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COMPREHENSIVE ANALYSIS OF PORTAL HYPERTENSION: UNRAVELING OPTIMAL MANAGEMENT STRATEGIES FOR ENHANCED TREATMENT OUTCOMES

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ABSTRACT

Portal hypertension, characterized by increased pressure within the portal venous system, is a significant complication often associated with cirrhosis. The key diagnostic parameter is the portal pressure gradient, with a gradient of 6 mmHg or more indicating the presence of portal hypertension and a gradient exceeding 10 mmHg considered clinically significant. This condition arises from increased resistance to portal blood flow, occurring either within the liver (cirrhosis) or externally, such as in portal vein thrombosis or Budd-Chiari syndrome.

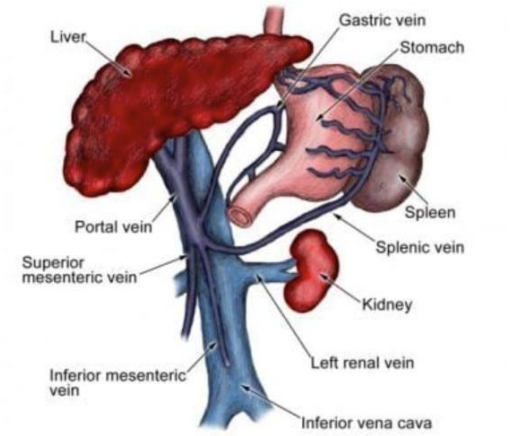
The hepatic venous pressure gradient (HVPG) serves as a reference standard for diagnosing clinically significant portal hypertension but is limited by its invasiveness. Portal hypertension is implicated in various complications, including variceal bleeding, ascites, hepatorenal syndrome, and collateral circulation expansion. The development of clinically significant portal hypertension is a crucial milestone in the progression of liver cirrhosis, leading to increased risks of complications, including gastroesophageal varices, hepatocellular carcinoma, and mortality.

Pharmacological management, particularly in cirrhotic patients, involves first-line drugs such as terlipressin, somatostatin, and octreotide for treating acute variceal bleeding. Long-term treatment for cirrhotic portal hypertension includes propranolol and carvedilol. However, the safety and efficacy of these medications, especially non-selective beta-blockers (NSBBs), in non-cirrhotic portal hypertension patients require further investigation. This review emphasizes the importance of understanding the pathophysiology, diagnostic approaches, and pharmacological interventions in managing portal hypertension to improve patient outcomes.

INTRODUCTION

Portal hypertension is expanded strain inside the portal venous framework. Still up in the air by the expanded entrance pressure angle (the distinction in pressures between the portal venous strain and the tension inside the sub-par vena cava or the hepatic vein. This tension angle is typically not exactly or equivalent to 5 mmHg. A strain slope of 6 mmHg or more between the portal and hepatic veins (or substandard vena cava) recommends the presence of portal hypertension much of the time. At the point when the strain slope is more prominent than 10 mmHg, portal hypertension turns out to be clinically huge. A strain inclination between 5 to 9 mmHg for the most part reflects subclinical infection **(Berzigotti et al., 2013).**

Pharmacological administration is the pillar of Portal Hypetension in cirrhotic or Non cirrhotic Portal Hypetension patients. Terlipressin, Somatostatin and octreotide are the first-line drugs for treating Acute Variceal Bleeding in quite a while with PHT. Propranolol and carvedilol are suggested for the drawn out treatment of cirrhotic PHT. Whether these medications, particularly NSBBs, are additionally protected and proficient in Non cirrhotic Portal Hypetension patients requires further examination **(Gao et al., 2020).**



REVIEW OF LITERATURE

Portal hypertension is expanded pressure inside the portal venous system. It is categorised by the expanded portal pressure gradient (the distinction in pressures between the portal venous pressure and the strain inside the inferior vena cava or the hepatic vein. This strain inclination is regularly not exactly or equivalent to 5 mmHg. A strain slope of 6 mmHg or more between the portal and hepatic veins (or inferior vena cava) recommends the presence of portal hypertension by and large. At the point when the strain slope is more noteworthy than 10 mmHg, portal hypertension turns out to be clinically huge. A strain inclination between 5 to 9

mmHg ordinarily reflects subclinical disease. This slope is estimated by the assurance of the hepatic venous pressure gradient (HVPG). Portal hypertension creates when protection from portal blood stream increments. This obstruction frequently happens inside the liver, as in cirrhosis. It can likewise be outside the liver, for example, prehepatic in portal vein thrombosis or post hepatic on account of constrictive pericarditis or Budd-Chiari disorder. Identification of the degree of protection from portal blood stream permits the assurance of the reason for portal hypertension. This condition is the most successive reason for hospitalization, variceal drain, liver transplantation, and passing in patients with cirrhosis (**Tony and Oliver, 2023).**

