systolic murmur at the tricuspid focus.

Biological tests showed polycythemia of 7 million/ul and mild anaemia of 11g/dL. The electrocardiogram showed atrial fibrillation (AF) with rapid ventricular response, while the X-ray showed significant cardiomegaly. Echocardiography showed a short-axis parasternal slice centred on the PA, with a tripod image and a left-right shunt between the aorta and PA. Continuous Doppler showed systolic flow in this shunt with diastolic extension without return to the isoelectric line. There was a passage of air bubbles into the left cavities (the patient had a venous line), dilatation of the coronary sinus, dilatation of the right cavities, and severe PAH at 90 mmHg. Echocardiography concluded that the patient had PCA with severe right-sided dilatation and severe PH associated with abnormal venous return. Chest CT showed the existence of two superior vena cava, one on the left and the other on the right, draining into the left and right atria respectively.

The diagnosis was persistent patent ductus arteriosus and SCAV complicated by AF and syncope. Treatment included oxygen therapy, curative anticoagulation with Enoxparin and an antiarrhythmic drug (Amiodarone). The patient developed a cardiovascular collapse resistant to vasoactive amines and died after 7 days in hospital.

Conclusion: The persistence of a ductus arteriosus associated with a left superior vena cava in an adult who has been asymptomatic for a long time is very rare. PCA would have made it possible to reach adulthood by protecting the left ventricle through the return of blood from the SVCG to the PA, hence the significant impact on the right cavities due to pulmonary hyperflow. This clinical presentation requires early medical and, above all, appropriate surgical management to avoid a fatal outcome.

Keywords

Patent ductus arteriosus, Left superior vena cava, Literature review, Burkina Faso

Introduction

Persistent left superior vena cava (PLSVC) is a congenital malformation in which the left superior vena cava persists instead of being reabsorbed during embryonic development [1]. This anomaly, which is generally asymptomatic and often discovered accidentally, can also lead to a variety of clinical symptoms, ranging from minor signs to more severe manifestations, such as syncope [2,3]. Persistent SCV is often associated with other cardiac and vascular anomalies such as septal defects, tetralogy of Fallot, patent ductus arteriosus, or

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coarctation of the aorta, making the clinical diagnosis complex [4]. The pathophysiological mechanisms underlying syncope in these cases are mainly related to compression of the left superior vena cava, which disrupts venous return to the heart, leading to cerebral hypoperfusion [5]. Despite the rarity of this condition, treatment must be rapid and appropriate in order to prevent serious complications [5]. In this report, we detail the clinical case of a 27-year-old adult with a persistent left superior vena cava associated with a patent ductus arteriosus. The diagnostic aspects, strategies and therapeutic implications of this anomaly will be examined in this clinical case while highlighting the challenges encountered during its management.

Clinical observation

The patient was a 27-year-old mechanic with no known cardiovascular risk factors. He was admitted for syncope of sudden onset with no prodromal symptoms or associated signs. The patient had been suffering from permanent palpitations and exertional dyspnoea for several months. On physical examination, consciousness was clear, with blood pressure at 124/74 mmHg, tachycardia at 133 beats per minute and xiphoid tingling. Auscultation revealed irregular heart sounds with a tricuspid insufficiency murmur of intensity 4/6 and an aortic insufficiency murmur of intensity 3/6. Examination of the other equipment was normal. The electrocardiogram showed coarse-mesh atrial fibrillation with a rapid ventricular response of 140 cycles per minute (Figure 1). The chest X-ray showed cardiomegaly (cardiothoracic index = 0.75), a right inferior arch protrusion (dilatation of the right atrium), and a convex middle arch with an outward point (Figure 2). On Doppler echocardiography, there were visible bullae in the left cavities, significant dilatation of the right cavities, persistence of the ductus arteriosus, pulmonary hypertension (PAPS= 90 mmHg) and major dilatation of the coronary sinus in favour (Figure 3). The CT-scan also showed dilation of the right cavities and confirmed the presence of two superior vena cava, one on the right draining into the right atrium and the other on the left draining into the coronary sinus (Figure 4). The biology work-up showed polycythemia at 7 million/ul and mild anaemia at 11g/dL. The diagnosis was persistent CA and SCAV complicated by AF. The patient was treated with a curative dose of Enoxaparin followed by Rivaroxaban and Amiodarone. The course was marked by the onset of cardiovascular collapse refractory to vasopressive amides, followed by death on the seventh day of hospitalisation.

