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ORIGINAL ARTICLE

Spontaneous Bacterial Peritonitis In Ascites: A Prospective Study In A Tertiary Care Hospital

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ABSTRACT

Background: Spontaneous bacterial peritonitis is a common and fatal complication occurring in cirrhotic patients with ascites. It is defined as infected ascites in the absence of any recognisable secondary cause of infection.

Objective: To evaluate the relative frequency, clinical presentation and microbial spectrum of spontaneous bacterial peritonitis in ascites patients.

Design: A Hospital based prospective study carried out in patients with ascites.

Place And Duration Of Study: The study was conducted in the departments of Medicine and Biochemistry from August 2008- July 2009 at S.Nijalingappa Medical College and HSK hospital and Research Center, Bagalkot, Karnataka.

Material And Methods: 100 patients admitted to the Department of Medicine with the diagnosis of ascites were selected. They were divided into cirrhotic and non cirrhotic ascites cases. Ascitic fluid from these patients was analysed for cytology, culture/sensitivity and biochemical parameters. Based on these investigations, the cases were further categorized into the SBP (Spontaneous bacterial peritonitis), CNNA (Culture Negative Neutrocytic Ascites) and MNB (Monomicrobial non-Neutrocytic Bacterascites) groups. Statistical analysis was done by using the unpaired "t" test.

Results: 81 patients were cirrhotic and the rest of the 19 cases were non cirrhotic. Among the patients of cirrhotic ascites, SBP was diagnosed in 8 cases (9.81%) and CNNA and MNB were diagnosed in 3(3.7%) and 1(1.23%) cases, respectively. In the SBP group, *Escherichia.coli* was the most frequently cultured organism and it was isolated in 4 cases (50.0%), followed by *Klebsiella pneumoniae* in 3(37.5%) cases and *Pseudomonas aeruginosa* in 1 (12.5%) case. In the CNNA group, the culture was negative, while in MNB one case was E.coli positive. Abdominal pain, hepatic encephalopathy and fever were the common presenting features in 75%, 75% and 62.5% cases in the 3 groups, respectively. The ascitic fluid protein was 0.92 ± 0.25 gms/dl in the SBP group, 1.13 ± 0.49 gms/dl in the CNNA group and 1.4gms/dl in MNB patients.

Conclusion: SBP is a fatal complication of cirrhosis with ascites. It has a heterogenous clinical presentation. Ascitic fluid should be analysed routinely in all cases of cirrhosis with ascites for the early detection of SBP.

Key Words: Ascites, cirrhotic ascites, SBP, CNNA, MNB.

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Introduction

Ascites is a Greek term (askos) which refers to a bag or sac. It is the most frequent complication of cirrhosis and is associated with increased susceptibility to infection and has poor long term outcome [1]. Spontaneous bacterial peritonitis is an infection of ascitic fluid in the absence of any obvious intra-abdominal source [2,3].The prevalence of the disease in cirrhotic patients has

been estimated to be between 8-27%, with resulting mortality ranging from 48-57% [4].

The diagnosis of SBP can be difficult, as there are no typical signs and symptoms and it can be detected only if the ascitic fluid is subjected to cytological examination and culture/sensitivity. Low protein concentrations (1gm/dl) in ascites are particularly prone to develop SBP due to a defect in the opsonisation and neutrophil phagocytosis of bacteria [5].

SBP(Spontaneous Bacterial Peritonitis), CNNA (Culture Negative Neutrocytic Ascites) and MNB (Monomicrobial non-Neutrocytic Bacterascites) are diagnosed on the basis of leucocyte count per cubic mm and absolute polymorphonuclear leucocyte (PMN) count in the routine examination of ascitic fluid, along with the result of its bacterial culture.[6].

In SBP, the bacterial culture is found to be positive, along with a leucocyte count of >500 cells mm³ or an absolute PMN count > 250 cells mm³, whereas in CNNA, the ascitic fluid culture is found to be negative and the absolute PMN count is similar to that of SBP. In MNB, the culture is positive, but the leucocyte count is < 500 cells mm³ and the absolute PMN count is < 250 cells mm³ [7,8].

In view of the high rate of morbidity and mortality which is associated with SBP, this study was carried out to find out the relative frequency, clinical presentation and the organisms which are involved in this condition.