Portal hypertension is in this manner delegated prehepatic; intrahepatic (cirrhosis), and posthepatic (Budd-Chiari disorder). The most widely recognized reason for portal hypertension is cirrhosis. In cirrhosis, the expanded resistance is generally brought about by hepatic engineering twisting (fibrosis and regenerative knobs) however about 33% of the expanded opposition is brought about by intrahepatic vasoconstriction, amenable to vasodilators (**Tony and Oliver, 2023).**

Portal hypertension is fundamentally made by the expansion in opposition portal outflow and also by an expansion in splanchnic blood stream. Portal hypertension is related with changes in the intrahepatic, foundational, and portosystemic security course. Modifications in vasoreactivity (vasodilation and vasoconstriction) assume a focal part in the pathophysiology of portal hypertension by adding to expanded intrahepatic opposition, hyperdynamic course, and extension of the collateral circulation **(Cichoz, 2008).**

The hepatic venous strain gradient (HVPG) stays the reference standard for analysis of clinically critical portal hypertension (CSPH) however is restricted by its intrusiveness and accessibility **(Chengyan et al., 2023).**

The portal hypertension is answerable for the vast majority of the appearances of liver cirrhosis. A portion of these complexities are the immediate outcomes of portal hypertension, like gastrointestinal draining from ruptured gastroesophageal varices and from portal hypertensive gastropathy and colopathy, ascites and hepatorenal disorder, and hypersplenism. In different complexities, portal hypertension assumes a key part, despite the fact that it isn't the just pathophysiological figure their turn of events. These incorporate unconstrained bacterial peritonitis, hepatic encephalopathy, cirrhotic cardiomyopathy, hepatopulmonary

condition, and portopulmonary hypertension **(Said et al., 2012).** It tends to be additionally characterized by the level of portal hypertension, as assessed by its best quality level, the hepatic venous pressure gradient (HVPG), in compensated cirrhosis without portal hypertension (HVPG <5 mmHg), with mild portal hypertension (HVPG >5 mmHg, yet <10 mmHg), or clinically critical portal hypertension (CSPH, and HVPG ≥10). The advancement of CPSH is a significant trademark in the regular history of liver cirrhosis and is related with an expanded gamble of gastroesophageal varices, hepatic decompensation, hepatocellular carcinoma (HCC), and mortality (**Guadalupe et al., 2017).** The treatment of portal hypertension incorporates the counteraction of variceal discharge in patients who have never bled, the treatment of the intense bleeding episode and the counteraction of rebleeding in patients who have endure a draining episode from esophageal or gastric varices. An extra situation might come into training: the 'pre-essential' prophylaxis, or treatment of remunerated patients without varices to forestall the improvement of varices and ascites. The primary contrast among these situations is that normal history and anticipation are very not quite the same as to each other. Information on the normal history of every one of these circumstances ought to direct the choice of treatments, since the hemostatic or prophylactic viability of the accessible medicines are straight forwardly corresponding to their intrusiveness and unfavorable impacts (**Jaime et al., 2003).**

AIM AND OBJECTIVE

AIM: The primary aim of this analysis is to investigate Portal Hypertension, focusing on unraveling the optimal management strategies for achieving enhanced treatment outcomes.

OBJECTIVE: The study aims to unravel optimal management strategies for Portal Hypertension.

MATERIAL AND METHODS

Study design and site: Patients of portal hypertension reporting at tertiary care hospital, Rajsamand.

Study population: Adult patients with Portal Hypertension who were being treated in a tertiary hospital were included in the investigation's study population.

Study material: Data was collected from old case records of medical record department.

Data was collected from patients reporting to general medicine between November 2022 to April 2023.

