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Original Research Article

Study of Spontaneous Bacterial Peritonitis in Patients of Cirrhosis of Liver with Ascites

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Abstract:

Background: Spontaneous bacterial peritonitis is most common life-threatening complications of cirrhosis of liver, with mortality rate of 20-40%. It's an infectious complication in patients with ascites characterized by abrupt onset of fever, chills, abdominal pain with rebound tenderness over abdomen, leucocytosis. Paracentesis reveals cloudy ascitic fluid with many WBCs, predominantly polymorphonuclear cells (PMN). SBP is defined as the infection of previously sterile ascitic fluid without an apparent intra-abdominal source of Infection. The incidence of SBP in cirrhotic patients varies between 7 to 30% per year. Early detection of SBP is extremely valuable for patients, since the mortality rate among untreated patients is around 50%.

Methods: Hospital-based cross-sectional study conducted at Mandya Institute of Medical Sciences, Mandya from June 2020 to May 2021. A total of 80 adult patients of either sex having cirrhosis of liver with ascites from indoor medical departments of above-mentioned hospital is studied. A detailed history of presenting symptoms, past history, drug and personal history taken. Anthropometric and clinical examination including blood pressure (BP) measurement is carried out for each subject. Written consent taken from all participating cases. Ascitic fluid of all cases aspirated under aseptic condition, before initiation of antibiotic therapy. Cytology done for the total and differential cell count and ascitic fluid for culture and sensitivity done. All relevant blood investigations done.

Result: The ascitic fluid of 80 participants was analyzed. After the analysis, the prevalence of SBP is 26.2%. The mean age of the participants in the study was 51.07 years with a standard deviation of around ±8.73 years. Among 80 participants 67(83.75%) were males and 13(16.25%) were female. Among 80 study participants 95.2% of SBP and 56.7% of Non SBP were alcoholics. Among 80 participants in the study most of them were presented with pain abdomen (61.25%) among them 90.5% of pain abdomen were having SBP. In 80 participants, 35% were having fever, among them 95.2% of fever were diagnosed to have SBP. All 21 participants of SBP had jaundice, 90.47% of SBP presented with Hepatic encephalopathy (HE). All 21 patients with SBP were in Child Pugh class C and 18.6% of Non SBP is in class C.

Conclusion: The ascitic fluid was examined and the results were analysed. After the analysis, our study concludes that the prevalence of SBP is seen in 26.2% of patients with cirrhosis with ascites. Classic SBP is seen in 22.5%, CNNA in 1.2% and BA in 2.5% of patients. SBP is common in alcoholic cirrhotics. Abdominal pain, Fever and jaundice are common in patients with SBP. Child Pugh class C is risk factors for SBP.

Keywords: SBP; CNNA; BA; Hepatic encephalopathy; Ascites; Cirrhosis; Jaundice.

Introduction

Bacterial infections constitute a major complication of cirrhosis. They account for 25%–46% of hospitalizations due to acute decompensation events in patients with cirrhosis and are associated with high morbidity and mortality. [1] Bacterial infections increase fourfold the probability of death of patients with decompensated cirrhosis, reaching a 30% mortality rate after the first month and 63% after the first year of follow-up. [2] Spontaneous bacterial peritonitis is the most frequent bacterial infection in patients with cirrhosis, followed by urinary tract infection, pneumonia, skin and soft tissue infections, and spontaneous bacteremia. [3] During or after an episode of spontaneous bacterial peritonitis, patients frequently present signs of decompensation such as development or progression of ascites or hepatic encephalopathy,

gastrointestinal bleeding, and extra hepatic organ compromise such as renal failure. [4]

In fact, the most common cause of death in patients with cirrhosis admitted for bacterial infections is the development of acute-on-chronic liver failure, characterized by a high mortality rate due to multiorgan failure. [5] In daily practice, the diagnosis of spontaneous bacterial peritonitis and other infections might be challenged by the fact that typical signs and symptoms, like fever or leukocytosis, are frequently absent. Therefore, a high index of suspicion is usually necessary for early diagnosis and treatment, which is associated with better outcomes. [6]

