Spontaneous Bacterial Peritonitis, Causes and Antibiotic Usage in Srinagarind Hospital

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Abstract

Spontaneous bacterial peritonitis (SBP) is a common and often fatal complication occurring in cirrhotic patients with ascites. It is defined as an infection of the ascitic fluid in the absence of any obvious intra-abdominal source. This study was a descriptive retrospective study that examined signs and symptoms of SBP, prevalence, result of the culture and antibiotic susceptibility of the organisms and outcome of antibiotic treatment, especially to ampicillin-aminoglycoside Data were collected from inpatient medical records at Srinagarind Hospital between 1993 and 1997. Forty-four patients with 54 episodes of SBP were included in this study. The results revealed that SBP commonly occurred in cirrhotic patients. Presenting symptoms of SBP were fever, abdominal pain and abdominal distension, respectively. Signs of SBP were ascites and rebound abdominal tenderness. Forty-three per cent of ascitic fluid cultures were positive for bacteria. *E.coli* (30.4%), *Streptococcus* spp (26.1%) and *Klebsiella* spp (13.0%) were the most common causes of SBP which were similar to other studies. Ampicillin plus an aminoglycoside were mostly often used in this study; in only 15.8 per cent of patients did the antibiotics need to be changed. Mortality rate in this group was not increased after antibiotic was changed.

Key word : Spontaneous Bacterial Peritonitis, *E.coli*, *Streptococcus* spp, Antibiotic Regimen

LOLEKHA P & CHUNLERTRITH K
J Med Assoc Thai 2001; 84: 995-999

Spontaneous bacterial peritonitis (SBP) is a common and often fatal complication occurring in cirrhotic patients with ascites. Although SBP has been described as occurring in different clinical settings, such as nephrotic syndrome or heart failure, SBP is defined as an infection of the ascitic fluid in the absence of any obvious intra-abdominal source. Gram-negative enteric bacteria and gram-positive cocci cause more than 90 per cent of SBP episodes. *Escherichia coli, Streptococcus* spp *and Klebsiella*

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pneumoniae are the organisms isolated most frequently[1]. Many years ago, the usual treatment for patients with SBP was the combination of ampicillin plus an aminoglycoside[2]. However, patients with SBP are very sensitive to nephrotoxicity associated with the use of aminoglycosides[3]. In recent years, third-generation cephalosporin has become the empiric antibiotic of choice for the treatment of SBP because of lower nephrotoxicity and excellent efficacy[4].

The objective of this study was to determine symptoms and signs, bacteriologic aspects of SBP, antibiotic usage, and outcome during treatment in the Internal Medicine wards in Srinagarind Hospital. This study might be useful for prediction of organisms that cause SBP and selecting the appropriate empirical antibiotic.

MATERIAL AND METHOD

This retrospective study was performed at Srinagarind Hospital in Khon Kaen province. Data were collected from inpatient medical records from January, 1993 to December, 1997. The keyword for searching the data was "peritonitis" in the ICD 10 coding system, then only SBP or primary peritonitis were selected manually. Patients included in this study had to fulfill all three of the following criteria:

(a) Patients who were admitted to Internal Medicine wards between January, 1993 and December, 1997.

(b) Patients who were diagnosed with SBP by the following criteria[1,5]:

(1) ascitic fluid with polymorphonuclear cell count of $\geq 250/mm^3$.

(2) absence of a surgically treatable intraabdominal source of infection.

(c) Patients who had SBP before admission.

Patients with any of the following were excluded from study entry:

(a) received antibiotics before admission.

(b) transferred from other departments.

(c) refused treatment in hospital.

RESULTS

Forty-four patients were included in this study. Each patient had one to three episodes of SBP. So, 54 episodes of SBP were included (38 episodes in men, 16 episodes in women). Mean age was 47.3 years old. Underlying diseases were found in 43 out of 44 patients. Thirty seven patients (84%) had cirrhosis (20 with alcoholic cirrhosis, 10 with hepatitis B viral infection, 4 with hepatitis C viral infection, and 3 with alcoholic cirrhosis plus hepatitis B viral infection.). There were 7 patients in the non-cirrhotic group (2 with SLE, 2 with nephrotic syndrome, 1 patient each with cholangiocarcinoma, portal vein thrombosis and normal host). In the cirrhotic group, there were no patients with Child-Pugh class A, only 7 patients (18.9%) were class B, and 30 patients (81.1%) were class C.

The patients had had symptom of SBP for about 4.8 days before admission. Duration of hospitalization was about 15.5 days. Common presenting symptoms (Table 1) were fever (79.6%), abdominal pain (68.5%), and abdominal distension (46.3%), respectively. Ascites (100%), abdominal tenderness (64.8%) and guarding (22.2%) were the most common physical findings (Table 2). Most patients had anemia (mean hematocrit 28%) and leukocytosis with polymorphonuclear cell predominate (81%). Ascitic fluid polymorphonuclear cell count varied from 250-66,500/mm^3. In thirty episodes (55.5%), organisms were found in Gram stain but only 23 episodes (42.6%) had positive ascitic fluid culture. We found discrepancy between gram

Table 1. Presenting symptoms of SBP.