Study Duration

6 Months Prospective and 2 Years Retrospective.

Inclusion Criteria

Male or female subject aged between 18 -70yrs.

Subject with diagnosis of Portal Hypertension (based on clinical, laboratory, endoscopic and ultra-sonographic features)

Subject who has been hospitalized for Portal Hypertension.

Exclusion Criteria

Below 18 years

Pregnant women and lactating women.

Patients on other medication (AYUSH)

Patients having no diagnostic evidence of cirrhosis.

STUDY PROCEDURES

Study was retrospective and prospective, of patients of Portal Hypertension reporting at Ananta Institute of Medical Sciences and Research Centre. Data will be collected from case records of patients maintained in medical record department and also from general medicine department.

Data collection sheets were prepared which included the details of patient's, such as name, age, sex, including relevant history, examination details, diagnostic test (USG abdomen, endoscopy, CT SCAN, MRI) and laboratory investigation including level of serum SGOT, SGPT, serum total bilirubin, serum albumin ,AG ratio, platelet count and PT- INR was collected and recorded.

Mentioned data was compiled and analyzed to record incidence and prevalence of liver cirrhosis during the duration mentioned. Analysis was also done to check the comorbidity occurring in such patients. It was further analysed to find out the treatment options.

INVESTIGATIONS FOR PORTAL HYPERTENSION

1) USG

Although measurement of hepatic venous pressure gradient (HVPG) and upper endoscopy are considered the criterion standards for assessment of portal hypertension.

HVPG – 2- 5mmg is normal value <= 5 is portal hypertension

2) CT SCAN and MRI

Findings suggestive of portal hypertension include splenomegaly, portal vein dilation, portal vein occlusion, collateral vessel formation, declining platelet counts, and ascites with a serum- ascites- albumin gradient of 1.1 g/dL or more.

RESULTS

Table 5.1: Laboratory Investigations With Their Reference Range.

LABORATORY INVESTIGATIONS	NORMAL RANGE
Hb(g/dl)	11.5- 14.5 g/dl
TLC(10*3 cells/mm*3)	4.0- 11.0 (10*3 cells/mm*3)
PLA(per mlc)	150-400 10*3 cells/ul
BT(mg/dl)	0.2-1.3 mg/dl
BD/BI	0-0.3 / 0.0-1.1 mg/dl
SGPT(U/L)	13-41 U/L
SGOT(U/L)	5-35 U/L
Na(mmol/L)	136-145 mmol/L
K(mmol/L	3.5-5.1mmol/L
ALB(g/dl)	3.2-5.0 g/dl
GLO(g/dl)	2.3-3.6 g/dl
A/G	1.2-1.5
PT (secs)	12-4 secs
INR (secs)	0.85- 1.15 sec
S.Cr (mg/dl)	0.7-1.4 mg/dl

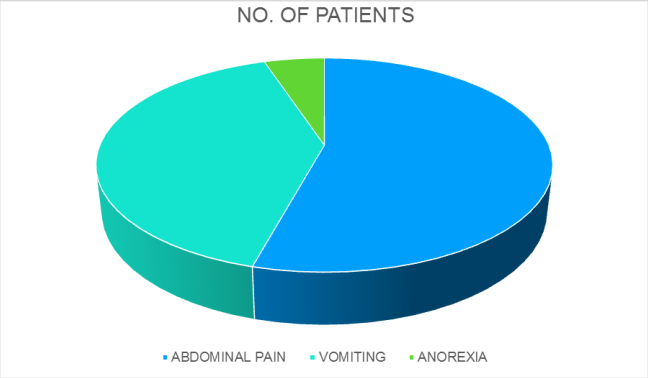
Table 5.2: Biochemical Parameters Of Patients With Liver Cirrhosis.

S. NO.	PARAMETERS	MEAN ± SD
1	**HAEMOGLOBIN**	**9.73 ± 2.75**
2	**TOTAL LEUKOCYTE COUNT**	**9.94 ± 14.08**
3	**PLATELET COUNT**	**255.58 ± 824.40**
4	**BILURIBIN TOTAL**	**2.7 ± 4.34**
5	**SGPT**	**40.3 ± 46.08**
6	**SGOT**	**64.38 ± 64.71**
7	**SODIUM**	**134.29 ± 9.00**
8	**POTASSIUM**	**4.53 ± 4.11**
9	**ALBUMIN**	**2.69 ± 0.92**
10	**GLOBULIN**	**3.45 ± 1.13**
11	**PT**	**18.77 ± 5.76**

12	**INR**	**1.58 ± 1.43**
13	**SERUM CREATININE**	**1.59 ± 2.51**

Table 5.3: Clinical Features Associated.