Ascites is the accumulation of lymphatic fluid within the peritoneal cavity. It is one of the major complications of decompensated liver disease, along with variceal hemorrhage and hepatic encephalopathy, and is the most common cause of hospitalization in the cirrhotic patient. [7] The development of ascites is a marker of prognosis in liver cirrhosis, as it indicates a reduction in 1- and 5-year survival rates by 15% and 23.5%, respectively. One of the most serious sequelae of ascites is spontaneous bacterial peritonitis (SBP). [8] SBP is the most common source of infection in liver cirrhosis, accounting for approximately 25% of bacterial infections. Mortality due to SBP ranges between 30% and 90% within the first year of diagnosis. [9]

Ascites may develop from a variety of causes including cirrhosis, malignancy, tuberculosis, Budd–Chiari syndrome, or congestive heart failure (CHF). Liver cirrhosis accounts for nearly 85% of cases of ascites. [10] In cirrhosis, portal hypertension (PHTN) is the necessary predecessor to the development of ascites. The degree of PHTN is assessed by measuring the hepatic–venous pressure gradient (HVPG), as calculated by subtracting the wedged hepatic pressure from the free hepatic pressure. The threshold HVPG after which fluid retention occurs is above 12 mmHg. [11]

Material and Methods

This is a Cross-sectional Study

Study period: June 2020 to May 2021, a period of 12 months.

Sampling method: Purposive sampling

Inclusion criteria:

Patients of both genders with clinically diagnosed cirrhosis of liver with ascites between the age group of 18-75 years.

Exclusion criteria:

1. Those having ascites due to etiology other than liver disease,
2. Those who were already on antibiotics,
3. Those having some intraabdominal source of infection like surgery,
4. Those who did not consent to participate in the study.

Methodology:

Hospital-based cross-sectional study conducted at Mandya Institute of Medical Sciences, Mandya from June 2020 to May 2021. Ethical committee clearance taken. Atotal of 80 adult patients of either sex having cirrhosis of liver with ascites from indoor medical departments of above-mentioned hospital are studied.

A detailed history of presenting symptoms, past history, drug and personal history taken. Anthropometric and clinical examination including blood pressure (BP) measurement is carried out for each subject using prepared proforma.

Written consent taken from all participating cases.

Ultrasonography of abdomen is done to know the liver architecture.

Ascitic fluid of all cases aspirated under aseptic condition, before initiation of antibiotic therapy. Cytology done for the total and differential cell count and ascitic fluid for culture and sensitivity done.

All relevant blood investigations done.

Ascitic fluid collection

Under strict aseptic precautions diagnostic paracentesis of the ascitic fluid was done. Proper positioning of the patient was done. The site of tapping on the abdomen was marked by clinical or with ultrasound guidance. Povidone iodine solution was used for skin disinfection. Abdominal draping was done with sterile towel. Sterile gloves were worn before performing the procedure. 22-gauge needle was used for tapping. Z technique was applied for tapping of the fluid. 30 ml of the ascitic fluid was obtained using two syringes.

The blood culture bottles were inoculated first. For ascitic fluid culture, about 10 ml of the ascitic fluid was inoculated directly into 50 ml blood culture bottles -aerobic and anaerobic media each at the bedside itself under strict aseptic precautions and using a sterile needle. Ascitic fluid was also sent for analysis of total leucocyte count, polymorphonuclear neutrophil counts, total proteins, albumin, globulin, sugar, cytology, culture and sensitivity.

Results

Table 1: Prevalence of the Spontaneous Bacterial Peritonitis among the Study Participants

Clinical Condition		Frequency (N)	Percentage (%)
Non-Spontaneous Bacterial Peritonitis		59	73.8
	Classical Spontaneous Bacterial Peritonitis	18	22.5
	Bacterascites	2	2.5
	Culture Negative Neutrocytic Ascites	1	1.2
Total		**80**	**100.0%**

In the study, all the participants were suffering from liver cirrhosis with ascites. However, the clinical condition was further assessed by considering the parameters which include presence of increased polymorphonuclear leucocytes and positive culture in ascitic fluid. Accordingly, the prevalence of spontaneous bacterial peritonitis was found to be about 26.2%. This category subdivided into 3 classes, where majority were regarded as classical SBP. Remaining 2 were considered as Bacterascites where the PML was in the normal range, and only 1 individual was found to be CNNA as the culture sensitivity report was negative for growth of any microbial agent. Among 80 participants 59 were without spontaneous bacterial peritonitis (non SBP).