Symptoms	%
Fever	79.6
Abdominal pain	68.5
Abdominal distension	46.3
Diarrhea	24.1
Altered mental status	22.2
Upper GI bleeding	16.7
Chills	16.7
Nausea/ vomiting	14.8
Malaise	1.9

Table 2. Abdominal signs of SBP.

Signs	%
Ascites	100
Abdominal tenderness	64.8
Abdominal guarding	22.2
Rebound tenderness	24.1
Decreased bowel sound	7.4

Table 3. Organisms isolated from ascitic fluid (23 episodes).

Organisms	Number	%
E. coli	7	30.4
Streptococcus spp	6	26.1
Klebsiella spp	3	13.0
Enterobacter spp	2	8.7
Aeromonas spp	1	4.4
Citrobacter spp	1	4.4
Pseudomonas spp	1	4.4
Plesiomonas spp	1	4.4
Salmonella spp	1	4.4

stain and culture in 11 out of 23 (47.8%) of culture positive cases. So, Gram stain may not be helpful for the prediction of the organisms that caused SBP. *E. coli* (30.4%), *Streptococcus* spp (26.1%), and *Klebsiella* spp (13.0%) were the common organisms which caused SBP (Table 3). Most of the organisms were susceptible to ampicillin plus aminoglycoside (Table 4).

For the treatment of SBP, we divided the patients into 3 groups. The first group got ampicillin plus an aminoglycoside, the second group got third-generation cephalosporin with/without other drugs and the third group got betalactam-betalactamase inhibitor with/without other drugs. Most patients were in the first group (38 of 54 episodes (70.4%)). Nineteen of 38 episodes (50%) continued with intravenous ampicillin plus aminoglycoside until the course of treatment was completed. In twelve of 38 episodes (31.6%), antibiotics were changed to narrower spectrum and cheaper drugs such as ampicillin or aminoglycoside only or changed to an oral regimen, such as amoxicillin. In only 6 of 38 episodes (15.8%) were the antibiotics changed to a higher spectrum according to the results of culture and susceptibility testing. One patient in this group died from *Klebsiella* infection. Of the remaining 5, 2 were treated with cefazolin, 1 patient each was treated with co-trimoxazole plus amikacin, vancomycin plus aztreonam and pefloxacin. The mortality rate in the ampicillin plus aminoglycoside group was 1 of 38 episodes (2.6%).

Patients in the second and third group had higher morbidity and mortality than the first group even though they received a broader spectrum antibiotic than the first group. We might not be able to interpret this finding because the number of patients in the second and third group was small.

DISCUSSION

This study was a descriptive retrospective study so some of the data was incomplete. This study showed that SBP was a common finding in cirrhotic patients[6]. All of them were in Child-Pugh class B and C. Presenting symptoms of SBP were fever, abdominal pain and abdominal distension, respectively. Signs of SBP were ascites, abdominal tenderness and rebound tenderness, respectively. This study found symptoms and signs of SBP more often than in other western studies, [5,9-11] which might be because many of the patients in this study came to the hospital late (4.8 days). Twenty-three episodes (42.6%) had positive ascitic fluid culture by conventional technique similar to other studies (< 50%) that used this technique[7]. In recent years, ascites have been inoculated into blood-culture

Table 4. Susceptibility pattern of the pathogens.

Organism	Antibiotic				
	Ampicillin	Cephalotin	Gentamicin	Amikacin	Netilmicin
E. coli	4/7*	5/7	7/7	7/7	6/7
Streptococcus spp	5/6	4/6	3/6		1/6
Klebsiella spp		3/3	3/3	3/3	3/3
Enterobacter spp			1/2	1/2	1/2
Citrobacter spp			1/1	1/1	1/1
Aeromonas spp		1/1	1/1	1/1	1/1
Plesiomonas spp	1/1	1/1	1/1	1/1	1/1
Pseudomonas spp		1/1	1/1	1/1	1/1
Salmonella spp	1/1	1/1	1/1	1/1	1/1