Review of the literature - Discussion

The literature was searched using PubMed and Google Scholar. This search was carried out using the following three equations: "association of a left superior vena cava and a persistent ductus arteriosus", "persistent left superior vena cava" and "persistent ductus arteriosus" and "persistent left superior vena cava", "persistent ductus arteriosus". In total we obtained six articles [6-11] which are summarised in Table 1. Generally speaking, this association appears to be rare in the literature and is mainly documented in Asian countries [6-11]. Although there are asymptomatic forms known as aged forms, it can be responsible for the rapid development of fixed pulmonary hypertension, leading to the death of children from an early age.

The persistence of the left superior vena cava is a rare congenital anomaly, observed in approximately 0.3% to 0.5% of cases in the normal population and 10% in subjects with congenital heart disease [2]. Although the majority of patients are asymptomatic, in some cases persistent SCV may be responsible for severe symptoms, including syncope, mainly related to disruption of venous return [12]. Persistent CSVG can lead to compression of the coronary sinus and right superior vena cava, reducing venous return to the heart. This impaired blood flow to the right atrium and right ventricle can lead to cerebral hypoperfusion, responsible for the transient loss of consciousness seen in syncope [3].

The clinical symptoms of persistent SCSV vary according to the severity of compression and the presence of other associated malformations. However, in asymptomatic forms, persistent CSBV is often discovered incidentally during routine examinations [13]. Other symptoms may include signs of venous congestion or cardiac symptoms such as dyspnoea, chest pain or palpitations associated with rhythm disorders, malaise or even syncope [3].

Diagnosis of persistent SCV is based on imaging. Transthoracic and transoesophageal echocardiography allow direct visualisation of the left superior vena cava and assessment of the impact on blood flow [14]. They can be combined with cardiac MRI, which offers better resolution of vascular structures and can confirm the persistence of the LVES [15]. In addition, a chest CT scan may be useful to assess the topography and anatomical relationships of the SCCV in relation to other vascular and cardiac structures [16]. These techniques are essential for assessing the extent of the malformation and its impact on the circulatory system.

Treatment of persistent SCV is often conservative in asymptomatic cases. However, in cases where syncope or other cardiovascular complications occur, more active treatment may be required. Treatment options include endovascular ablation or ligation of the persistent SVC in some severe cases, particularly if the compression causes significant symptoms [17]. In other cases, medical treatment may be considered. This treatment aims to alleviate the clinical symptoms and includes heart failure drugs and anti-arrhythmic drugs, in particular amiodarone. In the case of severe conductive disorders, pacemaker implantation is the treatment of choice [18]. Surgery is often reserved for patients with serious complications or who are refractory to medical treatment [19].

The prognosis for persistent SCV is generally favourable, especially in asymptomatic forms and particularly in the case of early surgical management [8-10,20]. However, when associated with a persistent ductus arteriosus, the evolution and prognosis may be life threatening, especially if discovered late at the stage of fixed pulmonary hypertension. In these situations, signs of tissue hypoperfusion, particularly in the brain, such as syncope, may occur and require more intensive treatment. The prognosis of patients who undergo surgery, although generally better, depends on the nature of

