**Spontaneous bacterial peritonitis in cirrhotic patients - case report**

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**Abstract:** Spontaneous bacterial peritonitis (SBP) is one the most common and life-threatening complication of cirrhosis. It occurs in 10% to 30% of patients admitted to hospital and recent studies tend to demonstrate that SBP incidence seems to be decreasing in its frequency; the prompt diagnosis of SBP is the key factor for reduction observed in mortality rates in recent years. The clinical diagnosis of SBP is neither sensitive nor specific. Patients at risk of developing SBP can be categorized in three groups: (1) patients with active variceal bleeding; (2) patients with ascitic fluid protein <10.0 g%; and (3) those with a prior episode of SBP. We report the case of a 60-year-old woman, who after intervention and therapy died.

**Key words:** spontaneous bacterial peritonitis, pathophysiology, case death

The term spontaneous bacterial peritonitis (SBP) was coined by Conn in 1971 (1) to describe the infection of ascitic fluid in the absence of any intra-abdominal, surgically treated source of infection. Runyon (2) describe the many unnecessary and “mysterious” death in the past, before this common infection gained a place in the diagnostic algorithm of the deteriorating, confused patient with ascites.

Spontaneous bacterial peritonitis (SBP) is defined as an infection of ascitic fluid without a contiguous source of intra-abdominal infection (e.g. intra-abdominal abscesses, intestinal perforation) and in the absence of intra-abdominal focus of inflammation, cholecystitis or acute pancreatitis (3). SBP is one of the most frequent and life-threatening complications of patients with cirrhosis (4). Mortality rates have stayed constant in spite of the development of new antibiotic treatments and early diagnosis of SBP infection (3). Recent British Society of Gastroenterology (BSG) guidelines on the management of ascites cirrhosis (5), highlight the effect of early diagnosis and prompt treatment with the reduction of in-hospital mortality from 90% to less than 20% (6).

Bacterial translocation in the “passage” of bacteria from the lumen to the mesenteric lymph nodes and thereafter to the blood stream and other extra-intestinal sites (7). It is considered to be the key step in the pathogenesis of SBP (8,9). Both humans and animals have duplicative mechanisms for protection from bacteria; therefore, intestinal bacterial translocation represents failure of a group of elaborate defensive factors to contain bacteria within the bowel (2).
Bacterial overgrowth is associated with impairment of the intestinal barrier (probably a consequence of vascular stasis due to portal hypertension), alterations of local immune defenses, slow motility of the bowel in patients with cirrhosis and reduced opsonic activity (hence decreased reticulo-endothelial system activity) precede the episodes of bacterial translocation (10,11,12).

More recently detection of translocation of bacterial products, such as lipopolysaccharides (LPS) from Gram-negative bacteria and peptidoglycans/lipoproteides from Gram-positive bacteria together with bacterial DNA, through the intestinal wall has been associated with production of many cytokines (13). High-levels of TNF-α (tumor necrosis factor-α), IL-6 (interleukin-6) and IL-1 (interleukin-1) in patients with cirrhosis cause over-activation of the sepsis syndrome pathways, leading eventually to renal failure and shock with reduced chances for survival (14,15).

The disturbance in small intestinal motility and the presence of hypochlorhydria has been demonstrated to occur in cirrhotic patients and seems to be responsible for the bacterial overgrowth commonly observed in these patients (16). The actual role of intestinal overgrowth in the pathogenesis of SBP has not yet been settled (4). Chang et al.(17) demonstrated that the prevalence of bacterial overgrowth was higher in patients with a history of SBP associated to disturbances in small intestinal mortality. On the other hand, Bauer et al. (16) were not able to confirm this hypothesis in their investigation.

These bacteria are translocated through the intestinal wall, which has its permeability altered by the portal hypertension (4); in consequence they reach the mesenteric lymph nodes. After that, they move to the systemic circulation until they contact the ascitic fluid. Other sites than gut have been demonstrated to originate bacteria seeding. These could be represented by pneumococcal sepsis, cellulitis, urinary tract and dental infections (17,18).

Case report
A 60-year-old woman presented a symptomatology of abdominal pain, meteorism, dyspnea, nausea, fatigue. The patient was hospitalized in Surgical Clinic of Tg. Mureș with the diagnosis of intestinal sub occlusion, post-surgery gigant eventration, chronic hepatitis, diffuse peritonitis, in February 23, 2009. Her medical history recorded a cholecystectomy (1979); diabetes mellitus type II insulin-dependent (1999). Upon admission the body temperature was 37°C, urinary flux 700ml/day. Laboratory examinations: Hgb 8.4g%, leukocyte count 25860/ml, Ht 29%, Na+ 139 mmol/L, K+ 5.5mmol/L (normal: 3.3-4.7mmol/L), T. Quick 27.1 (39.1%), APTT 23.3, platelet count 357000/ml, glycemia: 258mg%, BUN: 144mg%, creatinine: 2.33mg%.

A surgical intervention was performed the second day of admission for the cure of the eventration. Post operative therapy consisted in hydro-electrolytic and acido-basic reequilibration, positive inotropic support, antialgics, antibiotics, insulin, diuretics. The post intervention evolution was marked by a progressive bradicardia with iresuscitable asystole.