Table 2: Association between Spontaneous Bacterial Peritonitis and Age of the Study Participants

Age in years	SBP	Total
≤45	9 (42.9%)	25
46-55	7 (33.3%)	30
56-65	3 (14.3%)	20
≥66	2 (9.5%)	5
Total	**21 (100.0%)**	**80**
p-value	**0.368**	

The mean age of the participants in the study was 51.07 years with a standard deviation of around ±8.73 years. The minimum age and maximum age of the participants were 36 years and 75 years, respectively. On analysing for existence of any association between age of the participants and spontaneous bacterial peritonitis, the study did not show statistically significant relation.

Table 3: Association between Spontaneous Bacterial Peritonitis and Positive Clinical Findings among the Study Participants

Clinical Findings		Non SBP	SBP	p-value
Temperature	Normal (97.7-99.5 ºF)	59 (100.0%)	1 (4.8%)	**<0.001**
	High(>100.4ºF)	0 (0.0%)	20 (95.2%)	
Abdomen	Non-Tender	54 (91.5%)	3 (14.3%)	**<0.001**
	Tender	5 (8.5%)	18 (85.7%)	
Jaundice	Present	7 (11.9%)	21 (100.0%)	**<0.001**
	Absent	52(88.1%)	0 (0.0%)	

In the study, the participants were examined for relevant clinical findings. On analysing the association between spontaneous bacterial peritonitis and positive clinical findings, there exists statistically significant relation, as the temperature was high, abdominal tenderness and jaundice were present in majority among those who were diagnosed with spontaneous bacterial peritonitis comparatively.

Table 4: Association between Spontaneous Bacterial Peritonitis and Ascitic Fluid Profile of the Study Participants

Ascitic Fluid		Non SBP	SBP	p-value
Sugar	Mean	80.36	84.47	**0.379**
	SD	17.38	20.86	
Protein	Mean	1.70	1.04	**0.513**
	SD	4.59	1.07	

On analysing the ascitic fluid of the participants, the study did not find statistically significant difference in the mean values of sugar and protein with respect to the spontaneous bacterial peritonitis. This can be appreciated by the findings where the mean values of sugar and protein in the ascitic fluid of the participants with spontaneous bacterial peritonitis was almost closer to those diagnosed with non-spontaneous bacterial peritonitis.

Table 5: Association between spontaneous bacterial peritonitis and Child-Pugh scored by the study participants

Child-Pugh Score	SBP	Total
Class A (5-6)	0 (0.0%)	**6 (7.5%)**
Class B (7-9)	0 (0.0%)	**42 (52.5%)**
Class C (10-15)	21 (100.0%)	**32 (40.0%)**
Total	**21 (100.0%)**	**80 (100.0%)**
p-value	**<0.001**	

The prognosis of the condition was assessed by Child-Pugh score in the study. Accordingly, all the participants diagnosed with non-spontaneous bacterial peritonitis were categorized under Class C. Whereas in case of the participants with non- spontaneous bacterial peritonitis, majority was categorized under Class B. Thus, the study found statistically significant association between spontaneous bacterial peritonitis and Child-Pugh classification.

Table 6: Association between spontaneous bacterial peritonitis and alcohol consumption by the study participants

Alcohol Consumption	SBP
Present	20 (95.2%)
Absent	1 (4.8%)
Total	**21 (100.0%)**
p-value	**0.004**

In the study, the consumption of alcohol was inquired among the participants. Accordingly, majority of the participants in both the categories of spontaneous bacterial peritonitis were consuming alcohol. However, that proportion was extremely higher in the group of people with spontaneous bacterial peritonitis. Thus, the study found statistically significant association between spontaneous bacterial peritonitis and consumption of alcohol.

Table 7: Association between spontaneous bacterial peritonitis and hepatic encephalopathy among the study participants

Hepatic Encephalopathy	Non SBP	SBP
Present	1 (1.7%)	19 (90.5%)
Absent	58 (98.3%)	2 (9.5%)
Total	**59 (100.0%)**	**21 (100.0%)**
p-value	**<0.001**	

In the study, the presence of hepatic encephalopathy was observed among the participants. Accordingly, hepatic encephalopathy was present in 19 participants i.e., majority of the participants with spontaneous bacterial peritonitis. Whereas, this was completely contrast among the participants without spontaneous bacterial peritonitis, where majority were not having hepatic encephalopathy. Thus, the study found statistically significant association between spontaneous bacterial peritonitis and hepatic encephalopathy.

