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Original Article

Internal Medicine Section

Efficacy of Ascitic Fluid Dipstick Leukocyte Esterase Activity in Early Diagnosis of Spontaneous Bacterial Peritonitis

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ABSTRACT

Introduction: Spontaneously occurring ascitic fluid infections {Spontaneous Bacterial Peritonitis (SBP)} are the most common and recurring complications in patients with decompensated cirrhosis with ascitis. Unlike other infections, ascitic fluid infections usually present with non specific symptoms and may be asymptomatic in a large number of patients. They not only accelerate hepatic decompensation, but may also lead to, or exacerbate other complications like hepatic encephalopathy, hematemesis, renal failure and death. The existing protocol of diagnosis of SBP includes ascitic fluid total and differential leukocyte counts, and ascitic fluid cultures, by inoculating the ascitic fluid in blood culture vials, which are not only cumbersome, but also costly, time consuming and cannot be followed in all patients presenting for outpatient treatment for therapeutic peracentesis.

Aim: To evaluate the efficacy of testing ascitic fluid pH, protein and Leucocyte Esterase (LERS) activity, by using Siemens Multistix 10SG Reagent Strips (SMRS) for early screening of patients for SBP.

Materials and Methods: The observational study was conducted at SGRR Institute of Medical and Health Sciences Dehradun, Uttarakhand, India, from January 2018 to March 2019. The study included 329 patients with cirrhosis and ascites presenting in either the Outpatient Department (OPD) or Emergency Room for therapeutic paracentesis or with cirrhotic complications were evaluated for SBP using SMRS for ascitic fluid pH, Leukocyte Esterase (LERS) activity and ascitic fluid protein, for early detection of SBP. The standard diagnostic criteria i.e., ascitic fluid Polymorphonuclear Counts (PNM) more than 250 cells/mm^3, by Chamber Counting Method or positive ascitic fluid culture after 48 hours incubation were used as gold standard for diagnosis of SBP. Chi-square test was applied to find out significant association between independent and dependent variables. A p-value of <0.05 was considered significant.

Results: Among total 329 patients with cirrhotic ascitic, 81 were diagnosed to have SBP. At a cut-off of 2+, SMRS correctly detected SBP in 77/81 patients, was negative in 4/81 patients and falsely positive in 7/248 NSBP patients, thereby having a sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) of 95%, 97.33%, 98.96% and 96.69%. At a cut-off of 3+, SMRS was able to detect SBP in 53/81 patients, and was falsely positive in 1/248 patients, thereby, although decreasing the sensitivity to 64%, but improving the specificity and PPV to 99.6% and 98.11%, respectively.

Conclusion: During diagnostic paracentesis, ascitic fluid LERS activity using SMRS are highly sensitive markers for early detection of SBP, especially in the presence of fever, vomiting and shock.

Keywords: Ascites, Cirrhosis, Polymorphonuclear, Siemens Multistix 10SG reagent strips

INTRODUCTION

The development of ascites is an important landmark in the natural history of cirrhosis [1,2]. Ascites is invariably the first complication to occur and mark decompensation of liver cirrhosis [2,3]. Bacterial infections are common and recurring complication of cirrhosis, and associate with poor outcome [3]. The most common infection in cirrhotic patients is SBP (25%), followed by urinary tract infection (20%), Pneumonia (15%), bacteremia (12%) and cellulitis (2-11%) [4].

SBP patients usually present to the clinician with non specific features like abdominal pain, fever, diarrhoea, paralytic ileus, vomiting, altered sensorium, upper gastrointestinal bleed, hypotension, hypothermia, respiratory distress, coma or sudden worsening of ongoing features of advanced cirrhosis [5]. However, in upto 10% to 30% patients with SBP remain asymptomatic, and hence diagnosis of SBP without evaluation of the ascitic fluid is inadequate.

Present day diagnosis of SBP is made by diagnostic paracentesis, where a positive ascitic fluid culture with an elevated ascitic fluid absolute Polymorphonuclear leukocyte (PMN) cell count (atleast 250 cells/mm^3) with no evidence of an intra-abdominal surgically treatable source of infections [1]. Reported incidence of SBP in ascitic patients is upto 30% [1]. Altered host immune system and translocation of the bacteria from the gut into the ascitic fluid is thought to be the mode of infection, and the most common organisms are enteric pathogens, most common being *Escherichia coli*, which is present in about 70% of SBP patients [1].