The forensic autopsy (nr.120/2009, ILM Tg. Mureș) revealed the presence of acute pulmonary edema, acute brain edema, dilative cardiopathy (heart weight 430g), coronary atherosclerosis with IIIrd degree stenosis and with vascular calcification, peritonitis (fig. 1, 2) (E. coli), hepatomegaly (3000g), cirrhosis of liver with IVth degree fatty degeneration (fig.3) splenomegaly (610g) and pancreatic fibrosis.
Discussions

The relevance of infections in cirrhotic patients has been demonstrated since 30-50% of patients have one type of infectious complication when admitted to hospital and 15-35% develop infections after being in hospital (19).

Spontaneous bacterial peritonitis (SBP) reported by Caroli and Platteborse in 1958 (20), has had its importance increased since. Kerr et al.(21) described 11 episodes of ascitic fluid infection in 9 cirrhotic patients while Conn (1) introduced the term ‘spontaneous bacterial peritonitis’ for the first time in English literature.

The most common symptoms and signs in patients with SBP are pyrexia, increased confusion, diffuse abdominal pain, vomiting and reduced urine output or ileus (15).

However, signs of sepsis in patients with SBP may be masked because patients with cirrhosis have characteristics which make recognition of sepsis difficult (5) – namely, reduced polymorphonuclear leukocyte (PMNL) count due to hypersplenism, elevated baseline heart rate due to the hyperdynamic circulation, baseline hyperventilation due to hepatic encephalopathy, and blunted elevation of body temperature (14).

Therefore, a high index of suspicion is necessary in order to avoid diagnostic pitfalls, especially since the mortality rate of untreated

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Fig. 1 Peritonitis (Htp.nr. 21618/2009; col. HE x100)

Fig. 2 Peritonitis (Htp.nr. 21618/2009; col. HE x100)

Fig. 3 Cirrhosis (Hpt.nr.21615/2009; col. HE x40)

patients approaches 50% (15,22).
The spontaneous bacterial peritonitis (SBP) variants are:

- **bacterascites** (monomicrobial non-neutrocytic bacterascites) is the term used to describe the colonization of ascites fluid by bacteria, in the absence of inflammatory reaction in the bacterial fluid (23). By definition, the PMNL (polymorphonuclear leukocyte) count in \(<250 \text{ mm}^3\) and the culture positive while the patient may present with symptoms and signs of infection. The natural course of bacterascitis, if untreated, is variable. As the diagnosis of bacterascites made 2-3 days after initial paracentesis (the time necessary for culture growth), a repeat ‘tap’ is recommended on day 3. If the second sample has a PMNL count \(>250 \text{ mm}^3\), treat as for SBP. If the PMNL count is \(<250 \text{ mm}^3\) and a second set of cultures is positive, treat as for SBP. If the PMNL count is \(<250 \text{ mm}^3\) and the second set of cultures is negative, no further action is recommended (23);

- **culture negative neutrocytic ascites** (CNNA) is the term used to describe the clinical situation when the ascitic PMNL count is \(>250 \text{ mm}^3\) but cultures fail to grow any bacteria. It is considered to represent the expected 20% fail rate of culture to isolate the microorganism and it requires antibiotic treatment as if it were SBP. However, the term is now considered obsolete;

- **secondary peritonitis**. The vast majority of patients with ascites present with SBP and not with the secondary bacterial variant. It is useful to differentiate the two conditions, especially when one is faced with non-responders to antibiotic treatment, as secondary peritonitis rarely resolves without surgical treatment (24). It seems reasonable to think of the secondary form of peritonitis in the presence of a very high PMNL count when (14,23): (a) there is a lack of response to antibiotic treatment, (b) cultures grow two or more microorganisms, (c) two of following three findings of ascites fluid are present: glucose \(<50\text{mg}\% (278\text{mmol/L}), \text{protein } >10.0\text{g}\%, and lactate dehydrogenase values exceed normal serum levels.

SBP is a serious complication in patients with cirrhosis with high mortality rates (20-40\%) (15). Patients at risk of developing SBP can be categorized in three groups: (1) patients with active variceal bleeding; (2) patients with ascitic fluid protein \(<10.0\text{g}\%\) and (3) those with a prior episode of SBP (23). These patients are the targets for antibiotic prophylaxis (primary or secondary) with antibiotic administration. Newer quinolones are the prophylactic antibiotics of choice because they not only eliminate aerobic Gram-negative bacteria from the intestinal flora but also appear to have immunoregulatory capabilities by stimulating bactericidal capacity of polymorphonuclear cells and decreasing bacterial adhesion to mucosal surface (24).

All patients with cirrhosis (with and without ascites) and variceal bleeding are at high risk of developing SBP. In this acute setting several trials have demonstrated the effectiveness of short-term (7-14 days) prophylactic antibiotic administration in the prevention of SBP (25,26,27,28).

Patients with cirrhosis who survive an episode of SBP have a 40-70\% risk of relapse in the following 12 months (14). Selection of antibiotic-resistant bacteria is a worrying issue attributed to prolonged antibiotic administration. Non-antibiotic SBP prophylaxis has been tried through administration of lactobacilli (with or without antioxidants) (29,30) prokinetic agents such cisapride (31,32) and non-selective β–blockers (propranolol) (33,34) with variable results.
References