hepatopulmonary syndrome

general

Definition:
- Hepatopulmonary syndrome (HPS) is characterized by the presence of liver dysfunction, intrapulmonary vascular dilatation (IPVD), and gas exchange abnormalities, varying from increased alveolar-arterial oxygen gradient to severe hypoxia not explained by underlying cardiopulmonary disease.
- This syndrome usually occurs with cirrhosis but also has been described with noncirrhotic portal hypertension.
- The clinical manifestations are nonspecific and include dyspnea, platypnea, orthodeoxia, clubbing, cyanosis, and spider nevi.

diagnostic criteria

Hepatopulmonary syndrome

Chronic liver disease (± cirrhosis)
Arterial hypoxaemia
PaO_2 <75 mmHg (10 kPa) or A-aO_2 gradient >20 mmHg
Intrapulmonary vascular dilatation

epidemiology

- Almost half of liver transplantation candidates have gas exchange abnormalities.
- Hypoxemia secondary to HPS is present in 13% to 15% of patients with end-stage liver disease.

pathophysiology

- An imbalance in the expression of pulmonary vasodilating and vasoconstricting factors has been implicated in the pathogenesis of this phenomenon.
- Nitric oxide is thought to be responsible for the vasodilatation and the blunted hypoxic pulmonary vasoconstriction seen in HPS.
- It is important to differentiate HPS from portopulmonary syndrome (PPS). The latter is defined by a mean pulmonary artery pressure that is increased to greater than 25 mm Hg with increased pulmonary vascular resistance and normal or slightly elevated cardiac output. HPS, in contrast, presents as normal to low pulmonary artery pressure, low pulmonary vascular resistance, and high cardiac output.

differential diagnosis

- HPS must be differentiated from other causes of hypoxia in patients with end-stage liver including underlying lung diseases such as chronic obstructive pulmonary disease or pneumonia, congestive heart failure, massive ascites with associated atelectasis, or pleural effusion. Once these diagnoses are ruled out, HPS can be diagnosed by demonstrating abnormal oxygenation and the presence of an intrapulmonary shunt.

investigation

- The arterial blood gas analysis typically shows decreased PaO2 on room air in the standing position. PaO2 may not improve when the inspired gas is switched to 100% oxygen.
- Pulmonary function tests reveal decreased diffusion capacity (DLCO) in the majority of patients with HPS.
- The demonstration of an intrapulmonary shunt can be made by a radionuclide lung perfusion scan using technetium-Tc99 macroaggregated albumin.
- In the presence of a cardiac or pulmonary shunt, the isotope is not trapped in the lung as it would normally be but is also taken up by the brain, liver, and kidneys.
- Pulmonary angiography may help differentiate between two patterns of IPVD: type I, the diffuse form, and type II, the focal form. This information may be useful because type II may improve after local embolization.

medical management

- Many therapeutic agents have been tried in HPS, including methylene blue , indomethacin , octreotide, and garlic powder, but none has been clearly or consistently effective.
- Use of antimicrobial agents has shown interesting results but needs validation by data from further studies.

liver transplantation

- Symptomatic HPS is recognised as an indication for liver transplantation.
- Over 80% of patients have resolution or marked improvement, although time to resolution of HPS is quite variable and may take more than a year. The degree of preoperative hypoxia is not predictive of reversibility.
- liver transplantation remains the only currently available treatment for HPS and should be considered in patients with HPS having PaO2 less than 60 mm Hg.