

Review

Low Prevalence of Spontaneous Bacterial Peritonitis in Ambulatory Asymptomatic Cirrhotic Patients: Consequences in Patients' Care

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Abstract

The literature on the prevalence of spontaneous bacterial peritonitis (SBP) in cirrhotic outpatients who visited the hospital for therapeutic abdominal paracentesis was reviewed in order to assess the usefulness of urinary strips in this setting. The authors reviewed the studies published as peer-reviewed articles on the prevalence of SBP in ambulatory outpatients who visited the hospital for therapeutic paracentesis. Five such studies were available in the literature. It was found that the prevalence of SBP was in the range of 0%–3.5%. In regard to the use of reagent strips, Multistix8 SG is not useful in this setting, while the PeriscreenTM strip is a consistent screening tool for the rapid detection of SBP, particularly in the outpatients' setting (negative predictive value: 99.4%–100%). In asymptomatic cirrhotic outpatients undergoing a large volume of paracentesis with low risks of infection, the prevalence of spontaneous bacterial peritonitis is low. In this setting, a systematic analysis of ascitic fluid could be avoided. The use of reagent strips may serve as an alternative. Among the reagent strips tested so far, the PeriscreenTM strip has exhibited the highest diagnostic performance with a high negative predictive value.



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Keywords

Liver cirrhosis/complications; ascites/complications; ascitic fluid; bacterial infections/complications; paracentesis/methods; peritonitis/complications; urinary strips

1. Introduction

Abdominal paracentesis (AP) is a treatment method for patients with ascites who are resistant, intolerant, or refractory to medical treatment [1]. Several cirrhotic patients with ascites are regularly hospitalized for AP. According to the good clinical practice guidelines by the American Association for the Study of Liver Diseases (AASLD) [2], an ascitic fluid analysis should always be performed to search for two potential complications – bacterial peritonitis and neutrocytic ascites [3, 4]. The usefulness of this approach has been clearly established in the inpatients, although it remains debatable in the case of outpatients. It has been demonstrated in several retrospective and prospective studies that spontaneous bacterial peritonitis (SBP) is quite rare in outpatients [5-9]. The differences between inpatients and outpatients in terms of severity of liver disease might explain this lower prevalence of SBP in the outpatients. However, a limited number of studies have been conducted to elucidate these differences. The application of urinary strips for the diagnosis of spontaneous bacterial peritonitis (SBP) has been evaluated in several studies [10]. However, due to the low sensitivity of most of the strips, their use could not be recommended. Recently, it was demonstrated that a novel strip named the Periscreen strip was efficient in excluding SBP in the outpatient setting [11]. The present review focuses on the rarity of SBP in ambulatory outpatients and on the application of urinary strips for avoiding time consuming and expensive systematic bacteriological analyses.

2. Literature Analysis

A double-blind search of studies published in Medline until July, 2019 on the topic of prevalence and the associated factors of spontaneous bacterial peritonitis in asymptomatic outpatients having therapeutic paracenteses was performed using the following keywords: ascites, spontaneous bacterial peritonitis, outpatient procedures, asymptomatic patients, cirrhosis, and urinary reagent strips. Six studies, including those conducted on cirrhotic outpatients, have been published as full papers on this topic [5-9, 11]. One of these studies was an ancillary study [9] of the multicenter study that aimed at evaluating the reagent strip Multistix as a diagnostic tool for SBP [12]. The patients were eligible for inclusion on the basis of whether they did or did not present any signs of SBP according to the criteria defined by Jeffries et al. and Romney et al. [5, 7], which were as follows: a temperature above 38 °C or below 36.5 °C, chills, abdominal tenderness suggestive of peritonitis, developing or worsening hepatic encephalopathy, gastro-intestinal bleeding during the last 15 days, acute renal failure (defined by an increase in the serum creatinine levels reaching a value greater than 133 µmol/L), and arterial hypotension (systolic arterial pressure falling below 80 mmHg). These signs that were suggestive of an ongoing infection were carefully searched for, at the time of admission, by a senior physician. The exclusion criteria were: chylous ascites and ascites not associated with portal hypertension (i.e.,

pancreatic ascites, peritoneal tuberculosis, and peritoneal carcinomatosis). The patients with hemoperitoneum complicating the hepatocellular carcinoma were also excluded.

In the published series, the ascitic fluid parameters that were examined at the time of paracentesis included white blood cell counts, polymorphonuclear leukocytes counts/ μL , total protein concentration, and bacteriology. Moreover, bacterial cultures were obtained through bedside inoculation of ascitic fluid into aerobic and anaerobic bottles.

The prevalence of SBP was in the range of 0%–3.5%, according to the six studies, including several cases of paracenteses ranging from 118 to 976 (Table 1).

Table 2 presents the diagnostic performance of reagent strips in a large series of cirrhotic inpatients [12] or outpatients [11, 12] undergoing paracentesis. The diagnostic performance of Periscreen strip in cirrhotic outpatients was good, with negative predictive values of 100% (95% CI: 99.0–100) and 99.4% (95% CI: 98.5–99.8) using “Trace” and “Small” thresholds, respectively.

Table 1 Prevalence of spontaneous bacterial peritonitis in asymptomatic cirrhotic outpatients as reported in published articles.