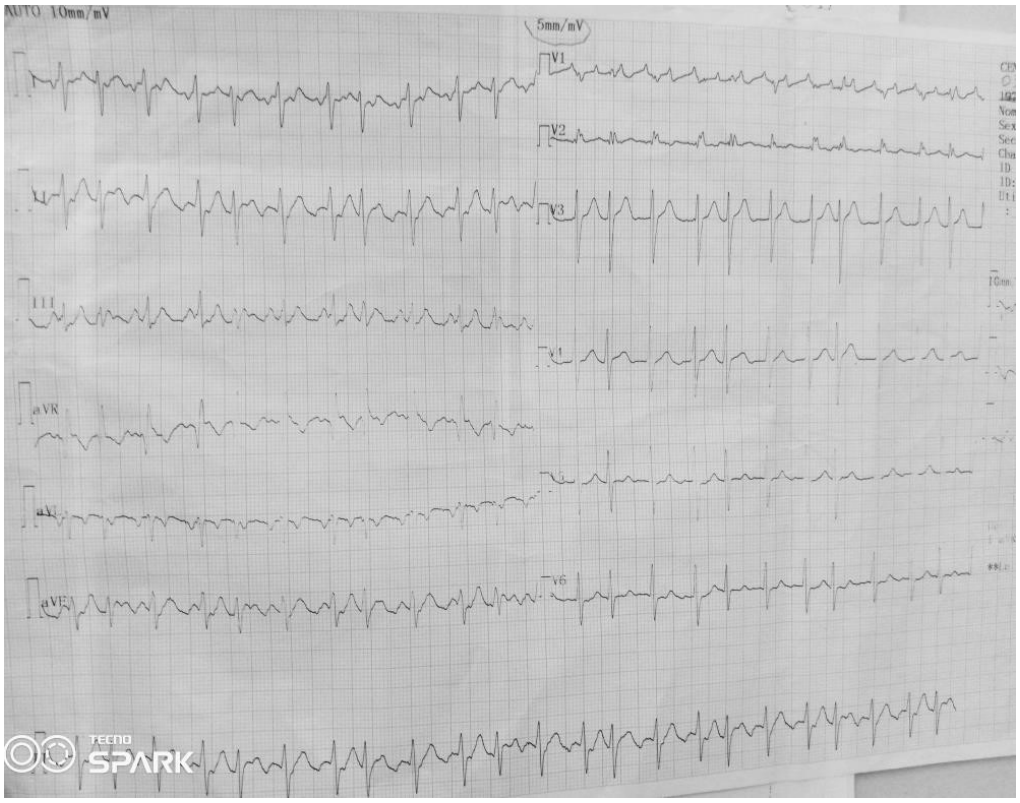

Figure 1: 12-lead surface electrocardiogram showing complete arrhythmia due to atrial fibrillation with ventricular response at 140 cycles per minute.

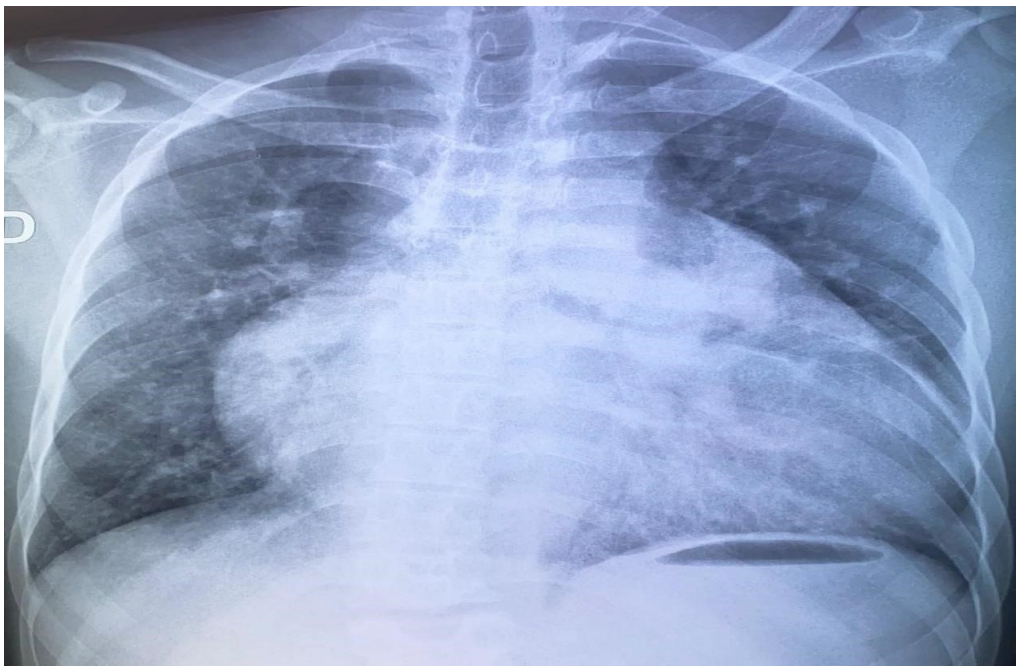

Figure 2: Front thoracic radiograph showing an enlarged cardiac silhouette with a cardiothoracic index of 0.75 (with a right inferior arch overhang, a convex left middle arch, a supra-diaphragmatic peak and bilateral interstitial syndrome.