The probability of developing SBP in decompensated cirrhotics is approximately 10% per year. However, recurrence of SBP after the 1st episode is as high as 70% every year [2,3]. Earlier literature describes high rates of mortality in SBP. However early diagnosis and aggressive management, have results in declining mortality. Currently the rate of in hospital mortality has been describes as 30% to 50% [1].

Even though, early diagnosis is the key to successful management of SBP, the existing protocol of diagnosis of SBP includes ascitic fluid total and differential leukocyte counts, and ascitic fluid cultures, by inoculating the ascitic fluid in blood culture vials. Although, automated counters are now being used in many laboratories, manual counting method (Improved Neubauer Chamber and light microscopy), is still the most prevalent method in most hospitals and laboratories. The transportation of fluid, processing and reporting is time consuming, technically challenging, and reports are often available after several hours. The culture reports are invariably

availably only after 48 hours only. Automated cell counters although have shown promising results, but their availability and cost are the major limitations [6].

Efforts are being made in recent years to develop tests for a rapid and accurate diagnosis of SBP, a test that can be performed bedside at the time of paracentesis and has a high sensitivity and low false positive rates. Earlier studies, focusing on the use of various ascitic fluid and serum biomarkers for rapid diagnosis of SBP have their own limitations like cost, availability, interpretation, technical challenges etc., [7]. Reagent strips have gained importance, as they have been proposed to achieve a "rapid" bedside diagnosis of SBP with good accuracy and are reasonably cost effective. Several studies have evaluated the utility of reagent strips activity for the screening and diagnosis of SBP [8-11]. Although, they have shown promising results, but these studies are few and needs to be performed in large groups of patients to validate their usefulness. The present study was performed to evaluate the usefulness of ascitic fluid pH, protein and leukocyte esterase activity, by using reagent strips for screening of SBP in cirrhotics with ascites.

MATERIALS AND METHODS

The observational study was conducted at SGRR Institute of Medical and Health Sciences Dehradun, Uttarakhand, India, from January 2018 to March 2019. The study was previously approved by the Institutional Ethics Committee vide letter No. SGRR/IEC/26/18 on 28th May 2018. An informed consent was taken from all the patients included in the study after explaining them the whole procedure.

The study population included all patients who were either newly diagnosed with liver cirrhosis and ascites or had previously been diagnosed to have cirrhosis and ascites, and on treatment and presented in the Outpatient Department (OPD) or Emergency Room for therapeutic paracentesis or any complication of liver cirrhosis, and fulfilled inclusion criteria.

A total of 483 patients with ascites were analysed, of which 349 patients were diagnosed to have cirrhotic ascites. A total of 134 patients having other causes for ascites, like tuberculous ascetis, malignancy related ascitic etc., were excluded. Of these 349 patients, with liver cirrhosis and ascetis, 20 patients were excluded from the final analysis, as 17 had haemorrhagic ascites, two patients presenting with hematemesis in ER and died within two hours after presentation and one patient was later noted to have obstructed inguinal hernia. Thus, 329 patients were finally analysed.

Inclusion criteria: a) SBP Group: Liver cirrhosis, diagnosed either by clinical, biochemical, radiological or histo-pathological evidence. Presence of high Serum Ascitic Albumin Gradient (SAAG) ascites and ascitic fluid PMN >=250 cells/mm^3, by Chamber Counting Method or positive ascitic fluid culture within 48 hours incubation, were included in SBP group.

b) 2.2 Non-SBP group: Liver cirrhosis, diagnosed either by clinical, biochemical, radiological or histopathological evidence with presence of high SAAG ascites but ascitic fluid PMN less than 250 cells/mm^3, by 'Chamber Counting Method' and a negative ascitic fluid culture after 48 hours incubation.

Exclusion criteria: Patients with age <18 years, history of any abdominal surgery within three months of study entry, antibiotic history within seven days of presentation, or hospitalisation within last 30 days, high SAAG ascites due to hepatic infiltration (liver metastasis/hepatocellular carcinoma), ascites due to other cause (gestrointestinal malignancy, congestive cardiac failure, chronic renal failure, pancreatic ascites or tuberculous ascites), patients with evidence of secondary bacterial peritonitis, total ascitic fluid drained less than 100 mL were excluded from the study.

