

Clinical study of pulmonary profile in patients with cirrhosis of liver with special reference to arterial blood gas analysis and pulmonary function tests

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Abstract

Introduction: In patients with cirrhosis of liver, pulmonary manifestations such as hepatic hydrothorax (HH), Porto pulmonary hypertension (PoPH) and hepatopulmonary syndrome (HPS) are commonly observed. Accumulation of fluid inside pleural cavity is known as hepatic hydrothorax, which may cause severe respiratory dysfunction depending upon the amount of fluid accumulated.

With advancing cirrhosis, rate of fluid accumulation as well as resistance to therapy is seen. On other hand, both PoPH and HPS are characterised by impaired arterial

oxygenation and limited functional status. Orthotopic liver transplantation (LT) constitutes the only effective treatment that is able to resolve the pulmonary complications of liver disease.

Aims: To study the pulmonary profile, to identify etiology of hypoxemia and to detect the presence of HPS in patients with cirrhosis of liver.

Material and Methods: Cross sectional study done on 60 Patients admitted in Medicine department, PMCH from March 2021 to Nov 2022 diagnosed to have Cirrhosis of liver, fulfilling the inclusion and exclusion criteria.

Results: The most common respiratory system finding was right pleural effusion. Restriction was the most common abnormality in pulmonary function tests. 6 patients (10%) were found to have Hepatopulmonary Syndrome (HPS). Orthodeoxia was the characteristic feature of the patients who had HPS. All 6 patients with HPS presented with cyanosis, orthodeoxia and spider naevi.

Conclusion: Restrictive pattern of PFT correlated with severity of liver disease. 10 patients (16.7%) had hypoxemia out of which Hepatopulmonary syndrome was seen in 6 patients (10%) with cirrhosis. The prevalence of HPS is influenced by the severity of liver disease.

Index terms: Cirrhosis, Hepatopulmonary syndrome, Hydro thorax, Orthotopic liver transplantation, Hypoxemia, Orthodeoxia, Contrast echocardiography

Introduction

Chronic liver disease is a leading cause of death in developed as well as developing countries. Cirrhosis, a final pathway for a wide variety of chronic liver diseases, is a pathologic entity defined as diffuse hepatic fibrosis with the replacement of the normal liver Architecture by nodules. Development and recognition of pulmonary manifestations in cirrhosis has several clinical implications with regard to their management, since they carry a poor prognosis. In patients with cirrhosis of liver, pulmonary manifestations such as hepatic hydrothorax, Porto pulmonary hypertension and hepatopulmonary syndrome are commonly observed. Accumulation of fluid inside pleural cavity is known as hepatic hydrothorax, which may cause severe respiratory dysfunction depending upon the amount of fluid accumulated. Also with advancing cirrhosis, rate of fluid accumulation as well as resistance to therapy is dramatic

ally observed. HPS occurs when pulmonary microvascular alterations impair gas exchange and is found in 5% to 30% of patients evaluated for LT. POPH occurs when Vaso constriction and remodeling in resistance vessels in crease pulmonary arterial pressures and is found in as many as 5% of patients with cirrhosis. Both PoPH and HPS are characterised by impaired arterial oxygenation and limited functional status. Orthotopic liver transplantation constitutes the only effective treatment that is able to resolve the pulmonary complications of liver disease.

Aims & objectives

- To study the pulmonary profile in patients with cirrhosis with reference to arterial hypoxemia, FEV₁ to FVC ratio and Peak expiratory flow rate (PEFR).
- To identify the etiology of hypoxemia in above patients.
- To detect the presence of hepatopulmonary syndrome among Cirrhotic patients

Material & methods

Study design: Cross-Sectional Study

Study duration: March 2021-November 2022

Patients admitted in Department of General Medicine, PMCH, Patna diagnosed to have Cirrhosis of liver, fulfilling the inclusion and exclusion criteria were included in the study group. 60 cases were selected on the basis of the simple random sampling technique. Emphasis was placed on the pulmonary complaints and its impact. Patients were investigated for Arterial blood gas analysis, Spirometry and Contrast Echocardiogram. Relevant Statistical methods were applied.

Inclusion criteria

- Age above 18 years, including male and females.
- Proven cases of cirrhosis of liver by clinical, endoscopic and sonographic evidence

Exclusion criteria

- Patients of age below 18 years
- Patients with coexisting primary pulmonary diseases like COPD, Bronchial asthma, ILD etc.
- Coexisting intrinsic heart disease.
- Patients with life threatening complications of cirrhosis like active upper gastrointestinal haemorrhage, hepatic encephalopathy. Smokers.