Material And Methods

The study was conducted in the department of Medicine and Biochemistry from August 2008-July 2009 at the S.Nijalingappa Medical College and HSK hospital and Research Center, Bagalkot, Karnataka.

100 patients who were admitted to the Department of Medicine with the diagnosis of ascites were selected. They were evaluated by detailed history, clinical examination and sonographical findings. Based on the above tests and their findings, the patients were divided into cirrhotic and non cirrhotic ascites categories.

Ascitic fluid tapping was done and sent for cytology, biochemical analysis and culture/sensitivity. Based on these investigations, SBP was diagnosed and it was further categorized into SBP, CNNA and MNB.

Exclusion Criteria

- a) Patients who had undergone abdominal paracentesis within 3 weeks.
- b) Patients on antibiotics.
- c) Patients with secondary causes of peritonitis like gut perforation and liver abscess.

Statistical Analysis:

The results of the study were analysed by the unpaired “t” test. P values lesser than 0.05 were considered to be statistically significant.

Results

100 cases of ascites were enrolled in the study. 81 patients were of cirrhosis and 19 were of non-cirrhotic ascites [Table/Fig 1]. The incidence of SBP, CNNA and MNB were 8(9.87%), 3(3.7%) and 1(1.23%) respectively in cirrhotic patients. The majority of cases [69(85.18%)] were that of sterile ascites i.e ascitic fluid PMN count < 250 cells/mm³ and culture negative.

(Table/Fig 1) Showing various causes of ascites.

Sl. No.	Causes of ascites	No. of cases	Percentage
1	Cirrhosis of liver	81	81%
2	T.B.Peritonitis	5	5%
3	Anaemia hypoprotinaemia	4	4%
4	Malignancy	2	2%
5	Nephrotic syndrome	2	2%
6	Congestive Cardiac Fluid	6	6%

The present study comprised of patients in the age group of 21-60 yrs. SBP and CNNA were more common in the age group of 41-60 yrs, while MNB was seen in the age group of 21-40 yrs. 68 patients were males and 13 were females and the disease was more common in males, with statistical significance (P<0.05). Abdominal pain, fever and hepatic encephalopathy were the leading clinical presentations of SBP and CNNA. One case of MNB was asymptomatic [Table/Fig 2].

(Table/Fig 2) Salient clinical features in SBP, CNNA & MNB

C/F	SBP								CNNA			MNB
	1	2	3	4	5	6	7	8	1	2	3	1
Abdominal Pain	+	+	+	+	-	+	-	+	-	+	+	-
Fever	-	+	+	+	-	+	-	+	-	+	-	-
Jaundice	-	-	+	+	+	+	-	+	+	-	-	-
Hepatic Encephalopathy	-	-	+	+	+	+	+	+	-	+	+	-
GIT Bleeding	-	-	-	-	-	-	+	+	-	-	-	-
Asymptomatic	-	-	-	-	-	-	-	-	-	-	-	+

The levels of ascitic PMN count, proteins and total serum bilirubin in SBP, CNNA and MNB are shown in [Table/Fig 3]. The ascitic fluid PMN count was raised in SBP and CNNA cases as compared to that in the MNB cases (P<0.05). The protein level was significantly decreased in SBP cases as compared to that in the CNNA cases (P<0.05). The levels were further more increased in MNB cases as compared to that in the CNNA cases (P<0.05). Serum bilirubin levels were raised in SBP cases as compared to that in the CNNA cases (P<0.05). The levels were lower in MNB cases as compared to that in the CNNA cases (P<0.05).

The microbial spectrum in the SBP, CNNA and MNB cases: 8 cases of SBP and one case of MNB revealed the presence of various bacteria in their ascitic fluid cultures. *E.coli* was the most frequently cultured organism which was isolated in 5 cases [Table/Fig 4].

(Table/Fig 3) Showing mean ± S.D. LFT in SBP CNNA & MNB

	Ascitic PMN count cells/mm ³	Ascitic fluid protein level (gm/dl)	Serum Bilirubin (mg/dl)
SBP	1440 ± 506.1	0.92 ± 0.25	6.87 ± 5.3
CNNA	1728 ± 23.5	1.13 ± 0.49	4.23 ± 1.7
MNB	38	1.4	2

(Table/Fig 4) Culture characteristic of ascitic fluid in various groups.