Procedure

At the time of presentation, a detailed history and examination was taken as per the study protocol. Diagnostic paracentesis was performed bedside. Ultrasound probe was used for guidance, wherever necessary. The fluid was collected in two 100 mL sterile containers. At the same time bedside inoculation of blood culture bottle with 5 mL of ascitic fluid was done for culture and sensitivity.

Therapeutic/large volume peracentesis was performed, wherever required depending upon patients symptoms. The first container was used to determine the physical appearance of ascitic fluid and bedside examination of the ascitic fluid using SMRS. The reagent strip was immediately immersed in the container containing the ascitic fluid, and compared with the charts given on the container, as per manufacturer's guidelines, for identification of ascitic fluid pH, protein and leukocyte esterase. The results were recorded in the data sheet immediately.

The second container was sent for laboratory evaluation of ascitic fluid parameters including Total Leukocyte Count (TLC), Polymorphonuclear leukocytes (PMNs) count, protein, albumin and glucose levels. Other blood investigations including complete blood counts, liver and renal function tests were also done at the time of parecentesis.

The strips are commercially available. The principal of each variable i.e., pH, protein estimation and leukocyte elastase activity is clearly mentioned and the procedure details are clearly mentioned in the package insert available with the container. The manufacturer's guidelines were strictly followed during the study.

STATISTICAL ANALYSIS

Data entry was done using Microsoft Excel 2011 and analysis was carried out by using Statistical Package for the Social Sciences (SPSS) version 23.0. Chi-square test was applied to find out significant association between independent and dependent variables. A p-value of <0.05 was considered significant.

RESULTS

Among these 329 patients with cirrhotic ascitic, 81 were diagnosed to have SBP as per the gold standard for diagnosis of SBP, i.e., ascitic fluid PNM more than 250 cells/mm^3, by chamber counting method or positive ascitic fluid culture after 48 hours incubation. A total of 248 patients did not have SBP.

Of the 81 patients in SBP group, 53 were males and 28 were females. In the NSBP group, there were 159 males and 89 females (p-value=0.93). The mean age of patients in the SBP group and NSBP group were 49.49±15.88 years and 52.31±12.04 years, respectively. There was no significant difference in age among both the groups (p-value=0.87).

Patients with SBP were significantly more likely to present with fever, vomiting, and shock. However a large number of patients were asymptomatic [Table/Fig-1]. In SBP patients, ascitic fluid was more likely to be turbid, had higher leucocyte count and higher neutrophil count. The ascitic fluid pH was significantly lower in the SBP group. [Table/Fig-2] shows all the evaluated parameters (laboratory and those using SMRS).

Parameters		Patients with SBP (81) n (%)	Patients without SBP(248) n (%)	p-value
Age Group (years)	18-40	26 (32.2)	74 (29.9)	0.876
	41-60	34 (41.9)	112 (45.2)	
	>60	21 (25.9)	62 (25)	
Gender	Male	53 (65.4)	159 (64.1)	0.93
	Female	28 (34.6)	89 (35.9)	
Child Pugh Score (Mean±SD)		9.71±2.26	9.70±1.97	0.97
MELD (Model for End stage Liver Disease) (Mean±SD)		21.90±8.86	19.97±8.27	0.07
Co-morbidities		52 (64.2)	154 (62.1)	0.83
Most Common Aetiology- Alcohol		46 (56.8)	173 (69.8)	0.12

Abdominal Pain	35 (43.2)	142 (57.2)	0.61
Jaundice	42 (51.8)	115 (46.4)	0.46
Fever	43 (53)	70 (28.2)	0.001
Nausea	37 (45.7)	91 (36.7)	0.19
Vomiting	32 (39.5)	56 (22.6)	0.005
Encephalopathy	15 (18.5)	28 (11.3)	0.14
Hematemesis	17 (21)	31 (12.5)	0.09
Shock	18 (22.2)	18 (7.3)	0.001
Asymptomatic	26 (32.1)	82 (33.1)	0.98

[Table/Fig-1]: Demographic and clinical profile of patients in SBP and Non-SBP groups. Chi-square test was used.
p-value of <0.05 was considered significant.