Discussion

Spontaneous bacterial peritonitis (SBP) is a severe complication in cirrhosis patients with ascites. Clinical awareness, prompt diagnosis by exclusion of secondary bacterial peritonitis, and immediate treatment are necessary to reduce mortality and morbidity in this patient group. [12] However, the emergence of multidrug-resistant (MDR) microorganisms has changed our understanding of SBP bacteriology and treatment. Antibiotic therapy specific to either community-acquired or nosocomial/healthcare-acquired SBP is ideal, while liver transplantation remains the definitive treatment following SBP. [13]

Prevention of SBP recurrence by antibiotic prophylaxis while patients wait for a liver transplant is therefore an important clinical issue. The poorly absorbed antibiotic rifaximin may be effective for both primary and secondary SBP prophylaxis, but additional prospective studies are required.

Further development of non-antibiotic strategies based on pathogenic mechanisms is also urgently needed. [14] Blind studies that avoid post-randomization dropout and consider clinically relevant outcomes, such as mortality, health-related quality of life, and decompensation events, are desired for future research. [15] There are three types of SBP. Bacterial translocation from the GI tract is the most common source of SBP. Therefore, two thirds of SBP cases were caused by Gram-negative bacilli, almost exclusively Enterobacteriaceae. Escherichia coli (E. coli) are the most frequently isolated pathogen. [16] However, a trend of Gram-positive cocci (GPC)-associated SBP has been demonstrated in recent

years, representing a changing paradigm in the known bacteriology of SBP, especially in nosocomial SBP; other sources, such as transient bacteremia due to invasive procedures, can also lead to SBP Gram-positive cocci (GPC), such as Staphylococcus, Enterococcus, as well as multi-resistant bacteria have become common pathogens and have changed the conventional approach to treatment of SBP. [17]

Healthcare-associated and nosocomial SBP infections should prompt greater vigilance and consideration for alternative antibiotic coverage. Acid suppressive and beta-adrenergic antagonist therapies are strongly associated with SBP in at-risk individuals. [17] A diagnostic paracentesis should be performed in all patients with cirrhosis and ascites who require emergency room care or hospitalization, who demonstrate or report signs/symptoms mentioned above in the clinical presentations, or who present gastrointestinal bleeding, in order to confirm evidence of SBP. [18] Distinguishing SBP from secondary bacterial peritonitis is essential because the conditions require different therapeutic strategies. Since SBP may be regarded as the final clinical stage of liver cirrhosis, one-year overall mortality rates range from 53.9 to 78%.[19]

Thus, liver transplantation should be seriously considered for SBP survivors who are good candidates for transplantation. The standard treatment for SBP is prompt broad-spectrum antibiotic administration and should be tailored according to either CAP or hospital-acquired, or to local resistance profiles. [20] Albumin supplementation, especially in patients with renal impairment (RI) is also beneficial. Not all patients with cirrhosis and ascites require antibiotic prophylaxis, sometimes referred to as selective intestinal decontamination (SID). SID is associated with a reduced risk of bacterial infection and mortality. [21]

Conclusion

The ascitic fluid was examined and the results were analysed. After the analysis, wehave come to a conclusion that, the prevalence of SBP is seen in 26.2% of patients with cirrhosis and ascites. Classic SBP is seen in 22.5%, CNNA in 1.2% and BA in 2.5% of patients. SBP is common in alcoholic cirrhotics. Abdominal pain, Fever and jaundice are common symptoms in patients with SBP. Hepatic encephalopathy is more common in patients with SBP. Child Pugh class C is risk factors for SBP.