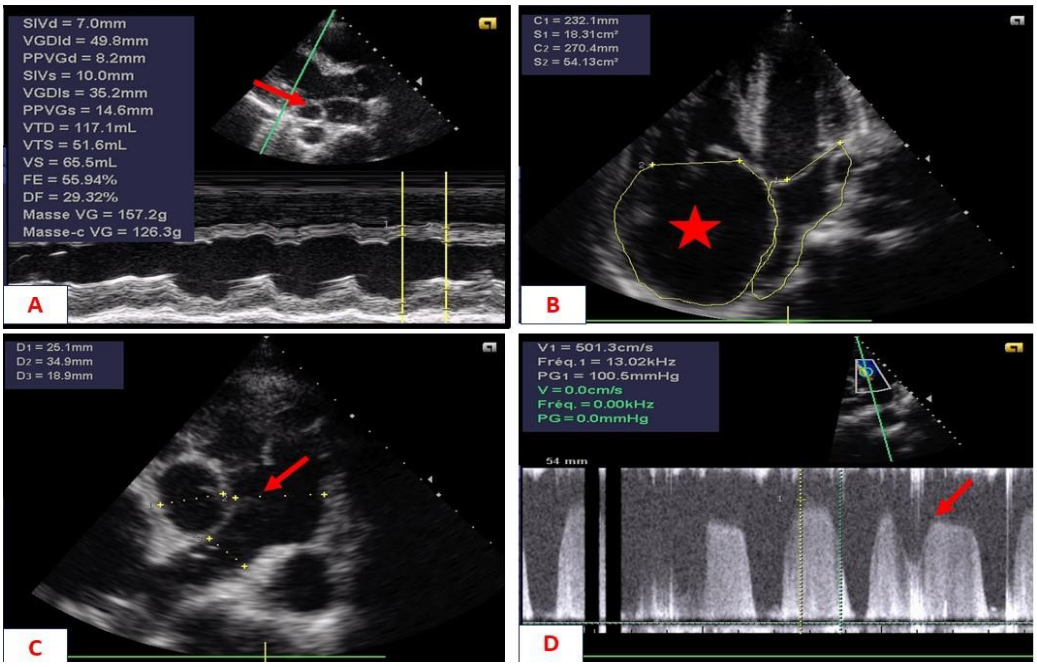

Figure 3: Transthoracic Doppler echocardiogram showing
A: para-sternal long-axis section, TM dilatation of the coronary sinus (red arrow)
B: apical 4-cavity slice, significant dilation of the right atrium (red arrow)
C: short axis, significant dilation of the pulmonary artery measured at 35 mm (red arrow)
D: short axis, persistence of a ductus arteriosus characterised by positive highvelocity systolo-diastolic flow.