Parameters		Patients with SBP (81) n(%)	Patients without SBP (248) n(%)	Odds Ratio	p-value
Appearance of Fluid	Turbid	65 (80.2)	116 (46.8)	4.62	0.001
	Clear	16 (19.8)	132 (53.2)	1.00	
Dipstick pH of Fluid	6.5	6 (7.4)	2 (0.8)	17.48	0.001
	7	35 (43.2)	13 (5.2)	15.68	0.001
	7.5	40 (49.4)	233 (94)	1.00	
Dipstick LE of Fluid	Zero	0	132 (53.2)		
	Trace	0	92 (37.1)	-	-
	+	4 (4.9)	17 (6.9)	1.00	-
	++	25 (30.9)	6 (2.8)	15.18	0.001
	+++	52 (64.2)	1(0.4)	221.00	0.001
		Mean±SD	Mean±SD		
TLC of fluid(cumm)		5391.6±5241.94	232.9±173.8		0.001
PMN of Fluid(cumm)		4542.9±5064.8	15.4±19.3		0.001
Albumin in Fluid(gm/dl)		1.03±0.12	1.12±0.30		0.01
Glucose in Fluid(mg/dl)		119.96±47.98	88.95±33.09		0.12
Protein in Fluid (gm/dl)		2.07±0.15	2.09±0.24		0.09
pH (blood)		7.24±0.63	7.39±0.10		0.003
Hb (blood) (gm/dl)		10.13±2.58	10.25±2.51		0.27
TLC (blood)(cumm)		12315.7±6680.1	9590.4±6752.9		0.41
Platelet (blood)(Lakh/cmm)		1.75±0.72	1.62±0.69		0.21
Urea (blood)(mg/dl)		60.55±53.26	44.11±32.63		0.001
Serum Creatinine (mg/dl)		1.73±1.93	1.26±1.13		0.001
Na (serum)(mmol/L)		133.25±7.15	141.71±9.52		0.26
K (serum))(mmol/L)		4.16±0.79	4.06±0.85		0.41
Serum Bilirubin (mg/dl)		5.07±6.63	5.48±6.58		0.61
SGOT (serum)(U/L)		126.4±19.1	138.0±27.4		0.86
SGPT (serum))(U/L)		61.7±21.6	79.51±23.78		0.21
ALP (serum))(U/L)		193.3±21.4	150.9±26.1		0.01
GGT (serum))(U/L)		127.9±15.9	188.7±21.5		0.03
Protein (serum) (gm/dl)		5.75±1.07	6.15±1.03		0.99
Albumin (serum) (gm/dl)		2.36±0.53	2.48±0.49		0.17
INR (blood)		1.87±1.03	1.78±0.87		0.86

[Table/Fig-2]: Dipstick and Laboratory parameters. Chi-square test was used.
p-value of <0.05 was considered significant. SGPT: Serum glutamic pyruvic transaminase; SGOT: Serum glutamic-oxaloacetic transaminase; GGT: Gamma-glutamyl transferase; ALP: Alkaline phosphatase; INR: International normalized ratio; Hb: Haemoglobin; TLC: Total leukocyte count; PMN: polymorphonuclear leukocyte

Using the bedside SMRS, 41/81 (50%) of SBP patients were noted to have pH ≤7 as compared with 15/248(6%) of Non SBP group (p-value<0.001). Using ascitic fluid pH ≤7.0 as cut-off, yielded a sensitivity of 51% and specificity of 94% compared to gold standard for diagnosing SBP. Analysis of blood pH using ABG analyser showed significantly lower blood pH in the SBP than in Non SBP group (p-value<0.003). Using blood pH ≤7.38, as cut-off, yielded a sensitivity of 68% and specificity of 56%.

Taking 2+ as the cut-off, the LERS was positive in 84/329 patients. The LERS strip could thus correctly diagnose SBP in 77/81 (95%) of patients with SBP. However it was negative in 4/81 (4.93%) patients with SBP and was positive in 7/248(2.82%) patients in NSBP group [Table/Fig-3]. Hence, the sensitivity, specificity, PPV and NPV for LERS, taking 2+ as cut-off were 95%, 97.33%, 98.96% and 96.69%, respectively.

