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Porto pulmonary hypertension due to progression of secondary biliary cirrhosis following Kasai procedure

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Abstract

Porto pulmonary hypertension is the presence of pulmonary arterial hypertension in patients with advanced liver disease and portal hypertension. It affects minority of advanced liver disease patients without a significant correlation between hepatic impairment and severe porto pulmonary hypertension. It is a rare complication of portal hypertension following successful portoenterostomy. We present a case of a seventeen-year-old male with a past history of Kasai procedure for congenital biliary atresia, presenting with severe pulmonary hypertension as a complication of cirrhosis. He was defaulted during childhood follow up and was asymptomatic during last 17 years which has led to silent progression of secondary biliary cirrhosis. Hence this highlights the importance of long-term follow up after Kasai procedure.

Key words: porto pulmonary hypertension, Kasai procedure, delayed presentation

Introduction

Pulmonary hypertension is defined as mean pulmonary artery pressure of more than 25 mmHg at rest as measured on right heart catheterization.[1] Porto pulmonary hypertension (PPHTN) is a complication of cirrhosis of any cause. It affects 2-5% of patients with portal hypertension following portoenterostomy even with normalization of liver markers. The median age of presentation is 11.5 years.[1] However, it can occur even in early stages of the liver disease.[3] Development of PPHTN is postulated to have many mechanisms, some of which include hyperdynamic state, increased pulmonary venous congestion and vascular constriction with obstruction of the pulmonary arterial bed and genetic predisposition in a minority.[4] Vascular obstruction to pulmonary arterial flow is reflected by increased pulmonary vascular resistance. It is the key parameter in defining PPHTN. Presenting features of pulmonary hypertension include dyspnoea, fatigue, weakness, angina, syncope, lower limb swelling and abdominal distension. Examination will reveal clinical signs of pulmonary arterial hypertension and right heart failure. Transthoracic echocardiogram is helpful in diagnosis of pulmonary hypertension, but the gold standard is right heart catheterization.[3] Vasodilators are the main therapeutic option available but liver transplantation is a promising option in a selected group of patients.[5]

Case report

A 17-year-old man with a history of congenital biliary atresia who underwent Kasai portoenterostomy procedure at 2 months of age was admitted with two episodes of syncope. It was associated with chest pain during heavy exertion. He was apparently well previously and has been physically active. He was a teetotaller with no history of hepatotoxic medications or significant family history of liver disease. On examination, he was mildly icteric with bilateral pitting ankle oedema. Cardiovascular examination revealed a loud second heart sound. Examination of abdominal and respiratory systems was unremarkable. His vital parameters were normal including oxygen saturation level. There was no postural drop in his blood pressure. Arterial blood gas analysis revealed mild respiratory alkalosis. Electrocardiogram (ECG) showed features suggestive of pulmonary hypertension including

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P-pulmonale and T inversions involving V1-V3 leads with right heart strain pattern. There were no dynamic changes in the ECG but troponin I level was elevated (0.046 nanogram per millilitre). Transthoracic echocardiogram (TTE) showed markedly enlarged right atrium, right ventricle and pulmonary artery dilatation with severe pulmonary hypertension. There were no regional wall motion abnormalities suggestive of myocardial ischemia or hypertrophic cardiomyopathy. There were no features of left heart disease to suggest type II pulmonary hypertension. His D-dimer levels were elevated, however computed tomography pulmonary angiogram (CTPA) did not reveal evidence of pulmonary embolism. It showed dilated pulmonary arteries with increased peripheral vascular margins and evidence of right heart strain with pulmonary hypertension, further confirming TTE findings. Lung window of the CTPA did not reveal lung parenchymal pathology and spirometry showed normal lung functions essentially excluding type III pulmonary hypertension. Ultrasound scan (USS) of the abdomen showed chronic liver parenchymal changes and portal hypertension with prominent spleen. Liver functions were abnormal with features suggestive of obstructive jaundice. Right heart catheterization and transoesophageal echocardiogram were planned but abandoned due to persistently low platelet levels. Autoimmune markers for liver disease including antinuclear antibodies (ANA), anti-smooth muscle antibodies and antimitochondrial antibodies were negative. Viral hepatitis screening and Human Immunodeficiency Virus 1 & 2 antibody levels were negative. Iron studies were within normal range. Eye examination for Keyser Fleischer ring was negative and serum ceruloplasmin level and serum copper levels were within normal range. In evaluation for syncope, non-contrast CT of the brain and 24-hour Holter monitoring did not reveal significant abnormalities. His serum electrolytes showed mild hypokalaemia, hypocalcaemia and hypomagnesemia with serum creatinine of 132 miromol/litre and eGFR of 75ml/min/1.73^2. USS of the abdomen did not reveal renal parenchymal changes. His blood sugars levels and vital parameters were normal throughout the ward stay. Thus, a diagnosis of PPHTN was made in the absence of other causes of pulmonary hypertension. He was started on dual therapy for pulmonary hypertension including bosentan and sildenafil. A diuretic was started to relieve symptoms of right heart failure. Follow up revealed resolution of his symptoms with no further episodes of syncope.

Discussion

This patient had congenital biliary atresia, underwent Kasai portoenterostomy during infancy and presented 17 years later with features of porto pulmonary hypertension. Kasai procedure involves removal of damaged extrahepatic bile duct and anastomosis of part of jejunum which then allows bile flow from liver to small intestine.[6] He was followed up at the paediatric clinic for seven years but unfortunately defaulted thereafter. During the childhood follow up, he was noted to have marginally elevated bilirubin levels which was managed conservatively. During the last 10 years it has gradually progressed to secondary biliary cirrhosis most probably due to remaining intrahepatic biliary obstruction.[7] Interestingly he was asymptomatic with underlying decompensated cirrhosis, resulting in a delayed presentation to medical care. His mild renal impairment with hypokalaemia, hypocalcaemia and hypomagnesemia is most likely due to renal tubular acidosis associated with biliary atresia.[8] ECG changes, positive cardiac troponins and elevated D-dimers were attributed to right heart strain.[9] Although the gold standard for diagnosis of pulmonary hypertension is right heart catheterization, we were unable to proceed due to low platelet count. Pulmonary vasoactive drugs including epoprostenol, phosphodiesterase 5 inhibitors and endothelin receptor antagonist bosentan are found to be effective in treating PPHTN.[10-13] In selected patients, liver transplantation is an option but patients with moderate to severe pulmonary hypertension have high risk of complications associated with surgery thus has poor outcome.[10,14] However, resolution of the PPHTN can be seen after liver transplantation.[14,15]

Conclusion

This is an atypical presentation of portopulmonary hypertension due to slowly progressive secondary biliary cirrhosis following Kasai procedure. Lack of symptoms during this period might delay the presentation till advance disease sets in. This highlights the importance of long-term surveillance for disease progression following the procedure.

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