Results

In our study, Cirrhosis was found common in young adults in the age group of 31-40 years with male to female ratio of 3:1. Alcohol was found to be the predominant etiology of cirrhosis. The most common respiratory system finding was right pleural effusion and it was the most common chest radiographic abnormality. Restriction was the most common abnormality in pulmonary function tests. 6 patients (10%) were found to have Hepatopulmonary Syndrome (HPS). Orthodeoxia was the characteristic feature of the patients who had HPS. All 6 patients with HPS presented with cyanosis, orthodeoxia and spider naevi.

Table 1: Age distribution

Age group (years)	Percent
20 -30	15.0 %
31-40	33.3 %
41-50	25.0 %
51- 60	21.7 %
>60	5.0 %
Total	100.0 %

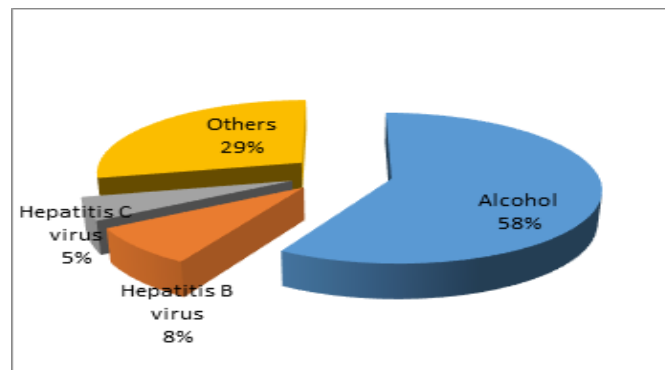
Table 2: Sex Distribution

	Percent
Male	76.7 %
Female	23.3 %

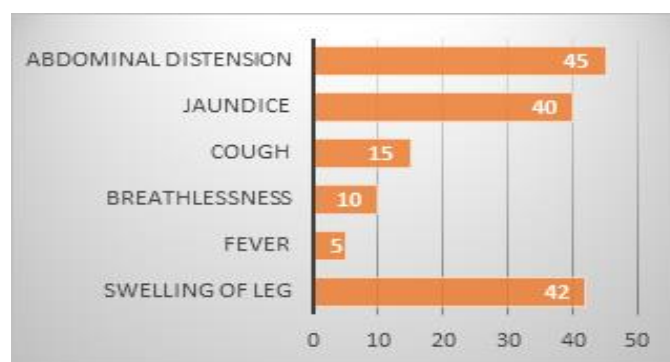
Table 3: Distribution of clinical findings among cases

Clinical Findings	Percentage
Clubbing	33.3%
Cyanosis	10%
Spider Naevi	20%
Pleural effusion	25%

Graph 1: Etiology of cirrhosis



Graph 2: Distribution of presenting complaints among cases



Graph 3: Upper GI endoscopy findings.



Restrictive PFT pattern	28.3%
Ascites	75%
Splenomegaly	90%
Ejection systolic murmur	25%
Hypoxia (PaO2 < 70)	16.7%
Intrapulmonary shunts on ECHO	12%
HPS	10%

Table 4: Correlation between grading of varices and PaO2 and FEV1

	Grading of varices	Mean	SD	Minimum	Maximum	Range	Correlation	P value
PaO2	1	81.04	5.99	72.00	92.00	20.00	-0.19	0.12
	2	74.45	10.29	64.00	99.00	35.00		
	3	75.90	11.11	60.00	90.00	30.00		
FEV1	1	88.21	6.69	76.00	98.20	22.20	-0.11	0.37
	2	82.68	13.25	54.00	98.20	44.20		
	3	83.64	10.45	70.10	96.20	26.10		

Table 4: Correlation between pao₂ & severityof liver disease (child Pugh class)

		Child Pugh class (CPC)			Total	Correlation	P value
		A	B	C			
PaO2	Hypoxia	1	2	6	9	-0.13	0.31
	Normal	11	28	12	51		

Table 5: Correlation between PFT & severity of liver disease (child-Pugh class)

Child Pugh class		PFT Pattern		Total	Chi square	P value
		N	R			
A	Count	10	2	12	5.991	0.049
B	Count	24	6	30		
C	Count	9	9	18		
Total		43	17	60		

Table 6: Correlation betweenchild-pugh class & HPS.

			HPS		Total	p value
			YES	NO		
Child Pughclass	A	Count	0	12	12	0.0054
	B	Count	0	30	30	
	C	Count	6	12	18	
Total			6	54	60	

Conclusion

The feature of our study was the detection of hypoxemia and pulmonary profile in patients with cirrhosis of liver. Restrictive pattern of PFT correlated with severity of liver disease. 10 patients (16.7%) had hypoxemia out of which Hepatopulmonary syndrome was seen in 6 patients (10%) with cirrhosis. The prevalence of HPS is influenced by the severity of liver disease. The only proven treatment for HPS is liver transplantation. As prognosis of HPS is poor, screening for its presence in cirrhotic patients is very important. Also Spider naevi could be a marker for the presence of intra pulmonary vascular dilatation.

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