Variable		Groups SBP Group	Groups NSBP Group	Total
Dipstick LERS activity	Positive	77	7	84
	Negative	4	241	245
Total		81	248	329

[Table/Fig-3]: Diagnosis of SBP by LERS taking grade 2+ as cut-off.

Taking 3+ as the cut-off, the LERS was positive in 53/329 patients. The LERS strip could correctly diagnose SBP in 52/81 (64.1%) of patients in SBP group. However it was negative in 29/81 (35.8%) patients with SBP and was positive in 1/248 (0.4%) patients in NSBP group [Table/Fig-4]. Hence the sensitivity, specificity, PPV and NPV for LERS, taking 3+ as cut-off were 64.20%, 99.6%, 98.11% and 89.49% respectively.

Variable		Groups SBP Group	Groups NSBP Group	Total
Dipstick LERS activity	Positive	52	1	53
	Negative	29	247	248
Total		81	248	329

[Table/Fig-4]: Diagnosis of SBP by LERS taking grade 3+ as cut-off.

During the study, a total of 108 asymptomatic patients were noted, of which 26 were in SBP group and 82 in NSBP group. Of these 31 were positive for LERS test using 2+ as cut-off. Sensitivity, specificity, PPV, NPV of LERS 2+ positive as 96.015%, 92.68%, 80.65%, 98.70% respectively compared to the gold standard. When authors considered LERS test 3+ as cut-off, out of 108 asymptomatic patients 19 were detected to have SBP with no false positive and 7 false negatives. The sensitivity, specificity, PPV, NPV of LERS 3+ positive was 73.08%, 100%, 100%, 92.13%. Considering both these results authors were able to safely conclude that leukocyte esterase reagent strip test can be efficiently used as bedside screening test in asymptomatic patients. Almost 75% of our asymptomatic SBP patients were later confirmed to have SBP by the gold standard.

ascitic fluid pH and LERS activity could thus be used as the rapid and cheap bedside intervention for screening patients with SBP.

DISCUSSION

Spontaneous Bacterial Peritonitis (SBP) is a life-threatening complication in patients with decompensated cirrhosis of liver and is defined as ascitic fluid infection in the absence of any identifiable intra-abdominal foci of infection [1]. The prognosis greatly depends on its prompt diagnosis and early initiation of antibiotics, which is the most crucial step in management of SBP [3]. The mortality in such patients is very high if not intervened timely. But diagnosis of SBP is presently based on ascitic fluid leukocyte count and ascitic fluid culture, which may delay the diagnosis. The initiation of antibiotics is thus delayed by atleast several hours if not days. It was shown by Karvellas CJ et al., that each hour of delay in treatment was associated with a 1.86 times increase in mortality [12]. Avoiding this delay warrants a rapid diagnostic procedure which can be performed bedside with high sensitivity and specificity to facilitate rapid diagnosis and early treatment in such cases.

It is easy to suspect SPB in most patients with worsening hepatic functions, encephalopathy, fever, shock, respiratory distress, renal and respiratory failure etc. In the present study also, fever and shock were found to be significantly high in the SBP group.

However, these symptoms themselves are late in clinical course of any infection, and are usually due to worsening sepsis, and Multiple Organ Dysfunction Syndrome (MODS). Abdominal pain has been noted as the most common presenting symptom in a number of studies and in a meta analysis also [7,13-15]. In the present study also, abdominal pain was one of the most common presenting symptoms. It is however a non specific symptom. Although it may aid in the diagnosis of SBP, along with other symptoms, alone may have poor diagnostic significance and may be due to other reasons, such as overstretching of the abdominal wall due to tense ascites, lurking abdominal wall hernias, sense of discomfort due to rapid filling of ascites or rarely due to diseases of other intra abdominal organs like gall bladder, pancreas and kidneys.

In the present study also, although, pain was the most common presenting symptom in the SBP group, in none of the cases it was not the sole presenting symptom. Moreover almost 57% patients in NSBP group had pain as the most prominent presenting symptom. It may also be noted that as many as 32% of patients in SBP group were asymptomatic. Asymptomatic SBP patients in various studies showed a wide variation, ranging from 10% to 40% [14]. It is possible that in most patients, the infection in ascitic fluid may initially be asymptomatic, and later become symptomatic, once sepsis supervenes. Abdominal pain and tense ascites are the usual presenting symptoms in a large number of OPD patients, who are otherwise stable and presents for routine therapeutic paracentesis. A high degree of suspicion is usually required in this group of patients, to diagnose SBP early, thereby preventing further deterioration of hepatic functions and improve survival. It is therefore, a routine practice in many centers, to get ascitic fluid TLC and PMN counts done in all such cases during therapeutic paracentesis, to detect SBP in these asymptomatic patients.