	Routine method	Modified method
SBP		
1	No organisms	<i>Klebsiella pneumoniae</i>
2	No organisms	<i>Klebsiella pneumoniae</i>
3	No organisms	<i>Klebsiella pneumoniae</i>
4	<i>Escherichia.coli</i>	<i>Escherichia.coli</i>
5	<i>Escherichia.coli</i>	<i>Escherichia.coli</i>
6	No organisms	<i>Escherichia.coli</i>
7	No organisms	<i>Pseudomonas aeruginosa</i>
8	No organisms	<i>Escherichia.coli</i>
CNNA		
1	No organisms	No organisms
2	No organisms	No organisms
3	No organisms	No organisms
MNB		
1	No organism	<i>Escherichia.coli</i>

Discussion

Cirrhosis of liver was the most common cause of ascites, followed by CCF, TB, peritonitis, anaemia, hypoproteinemia, malignancy and nephrotic

syndrome . These findings are in accordance with previous studies where they suggested that it may be caused due to poor nutritional status, as the body is prone to develop infectious diseases in this region [9]. In the present study, the prevalence of SBP, CNNA and MNB were 9.81%, 3.7% and 1.23 respectively. This is similar to the results found in other studies [10]. Cirrhosis was common in the age group of 41-60 yrs, which is almost consistent with the available data [11].

The most common presenting symptoms of SBP were hepatic encephalopathy (75%) and abdominal pain (75%), followed by fever (62.5%). Gastrointestinal bleeding was seen in 25% of the cases. The clinical features of CNNA were similar to those of SBP. Previous authors have reported abdominal pain in 78.5%, fever in 28.5% and hepatic encephalopathy in 50%, while GIT bleed was seen in 78.56% of cases [12].

Most of the patients with SBP had features of liver dysfunction at admission and the mean of serum bilirubin and serum albumin were 6.87mg/dl and 2.46 ± 0.54 mg/dl respectively. Serum albumin values less than 2.5gm% were associated with an increased risk of infection and mortality for SBP [13]. The mean ascitic fluid protein concentration in patients with SBP was decreased. It has been demonstrated that cases of cirrhosis with ascitic fluid protein concentration less than 1 gm% are 10 times more prone to develop SBP as compared to others [14].

In this study, 6 out of 8 cases with SBP had a raised peripheral leukocyte count. It was normal in 3 cases of CNNA and in 1 patient of MNB. Previous studies observed a raised peripheral leukocyte count in only 1 out of 7 cases of CNNA and in 1 out of 3 cases with MNB [15].

The culture of ascitic fluid has undergone a dramatic change. The conventional method of ascitic fluid culture is the collection of the fluid in a sterile culture tube and inoculation of the fluid in enriched chocolate agar. In the modified method, ascitic fluid was inoculated at the bed side of the patient in a blood culture bottle and was cultured on blood and Mckonkey's agar plates. Runyon et al introduced the improved technique of ascitic fluid culture and observed marked improvement in the culture yield of

ascitic fluid upto 9%, as compared to 42% yield by the conventional method [16]. In this study, the ascitic fluid culture was positive in 25% cases of SBP by the conventional method, as compared to 100% positive cases by the modified method.

These are in line with other documented studies on the microbial spectrum of SBP, including the gram negative aerobic flora of the gut. The common organisms which were isolated included *E.coli*, *Klebsiella pneumoniae* and *Proteus mirabilis*. However, gram positive cocci and anaerobic organisms have also been reported to be found in 10-15% of the cases [17]. In the study, gram negative organisms were commonly isolated by the ascitic fluid culture. *E.coli* was isolated in 5 cases (62.5%), *Klebsiella pneumoniae* in 2 cases (25%) and *Pseudomonas aeruginosa* in 1 case (12.5%)

Conclusion

SBP is a commonly encountered complication of liver cirrhosis with ascites. It has a heterogeneous clinical presentation. A high index of suspicion is required to establish early diagnosis and treatment. SBP is associated with a high rate of morbidity and mortality. Hence, it is recommended that ascitic fluid samples should be obtained routinely in all patients with cirrhosis. Use of modified techniques instead of conventional methods increases the culture yield of the ascitic fluid. SBP, if diagnosed early, can be treated with a very good success rate.

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