When Infections Unveil Hidden Hearts: A Case of Leptospirosis Leading to the Discovery of Partial Anomalous Pulmonary Venous Return (PAPVR)

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Introduction

Partial Anomalous Pulmonary Venous Return (PAPVR) is a rare form of congenital heart disorder that is said to affect ~ 0.7% of the population, however this number is thought to be lower due to majority of the patient being asymptomatic and the condition often identified incidentally [1,4]. PAPVR was first described by Winslow in 1739 [2]. Due to an abnormal connection of some of the blood vessels between the lung and the heart, a certain percentage of oxygenated blood returns to either the systemic circulation or to the right side of the heart [2]. Normally, blood circulation in our body occurs in one direction. The right ventricle pumps blood to the lungs via pulmonary artery and oxygenated blood returns to the left side of the heart via pulmonary vein. In PAPVR, instead of draining oxygenated blood into the left side of the heart, one or more pulmonary vein drains into the superior vena cava (SVC), Inferior vena cava (IVC), coronary sinus or right atrium causing right side of the heart to experience higher volume of blood which causes right heart chambers to increase their workload to compensate for the additional volume [4]. While there are multiple variations of the abnormal connection of the pulmonary vein, in most cases the right pulmonary vein connects to the SVC [5]. This increase of workload on the right heart chambers would cause dilation [3]. Long term complications of PAPVR includes remodeling of the pulmonary vasculature resistance causing pulmonary arterial hypertension (PAH), right sided heart failure and Eisenmenger syndrome due to increased pressure on the right side of the heart [5].

Case Presentation

A 20-year-old male, with a history of nicotine dependence, presented to the emergency department with complaints of weight loss, epigastric pain, and generalized fatigue. The patient was initially suspected of having a viral infection, and testing for leptospirosis was positive. He was treated with doxycycline and admitted for further management. During his inpatient stay, further diagnostic imaging was performed, including a transthoracic echocardiogram and CT chest scan.

Interestingly, an incidental finding on echocardiography revealed evidence of a right-sided heart strain. Further investigation with a cardiac MRI revealed a partial anomalous pulmonary venous return (PAPVR), where the right pulmonary vein was draining into the superior vena cava (SVC). This abnormal connection caused increased blood volume on the right side of the heart, leading to dilation of the right atrium and ventricle.

Given the clinical improvement in the patient's symptoms and the absence of ischemic findings, he was discharged and referred to pediatric cardiothoracic surgery for further evaluation and management of the PAPVR. This case highlights how congenital heart anomalies, such as PAPVR, can be incidentally discovered during evaluation for unrelated conditions like leptospirosis.

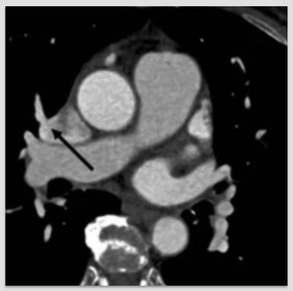

Figure 1: Anomalous drainage of the right upper pulmonary vein to the superior vena cava

Discussion

Partial Anomalous Pulmonary Venous Return (PAPVR) is a rare congenital anomaly, typically discovered incidentally. The condition, in which one or more pulmonary veins drain into the systemic venous circulation (such as the superior vena cava), can lead to right heart strain over time. Most individuals with PAPVR are asymptomatic, and the condition is often detected incidentally, as was the case with this patient.

In this case, the PAPVR was discovered during the workup for leptospirosis, a bacterial infection that commonly presents with fever, muscle pain, and fatigue. The patient's right heart strain, which was initially attributed to the infection, was later recognized as secondary to PAPVR, demonstrating how an unrelated illness can unmask a congenital cardiac defect. The physiological impact of PAPVR on the circulatory system includes a left-to-right shunt, where oxygenated blood returns to the right side of the heart, causing an increased volume load on the right heart. Over time, this can result in dilation of the right atrium and ventricle, and potentially lead to complications such as pulmonary hypertension and right-sided heart failure.

While PAPVR may be asymptomatic in many patients, it can have significant long-term effects on cardiovascular health. The discovery of PAPVR in this patient underlines the importance of thorough cardiac evaluation when patients present with unusual findings or symptoms that could indicate a secondary condition.

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