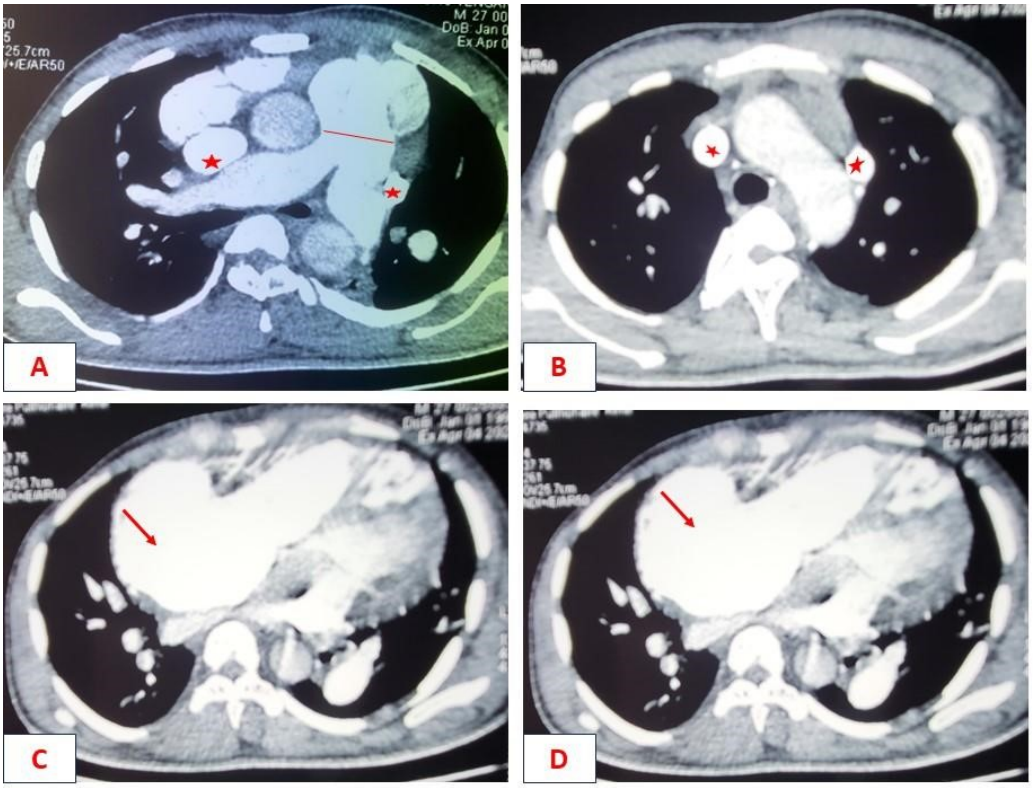

Figure 4: Thoracic angioscan showing
A: dilatation of the pulmonary artery trunk measured at 39mm (red line),
C and D: dilatation of the right heart chambers (red arrow),
A and B: persistence of two superior vena cava draining on the right into the right atrium and on the left into the left atrium (red star).

Table 1: Summary of patients in the literature review

N	Authors and year	Country	Age/Gender	Clinical picture	Pulmonary pressure	Medical treatment	Surgical treatment	Evolution
1	Tsutsumi, et al.,/1992 [6]	Japan	24 yrs/F	Dyspnoea and chest pain	95 mmHg	Not applicable	Operated	Favourable
2	Uehara, et al.,/2007 [7]	Japan	5 months/F	Cyanosis	Not applicable	Not applicable	Operated	Favourable
3	Tanoue, et al.,/2008 [8]	Japan	24 days	Dyspnoea	Not applicable	Not applicable	Operated	Favourable
4	Yang, et al., /2012 [9]	South Korea	27y/M	Chest discomfort	Not applicable	Antiplatelet agents	Not applicable	Favourable
5	Sahai, et al.,/2022 [10]	India	01years/M	Systolic murmur + thrill	Normal	Not applicable	Not applicable	Favourable
6	Kishore, et al.,/2024 [11]	India	20 yrs/F	Systolic murmur	40 mmHg	Not applicable	Operated	Favourable
7	Nacanabo, et al.,/2025	Burkina Faso	27 yrs/M	Syncope, dyspnoea, collapse	56 mmHg	Diuretic, vasopressor amine	No	Died

the malformation and the response to treatment [20]. Early surgery can improve patients' quality of life by reducing the frequency of syncope and associated symptoms.

Conclusion

Persistent left superior vena cava is a rare but clinically significant malformation. Although often asymptomatic, it can cause severe symptoms, such as syncope, due to disruption of venous return. Diagnosis is based primarily on echocardiographic and CT imaging, while treatment ranges from monitoring to surgical intervention in severe forms. Early and appropriate treatment generally results in a favourable prognosis, with targeted interventions depending on the severity of symptoms and complications.

Conflicts of interest

We have no conflicts of interest

Consent

We have obtained the patient's consent for publication of these results.

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