CLINICAL FEATURES	NUMBER OF PATIENTS
ABDOMINAL PAIN	32
VOMITING	24
ANOREXIA	3



1. Abdominal Pain: In the study, 32 patients reported experiencing abdominal pain, which can be a common symptom of liver cirrhosis.
2. Vomiting: The symptom of vomiting was reported in 24 patients, indicating its association with liver cirrhosis.
3. Anorexia: Three patients experienced anorexia, which refers to a loss of appetite, as a symptom of liver cirrhosis.

TREATMENT MODALITIES

The first-line therapy for portal hypertension depends on the underlying cause and specific manifestations of the condition. However, two commonly used first-line treatments for portal hypertension are non-selective beta-blockers (NSBBs) and endoscopic variceal band ligation (EVBL).

Non-selective beta-blockers (NSBBs): Medications such as propranolol and nadolol are commonly prescribed as first-line therapy for portal hypertension. These medications work by reducing the heart rate and decreasing the pressure in the portal vein.

Propranolol is a medication used for various medical conditions, including the management of liver cirrhosis. Here is the information you requested based on the World Health Organization (WHO)

Generic Name: Propranolol

Brand Names: Inderal, Inderal LA, InnoPran XL, Hemangeol, others

Dosage Regimens: The specific dosage of propranolol for liver cirrhosis may vary depending on the individual's condition and the prescribing physician's recommendations. The dosage can be adjusted based on the patient's response and tolerance to the medication. Starting dose of 20 mg twice daily, gradually increasing to a target dose of 40-160 mg twice daily based on the patient's heart rate and blood pressure.

Route of Administration: Propranolol can be administered orally (by mouth) in the form of tablets, capsules, or solutions.

Generic Name**:** Carvedilol

Brand Names: Carvedilol is available under various brand names worldwide. Some commonly known brand names for Carvedilol include Coreg, Dilatrend, and Carvil.

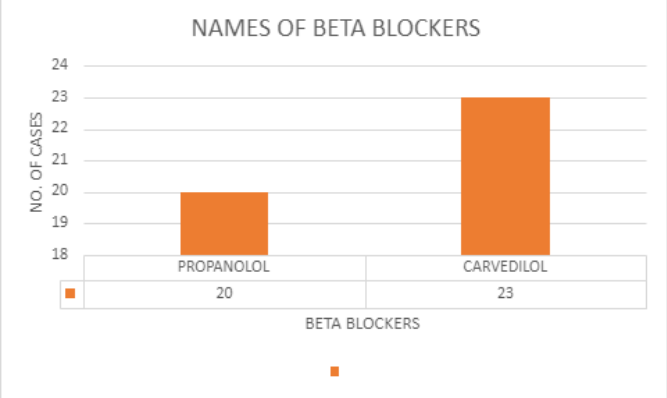
Dosage Regimes: The dosage of Carvedilol in liver cirrhosis may vary depending on the individual patient's condition, severity of liver disease, and other factors. Generally, the dosage of Carvedilol is initiated at a low dose and gradually increased as tolerated. Common dosage strengths available for Carvedilol include 3.125 mg, 6.25 mg, 12.5 mg, and 25 mg.

Routes of Administration: Carvedilol is primarily administered orally in the form of tablets. The tablets are taken by mouth with water.

TREATMENT MODALITIES

(PERCENTAGE OF BETA- BLOCKER USED)

NAME OF DRUG	CASES
PROPRANOLOL	20
CARVEDILOL	23



CONCLUSION

In conclusion, liver cirrhosis is a progressive condition characterized by the development of fibrosis and nodular transformation of the liver tissue, resulting from persistent injury. It can be caused by various factors such as viral infections, toxins, genetic disorders, or autoimmune processes. The major complications associated with cirrhosis include varices, ascites, hepatic encephalopathy, portal hypertension. Portal hypertension, characterized by increased pressure in the portal venous system, plays a central role in the development of complications in cirrhosis.

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