Comparative Study of Community Acquired and Nosocomial Spontaneous Bacterial Peritonitis and its Variants in 150 Patients

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Background: **Nosocomial acquisition of spontaneous bacterial peritonitis (SBP) is debated as having a different microbial etiology and prognosis. Identification of clinical, laboratory predictors of mortality and appropriate empirical antimicrobial selection is necessary to prevent early mortality and morbidity. We aimed to find the clinical and bacteriological profile in nosocomial and community acquired SBP and its variants, and the predictors of mortality.** ***Material and methods:*** **One hundred and fifty patients with 162 discrete episodes of different types of SBP were analyzed. Relevant clinical and laboratory data were analyzed. SBP was diagnosed according to standard criteria and classified as community acquired if the infection detected within 48 h of admission and as nosocomial after 48 h of admission to the hospital.** ***Results:*** **Eighty seven percent had community acquired SBP (CSBP), 13% had nosocomial SBP (NSBP). Patients of NSBP were older, had more episodes of GI bleed and higher previous episodes of encephalopathy. Patients who died were older, had worse encephalopathy. NSBP had higher one month mortality. Age, serum sodium, encephalopathy and NSBP predicted mortality. Culture positivity was 22.22%.** ***Escherichia coli*** **was the commonest organism isolated. There was no difference in the bacteriological profile between CSBP and NSBP.** ***E. coli*** **showed up to 48% resistance to third generation cephalosporins. Overall sensitivity to aminoglycosides was more than 75%.** ***Conclusions:*** **Overall mortality was 59%. NSBP had significantly high one month mortality. Age, serum sodium, encephalopathy and NSBP were predictors of mortality. Bacteriological profile was similar between CSBP and NSBP. (J Clin Exp Hepatol 2017;7:215–221)**

Spontaneous bacterial peritonitis (SBP) is a frequent and severe complication of cirrhotic ascites.[1] SBP is the most common infection in cirrhotics (25%) followed by urinary tract infection (20%) and pneumonia (15%).[2]

SBP is a landmark event in the natural history of cirrhosis of liver with more than 50% mortality at one year.[3] Proper identification and treatment of SBP reduces in hospital and short term mortality significantly.[4]

Enteric gram negative bacilli are the commonest organisms isolated in ascitic fluid of patients with SBP. However there is increased incidence of gram positive organisms isolated in hospitalized patients with cirrhosis.[5] Studies done to assess the importance of acquisition site in prognosis of SBP have shown conflicting results. This study was done to compare the clinical, profile in CSBP and NSBP, predictors of mortality and to find out difference if any in the bacteriological profile between the two groups.

MATERIAL AND METHODS

This is a prospective study done from June 2010 to August 2012. Patients with SBP and its variants admitted to Department of Gastroenterology and Hepatology, St Johns medical college hospital, Bangalore were studied. The study was approved by institutional ethical review board (IERB). An informed written consent was obtained from all the patients. All patients under went detailed clinical examination, laboratory study and abdominal imaging. Ascitic fluid was collected from all the patients during admission at bedside and analyzed for total leukocyte count, differential count along with protein, albumin, glucose, amylase and 10 ml of ascitic fluid was injected into the BACTEC bottle at the bedside for culture and sensitivity. Diagnosis of cirrhosis was made based on clinical, radiological and endoscopic findings.

Past history of SBP, encephalopathy and GI bleed were recorded. Risk factors like EGD, diagnostic paracentesis, therapeutic paracentesis in the preceding one month of admission were noted.

SBP was defined as an ascitic fluid PMN count > 250 with or without positive culture. Patients with ascitic fluid

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Abbreviations: CNNA: culture negative neutrocytic ascites; HCV: Hepatitis C virus; SBP: spontaneous bacterial peritonitis
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PMN count > 250 and negative culture were labeled as culture negative neutrocytic ascites (CNNA), were grouped with culture positives for analysis. Patients with positive culture and PMN count <250 were labeled as Monomicrobial bacterascites and were excluded from final analysis. SBP was considered community acquired if the infection was detected within 48 h of admission and as nosocomial if it was detected after 48 h after admission to the hospital.[6–8] All the patients were followed up for 6 months from the date of admission, those went against medical advice were called by telephone to determine the status after discharge.