The LERS activity by SMRS may prove as a useful armamentarium in the management of such patients. While all patients admitted to the Emergency Room are likely to have all the investigations like Renal Function Test (RFT), Complete Blood Count (CBC) and ascitic fluid analysis and culture done, same cannot be done for all OPD patients presenting for routine therapeutic paracentesis. In such case, screening with a test with reasonably high sensitivity and PPV is needed, for early detection of SBP. Multistix 10 SG Reagent Strip for LERS and ascitic fluid pH may be helpful in suspecting SBP. It is reasonable to start parenteral antibiotic therapy for all patients if the LERS test 3+ results are achieved. However as the PPV of LERS test 2+ results were slightly lower, starting antibiotic therapy with LERS test 2+ entails treating a few extra patients (approx. 20%) for suspected infection, and missing a few (approx. 3-4%)with definitive SBP. It is still heartening that almost 75% of the asymptomatic SBP patients are correctly picked up by LERS test results.

Thus all patients who present in the OPDs for routine therapeutic paracentesis should be investigated with Multistix 10 SG Reagent Strip. Those patients, who have ascitic fluid pH of more than 7.0 or LERS test activity of less than 2+ should not be tested further and allowed to go home. Those with pH less than or equal to 7.0 or LERS test activity 2+ or 3+ should be further investigated with ascitic fluid total and differential leukocyte count and ascitic fluid culture, and be either admitted or closely monitored. In case they don't want to get admitted, they may be atleast started on oral antibiotics, till laboratory results are available.

Because of wide variation in sensitivity and PPV between reported studies [Table/Fig-5] [16-21], some authors have raised doubt over the use of LERS as a valid surrogate marker of SBP [11], but there has been reported heterogeneity in the number of patients included in each study, the ascitic fluid samples tested and SBP episodes observed, which may affect test results [10-12]. Other potential cause of error may be the possibility of inter-observer variation in matching of colour. However, because of the consistently excellent NPV (>95% in the majority of the studies) for LERS, its place in the ascitic tap diagnostic algorithm, specially as a preliminary screening tool for SBP diagnosis can be strongly advocated. Apart from high diagnostic potential, the advantages of reagent strips include its easy availability, easy to use, low cost and rapid results. With use of bedside LERS test early antibiotic therapy can be started in a fair percentage of asymptomatic SBP patients. In the present study, authors could start early treatment in 16 out of 20 asymptomatic SBP patients, based upon LERS test results.

Limitation(s)

The present study although presented the largest experience with the Multistix 10 SG Reagent Strip for routine ascitic fluid analysis, was still a single centre study and non randomised. It is to be emphasised in this study reagent strips used were currently marketed only for urinary analysis.

Study	Year of study	LERS cut-off	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Butani RC et al., [16]	2000	2	83	99	91	98
Sapey T et al., [17]	2005	2	64.7	99.6	91.7	97.4
Ribeiro TC et al., [20]	2007	2	86	96	60	99
Li J et al., [19]	2006	2	92.8	84.7	71.8	96.1
Present Study	2021	2	95	97.33	98.96	96.69
Kim DY et al., [18]	2005	3	50	100	100	87
De Araujo A et al., [21]	2008	3	80	98.5	90.9	96.2
Present Study	2021	3	64.2	99.6	98.11	89.49

[Table/Fig-5]: Comparison of sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) of Siemens Multistix 10 SG in diagnosing SBP in various studies [16-21].

CONCLUSION(S)

High suspicion and early diagnosis of SBP is the most important factor in preventing rapid deterioration of hepatic functions and prolonging life in patients with decompensated chronic liver disease. ascitic fluid turbidity has low predictive value in diagnosing SBP. Routine screening of ascitic fluid with SMRS for leucocyte elastase activity and pH has high potential in early diagnosis of SBP, especially during routine therapeutic peracentesis in asymptomatic patients on outpatient basis.

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