* Number of cases susceptible to antibiotics / Total number of cases

bottles at the bedside. This technique yielded bacterial growth in about 80 per cent of episodes of neutrocytic ascites[7,12,13]. *E.coli* (30.4%), *Streptococci* (26.1%) and *Klebsiella* (13.0%) were common causes of SBP in this study. The pathogens isolated were very similar to those of previous reports[5,10,14]. In thirty episodes (55.5%), organisms were found in Gram stain but only 23 episodes (42.6%) had positive ascitic fluid culture. We found discrepancies between gram stain and culture in 11 out of 23 (47.8%) of culture positive cases. So, Gram stain may not be helpful for prediction of the organisms that cause SBP[1]. However, Gram stain may be useful in excluding secondary peritonitis if we find mixed organisms in ascitic fluid[5]. It is important to differentiate SBP and secondary peritonitis because the first order of treatment is medication but the second order is surgery. Ampicillin plus an aminoglycoside were mostly used in this study and the outcome in this group was satisfactory. In only 6 of 38 episodes (15.8%) did the antibiotics have to be changed to a higher spectrum according to the results of culture and susceptibility testing. Other studies showed that the mortality rate of SBP varied from below 5 per cent[8] to 90 per cent[15,16]. There was a high mortality rate if the patients had many complications such as hyperbilirubinemia[16], renal insufficiency[15,16], decompensated cirrhosis or encephalopathy[15], etc. This study found that the mortality rate in ampicillin plus an aminoglycoside for empirical treatment was very low (2.6%) when compared with other studies[8].

Based on this study, ampicillin plus an aminoglycoside appears to be excellent for empiric as well as definitive treatment of SBP. This regimen did not delay the outcome and did not increase the mortality rate after susceptibility testing results were available.

(Received for publication on May 18, 2000)

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เชื้อก่อโรคและการเลือกใช้ยาต้านจุลชีพ ในการรักษาภาวะเยื่อบุช่องท้องอักเสบชนิดปฐมภูมิ ในผู้ป่วยอายุรกรรม โรงพยาบาลศรีนครินทร์

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ภาวะเยื่อบุช่องท้องอักเสบชนิดปฐมภูมิ เป็นภาวะการติดเชื้อของเยื่อบุช่องท้องโดยปราศจากแหล่งของสาเหตุที่ชัดเจน และไม่มีสาเหตุทางศัลยกรรม พบได้บ่อยในผู้ป่วยที่มีน้ำในช่องท้องโดยเฉพาะผู้ป่วยโรคตับแข็ง ในการศึกษานี้เป็นการศึกษาเชิงพรรณนาโดยการเก็บรวบรวมข้อมูลย้อนหลังจากการค้นประวัติเก่าของผู้ป่วยโรงพยาบาลศรีนครินทร์ มหาวิทยาลัยขอนแก่น ตั้งแต่ปี พ.ศ. 2536 – 2540 เพื่อศึกษาลักษณะทางคลินิกของผู้ป่วยที่มีภาวะเยื่อบุช่องท้องอักเสบชนิดปฐมภูมิ รวมทั้งความชุกและความไวของเชื้อที่เป็นสาเหตุต่อยาต้านจุลชีพที่เลือกใช้ และผลของการรักษาโดยเฉพาะกลุ่มผู้ป่วยที่ได้รับยา ampicillin ร่วมกับ aminoglycoside ผลการศึกษาได้ข้อมูลผู้ป่วยทั้งหมด 44 ราย มีการติดเชื้อรวมทั้งสิ้น 54 ครั้ง ผู้ป่วยส่วนใหญ่ในการศึกษานี้เป็นผู้ป่วยชายที่มีโรคตับแข็ง อาการนำที่พบได้บ่อยคือ ไข้ ปวดท้องและท้องโตขึ้นตามลำดับ ส่วนอาการแสดงที่พบบ่อยได้แก่ การตรวจพบน้ำในช่องท้องและกดเจ็บบริเวณท้อง ผลการเจาะตรวจน้ำจากช่องท้องพบเชื้อคิดเป็น 42.6% และเชื้อที่เป็นสาเหตุได้แก่ *E. coli* (30.4%), *Streptococcus* spp (26.1%), และ *Klebseilla* spp (13.0%) ตามลำดับ ยาต้านจุลชีพที่เลือกใช้ในการรักษามากสุดคือ ampicillin ร่วมกับ aminoglycoside (70.4%) ผู้ป่วยกลุ่มนี้ พบว่าผลการรักษาค่อนข้างดีโดยสามารถให้ยาต่อหรือเปลี่ยนเป็นยารับประทานกลุ่มเดิมถึง 84.2% มีเพียง 15.8% ที่ต้องเปลี่ยนยาต้านจุลชีพตามผลการเพาะเชื้อโดยที่ผลหลังการเปลี่ยนการรักษามีอัตราการเสียชีวิตเพียง 2.6% ซึ่งเมื่อเทียบกับการศึกษาอื่นที่ผ่านมาไม่ได้ทำให้อัตราการเสียชีวิตเพิ่มขึ้นแต่อย่างใด

คำสำคัญ : ภาวะเยื่อบุช่องท้องอักเสบชนิดปฐมภูมิ, เชื้อก่อโรค, ยาต้านจุลชีพ

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