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Partial Anomalous Pulmonary Venous Return Associated with Celiac Trunk Variations on Thoracic Computed Tomography: An Incidental Finding

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Abstract | **Case Report**

Partial anomalous pulmonary venous return (PAPVR) is an uncommon congenital vascular anomaly in which one or more pulmonary veins bypass the left atrium and empty instead into the systemic venous system, producing a left-to-right shunt [1,2]. When the anomaly affects the right lung, drainage may occur into the superior vena cava, right atrium, inferior vena cava, azygos vein, hepatic vein, or portal vein. Diagnosis has traditionally relied on transthoracic or transoesophageal echocardiography and catheter angiography [2,3]. Echocardiography is attractive because it is portable and avoids ionising radiation, but visualisation of the pulmonary veins is not always adequate, and angiography, while accurate, carries the drawbacks of an invasive procedure. Multi-detector computed tomography (MDCT) offers a reliable, non-invasive alternative that can also reveal coexisting vascular anomalies in the same study [5,6,9]. We describe a patient in whom PAPVR and a variant celiac trunk anatomy were both discovered incidentally on MDCT performed for an unrelated pulmonary complaint.

Keywords: PAPVR, congenital vascular malformation, celiac trunk variant, multi-detector CT, pulmonary venous varix, superior mesenteric artery.

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INTRODUCTION

The pulmonary veins take shape early in foetal life. Before the lungs establish their own venous connection to the heart, blood from the primitive lung buds drains through the splanchnic plexus, a network that communicates with the paired cardinal veins and the umbilical-vitelline veins.

Of the paired cardinal veins, the right system goes on to form the right superior vena cava, while the left system largely disappears; in fewer than 1% of people it persists as a left superior vena cava. The umbilical-vitelline veins, for their part, give rise to the inferior vena cava, the portal venous system, and the ductus venosus.

A common pulmonary vein buds outward from the back wall of the left atrium and links up with the splanchnic plexus. Under normal circumstances the older splanchnic connections wither away and the pulmonary venous return is absorbed into the left atrium, ultimately producing the familiar four separate pulmonary veins. When this regression fails, one or more veins remain tethered to their embryonic systemic connections — the anatomic basis of PAPVR.

Echocardiography and angiography remain useful for detecting these anomalies, but MDCT can delineate the anomalous vein and accompanying vascular variants in a single, non-invasive examination [2,5,6,9].

CASE REPORT

A 40-year-old man presented with cough, haemoptysis, and generalised weakness, on a background of family history of tuberculosis. Sputum testing (GeneXpert) was positive for acid-fast bacilli.

A chest radiograph and an MDCT scan of the chest and upper abdomen were obtained.

The frontal chest radiograph showed a large tubular opacity in the right mid and lower zones extending down to the right hemidiaphragm, together with fibrotic change in both lower lobes.

MDCT demonstrated the following:

- A dilated right inferior pulmonary vein forming a pulmonary venous varix.
- Anomalous drainage of this vein into both the portal vein and the inferior vena cava — a mixed pattern of PAPVR.
- Non-visualisation of the celiac artery as a discrete trunk.
- The common hepatic and splenic arteries arising directly from the aorta.
- The short gastric and left gastric arteries likewise arising directly from the aorta.
- A normally branching superior mesenteric artery.

A well-defined cavity was also noted in the right lower lobe, surrounded by ground-glass change and fibrosis, in keeping with pulmonary tuberculosis and consistent with the clinical and laboratory picture.

The patient was started on anti-tuberculous therapy and is being followed clinically for the PAPVR. Surgical correction is reserved for patients who develop a haemodynamically significant shunt, pulmonary hypertension, or heart failure, none of which were present here.

Patient consent and ethical approval:

Written informed consent was obtained from the patient for publication of this case report and any accompanying clinical information. Institutional ethical approval was not required for publication of a single case report.

DISCUSSION

PAPVR occurs when one or more, but not all, pulmonary veins fail to join the left atrium and instead drain into the systemic circulation, creating a left-to-right shunt [1,3]. Larger shunts can cause dyspnoea, chest discomfort, palpitations, or pulmonary arterial hypertension over time, although many cases, as in this patient, are found incidentally [7,8].

The anomaly is conventionally divided into four patterns according to where the vein drains:

1. Supracardiac — into the superior vena cava, a persistent left SVC, or a brachiocephalic vein; the most frequently seen pattern.
2. Cardiac — into the right atrium or the coronary sinus.
3. Infracardiac — into the portal vein, a hepatic vein, or the inferior vena cava, as typified by scimitar syndrome.
4. Mixed — more than one drainage route in the same patient.

Because the anomalous vein in this case emptied into both the portal vein and the inferior vena cava, it fits the mixed category.

Patients found to have PAPVR should be assessed for associated cardiac defects, particularly atrial septal defects [2,3]. Echocardiography in this patient, however, did not show an atrial or ventricular septal defect.

A separate and unrelated finding was the absent celiac trunk, with its usual branches — the common hepatic and splenic arteries, together with the short gastric and left gastric arteries — arising independently from the aorta; the superior mesenteric artery followed its normal course.

Treatment of PAPVR is guided by the size of the shunt, symptoms, pulmonary pressure, and associated structural abnormalities [3,7,8]. Small, asymptomatic shunts are usually watched with periodic follow-up, whereas larger shunts or those paired with structural cardiac defects warrant surgical repair.

CONCLUSION

This case adds to the small body of reported mixed-type PAPVR, here with the right inferior pulmonary vein emptying into both the portal vein and the inferior vena cava. The unrelated finding of an absent celiac trunk, with its branches arising separately from the aorta, is a reminder that thoracoabdominal CT can surface unexpected vascular variants well outside the original clinical question.

MDCT was central to characterising both the venous anomaly and the arterial variant in a single, non-invasive study. Although the patient's presenting illness was pulmonary tuberculosis, the coexisting PAPVR still calls for periodic follow-up given the long-term risk of pulmonary hypertension and right heart strain.

Taken together, the findings illustrate why incidental vascular anomalies deserve careful documentation, and why managing them alongside an active infectious process benefits from input across specialties.

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