STATISTICAL ANALYSIS

Data were analyzed with statistical software StataIC-12. The results were reported as mean ± SD or Median (Range) for the continuous variables. The Student *t*-test or Wilcoxon rank sum and Chi-square test were used to compare quantitative data and qualitative variables. Logistic regression was done to assess the clinically and statistically significant factor associated with mortality separately after adjusted odds ratio was calculated. The *P*-value of <0.05 was considered statistically significant.

RESULTS

One hundred and fifty patients with 162 episodes of spontaneous bacterial peritonitis and its variants were studied among 706 patients of cirrhotic ascites. Incidence of SBP was 22.94%. Of the 162 episodes, 141 episodes (87.04%) were due to CSBP and 21 (12.96%) were secondary to NSBP. Mean age was 48.4 ± 14 and male to female ratio was 6:1.

One hundred and twenty six episodes (77.7%) were due to culture negative neutrocytic ascites (CNNA), rest were culture positive. Among them thirty three were due to spontaneous bacterial peritonitis and three episodes were due to Monomicrobial bacterascites.

Clinical characteristics, laboratory data, risk factors before an episode of SBP, past history and mortality comparing CSBP and NSBP are shown in Table 1.

Patients of NSBP were older, had more episodes of GI bleed, more episodes of vomiting and higher previous encephalopathy episodes compared to CSBP. Patients with CSBP presented with diarrhea more often than NSBP. Before an episode of SBP, endoscopic interventions and diagnostic paracentesis were more in NSBP compared to CSBP. Other risk factors were ERCP, ruptured urethra and pleural tap. Ascites was common in CSBP than NSBP. Few patients of NSBP developed ascites after admission and later showed SBP. CSBP had lower BMI in spite of more ascites compared to NSBP. Patients with NSBP had higher bilirubin compared to CSBP. Patients with NSBP had higher amount of alcohol use per day and higher cumulative dose compared to CSBP.

Etiologies for liver cirrhosis are depicted in Table 2. Ethanol was the commonest etiology followed by cryptogenic cirrhosis. Other etiologies were, Hepatitis B virus (HBV) in 8.6% (n = 14), Hepatitis C virus (HCV) in 4.3% (n = 7), Combination of HBV and ethanol in 2.4% (n = 4), Budd chairi syndrome in 3% (n = 5) and others in 4.3% (n = 7). There was no statistically significant difference between CSBP vs NSBP and culture positive vs culture negative with respect to etiology of cirrhosis.

Overall mortality was 59% at six months. Clinical characteristics, laboratory data, risk factors and past history comparing those who survived and died are shown in Table 3. Patients who died were older, had more renal impairment and had worse sensorium than those who survived. Patients who survived presented with fever more often than those who died. Patients who died had more endoscopic interventions, had higher number of patients with edema, encephalopathy, had higher bilirubin, creatinine, higher number of patients with CTP class C and lower serum sodium compared to those who survived. NSBP had significantly higher early mortality (less than one month) compared to CSBP. There was no statistically significant difference in mortality between culture positives and negatives.

Univariate and multivariate logistic regression of predictors of mortality are shown in Table 4. In univariate analysis age, serum sodium, serum creatinine, encephalopathy, bilirubin, NSBP, history of endoscopic procedure and AST predicted mortality. However on multivariate logistic regression age, serum sodium and encephalopathy predicted mortality.

Ascitic fluid positive culture yield was 22.22% (36 patients). Thirty three had SBP (20.37%). Three patients had Monomicrobial bacterascites (1.8%). The type of organisms in CSBP and NSBP are shown in Table 5. *Escherichia coli* was the commonest organism isolated. *S. aureus* or MRSA was not isolated in any of the patients. Culture positivity in CSBP was 22.69% and in NSBP was 19.04% (P = 0.59). No significant difference noted in bacteriological profile of CSBP and NSBP. All patients (n = 3) with Monomicrobial bacterascites were CSBP, however they were excluded from final analysis. Even though small number of culture positives in NSBP and *E. coli* was the commonest organism isolated, 50% isolates were due to gram positives.

Antimicrobial susceptibility of common organisms are depicted in supplement 1. Alfa-hemolytic Streptococci showed 100% sensitivity to penicillin, gentamicin, vancomycin and Teicoplanin. Since the number of culture positives in NSBP group was small, intergroup comparison between CSBP and NSBP with respect to drug susceptibility and resistance was not possible. The resistance pattern of organisms to various drugs as follows. *E. coli* showed 75% resistance to ciprofloxacin, around 50% resistance to third generation cephalosporins. *Klebsiella* showed around