Study, first author [Ref.]	Number of patients	Number of paracenteses	Prevalence of spontaneous bacterial peritonitis n (%)
Jeffries [5]	29	118	0 (0)
Evans [6]	427	427	15 (3.5)
Romney [7]	67	270	0 (0)
Castellote [8]	40	204	1 (0.5)
Nousbaum [12]	355	976	12 (1.2)
Thévenot [11]	315	803	12 (1.5)

Table 2 Diagnostic performances of urinary strips for the diagnosis of SBP in cirrhotic patients.

Study, first author [ref.]	Number of paracenteses	Number of SBP Reagent strip	Se % (95%CI)	Sp % (95%CI)	PPV % (95%CI)	NPV % (95%CI)
Nousbaum et al. [12]	2123	117 Multistix 8 SG	45.3 (36.6-54.3)	99.2 (98.8-99.6)	77.9 (68.1-87.8)	96.9 (96.1-97.6)
Thevenot et al. [11]	803	17 Periscreen “Trace” threshold	100 (81.6-100)	53.5 (50.0-57.0)	4.5 (3.0-6.0)	100 (99.0-100)
		Periscreen “Small” threshold	76.5 (50.1-93.2)	87.3 (84.7-89.5)	11.6 (6.3-19.0)	99.4 (98.5-99.8)

3. Discussion

The prevalence of SBP in asymptomatic outpatients is in the range of 0%–3.5% in the outpatients considered to be asymptomatic [5-7]. Runyon reported a prevalence of 2% for SBP in a series of 400 paracenteses performed within a duration of two years in an outpatient setting [2]. In a retrospective study conducted on cirrhotic outpatients, Evans et al. [6] analyzed 427 exploratory paracenteses performed over a period of 6 years. The exclusion criteria in that study were similar to those used in the study by Jeffries et al. [5]. Evans et al. reported a prevalence of 1.4% for SBP and 2.1% for neutrocytic ascites [6]. No case of SBP was reported in a prospective multicenter study, which included 270 paracenteses performed in 67 outpatients [7]. In a more recent study performed by Castellote et al., the prevalence of SBP was 0.5% [8]. A large-scale study, including 976 paracenteses in outpatients [9] reported a prevalence of 1.2% for SBP. The prevalence of SBP in asymptomatic outpatients was less than 1.5% in a large series [12], while it was greater than 8% in the symptomatic outpatients. On the contrary, in the series by Thevenot et al. on the usefulness of Periscreen TM® strip [11], the prevalence of SBP in outpatients was significantly lower than that in the inpatients (2.1% vs. 11.2%; $p < 0.001$). Differences in the SBP prevalence between inpatients and outpatients were elucidated in a study conducted by Cadranel et al. [9], who reported that in the inpatients, the cause of cirrhosis was more frequently alcohol-related, the Child-Pugh score was higher and more often C than B, the platelet count was lower, and the serum total bilirubin concentration was higher. In addition, the ascitic protein concentration was relatively lower in the inpatients [9]. The patients with low ascitic protein concentration and the cirrhotic patients with gastro-intestinal bleeding leading to antibiotic prophylaxis exhibit increased incidence of SBP [13, 14]. It has also been demonstrated that cirrhotic patients with hyponatremia or renal failure are at a higher risk of SBP [14-16].

In this group of patients, according to the criteria provided by Jeffries et al., the low prevalence of ascites liquid infection, a systematic cyto-bacteriological analysis may not be necessary.

In this context, the alternative would be an analysis of the ascitic fluid using reagent strips, provided that the negative predictive value is high. The studies conducted to date have demonstrated low sensitivity and a low positive predictive value in the case of Multitix, Combur, Nephur, or UriScan test strips [10, 12] (Table 2). The Periscreen strip exhibited good diagnostic performance with a high negative predictive value, at the levels of “trace” threshold as well as the “small” threshold [11] (Table 2).

In conclusion, the study of asymptomatic cirrhotic outpatients undergoing large volumes of paracentesis with low risks of infection revealed a low prevalence of spontaneous bacterial peritonitis, which could be explained by the relatively lower frequency of the risk factors for SBP in this group of patients.

A systematic analysis of ascitic fluid could be avoided in this setting, and the use of reagent strips might serve as an alternative. Among the reagent strips tested to date, the PeriscreenTM strip has exhibited the highest diagnostic performances with a high negative predictive value, and could, therefore, be useful in this setting, even though this argument is based on a single study only. Further studies are required to be conducted to confirm the value of the afore-stated strip.

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Author Contributions

JF Cadranel and JB Nousbaum wrote the manuscript.

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Competing interests

The authors have declared that no competing interests exist.

Additional Materials

Abbreviations:

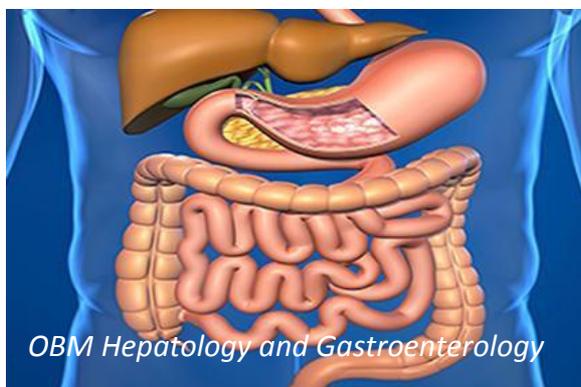
SBP: spontaneous bacterial peritonitis

AP: abdominal paracentesis

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