References

1. Oliveira AM, Branco JC, Barosa R, et al. Clinical and microbiological characteristics associated with mortality in spontaneous bacterial peritonitis: a multicenter cohort study. Eur J Gastroenterol Hepatol. 2016; 28(10):1216–1222.
2. Oladimeji AA, Temi AP, Adekunle AE, Taiwo RH, Ayokunle DS. Prevalence of spontaneous bacterial peritonitis in liver cirrhosis with ascites. Pan Afr Med J. 2013; 15:128.
3. Alexopoulou A, Papadopoulos N, Eliopoulos DG, et al. Increasing frequency of gram-positive cocci and gram-negative multidrug-resistant bacteria in spontaneous bacterial peritonitis. Liver Int. 2013; 33(7):975–981.
4. Poca M, Alvarado E, Conceptión M, et al. P0190: predictive model of mortality in cirrhotic patients with high risk spontaneous bacterial peritonitis. J Hepatol. 2015; 62:S375.
5. Tandon P, Kumar D, Seo YS, et al. The 22/11 risk prediction model: a validated model for predicting 30-day mortality in patients with cirrhosis and spontaneous bacterial peritonitis. Am J Gastroenterol. 2013; 108(9):1473–1479.
6. Acevedo J. Multiresistant bacterial infections in liver cirrhosis: clinical impact and new empirical antibiotic treatment policies. World J Hepatol. 2015; 7(7):916–921.
7. Fernández J, Navasa M, Gómez J, et al. Bacterial infections in cirrhosis: epidemiological changes with invasive procedures and norfloxacin prophylaxis. Hepatology. 2002; 35(1):140–148.
8. Piroth L, Pechinot A, Di Martino V, et al. Evolving epidemiology and antimicrobial resistance in spontaneous bacterial peritonitis: a two-year observational study. BMC Infect Dis. 2014; 14:287.
9. Fernández J, Acevedo J, Castro M, et al. Prevalence and risk factors of infections by multiresistant bacteria in cirrhosis: a prospective study. Hepatology. 2012; 55(5):1551–1561.
10. Merli M, Lucidi C, Giannelli V, et al. Cirrhotic patients are at risk for health care-associated bacterial infections. Clin Gastroenterol Hepatol. 2010; 8(11):979–985.
11. De Mattos AA, Costabeber AM, Lionço LC, Tovo CV. Multi-resistant bacteria in spontaneous bacterial peritonitis: a new step in management? World J Gastroenterol. 2014; 20(39):14079.
12. Moreau R, Elkrief L, Bureau C, et al. Effects of long-term norfloxacin therapy in patients with advanced cirrhosis. Gastroenterology. 2018 Dec; 155(6):1816–1827.
13. Tsung PC, Ryu SH, Cha IH, et al. Predictive factors that influence the survival rates in liver cirrhosis patients with spontaneous bacterial peritonitis. Clin Mol Hepatol. 2013; 19(2):131–139.
14. Bal CK, Daman R, Bhatia V. Predictors of fifty days in-hospital mortality in

decompensated cirrhosis patients with spontaneous bacterial peritonitis. World J Hepatol. 2016; 8(12):566–572.
15. Cheong HS, Kang CI, Lee JA, et al. Clinical significance and outcome of nosocomial acquisition of spontaneous bacterial peritonitis in patients with liver cirrhosis. Clin Infect Dis. 2009; 48(9):1230–1236.
16. D'Amico G, Garcia-Tsao G, Pagliaro L. Natural history and prognostic indicators of survival in cirrhosis: a systematic review of 118 studies. J Hepatol. 2006; 44(1):217–231.
17. Marciano S, Dirchwolf M, Bermudez CS, et al. Spontaneous bacteremia and spontaneous bacterial peritonitis share similar prognosis in patients with cirrhosis: a cohort study. Hepatol Int. 2018; 12(2):181–190.
18. Ginés P, Rimola A, Planas R, et al. Norfloxacin prevents spontaneous bacterial peritonitis recurrence in cirrhosis: results of a double-blind, placebo-controlled trial. Hepatology. 1990; 12(4 Pt 1):716–724.
19. Titó L, Rimola A, Ginès P, Llach J, Arroyo V, Rodés J. Recurrence of spontaneous bacterial peritonitis in cirrhosis: frequency and predictive factors. Hepatology. 1988; 8(1):27–31.
20. Fiore M, Maraolo AE, Gentile I, et al. Nosocomial spontaneous bacterial peritonitis antibiotic treatment in the era of multi-drug resistance pathogens: a systematic review. World J Gastroenterol. 2017; 23(25): 4654–4660.
21. Fernández J, Bert F, Nicolas-Chanoine MH. The challenges of multidrug-resistance in hepatology. J Hepatol. 2016; 65(5):1043–1054.