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Research Article

Bacterial Infection in Patients with Liver Cirrhosis: Experience of the Hepato-Gastroenterology Department of Casablanca University Hospital

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Abstract

Background and Aim: Bacterial infection is a complication that occurs frequently in patients with liver cirrhosis. Several factors are known to facilitate a bacterial infection. The aim of this study was to identify predictive factors for bacterial infection in patients with liver cirrhosis.

Methods: There was a retrospective study that enrolled a total of 330 patients with liver cirrhosis hospitalized in our department from 2018 to 2020. Clinical, biological and bacteriological data were analyzed.

Results: 125 patients were found with bacterial infection. The most common infections were urinary tract infections (n = 49,39%), SBP (26,4%) and pneumonia (12%), and bacteremia (1,6%). Microbiological cultures were positive in 41,6%. The most commonly isolated were Enterobacteriaceae. The predictive factors for bacterial infection were: decompensated cirrhosis ($P < 0.0001$), presence of ascites ($P = 0.002$) and variceal bleeding ($P = 0.0003$).

Conclusion: This study confirms that bacterial infections are frequent in patient with liver cirrhosis. We must actively search infections in all hospitalized patients with liver cirrhosis especially when its decompensated.

Keyword: *Bacterial Infection; Liver Cirrhosis*

Introduction

Patients with liver cirrhosis have an increased incidence of infections that are a major cause of morbidity and mortality [1]. Infections also represent a leading cause of decompensation [2]. The main cause has been founded in alterations of the enteric flora and of the intestinal barrier probably due to portal hypertension, in addition to a reticulo-endothelial system dysfunction [3]. Spontaneous bacterial peritonitis (SBP), urinary tract infections (UTI), respiratory infections and bacteremia are the commonest infections in cirrhotic patients. The most common causes are gram negative bacteria. Early diagnosis of infection and prompt commencement of appropriate antimicrobial treatment is essential to ensuring optimal outcomes for these patients.

Aim of the Study

The aim of this study was to describe the prevalence, localization and etiology of bacterial infections and to determinate the predictive factors of infection in hospitalized patients with liver cirrhosis.

Materials and Methods

This retrospective study included 330 patients with liver cirrhosis, hospitalized at the Department of Hepato-gastroenterology, Casablanca University hospital from 2018 to 2020. Diagnosis of bacterial infection was based on clinical examination, laboratory findings such as elevated markers of inflammation (CRP, PCT), bacterial positive culture of urine, blood and ascites. Diagnosis of spontaneous bacterial peritonitis was based on finding the absolute number of polymorphonuclears in ascitic liquid ≥ 250/mm^3. Diagnosis of pneumonia was based on chest X-ray. The data were analyzed by Microsoft Excel 2020.

Baseline characteristics of study patients were expressed in percentage. Association between patient factors (age, sex, etiology of liver cirrhosis, Child score, type of decompensation) and bacterial infection was evaluated. A p value less than 0.05 was considered statistically significant.

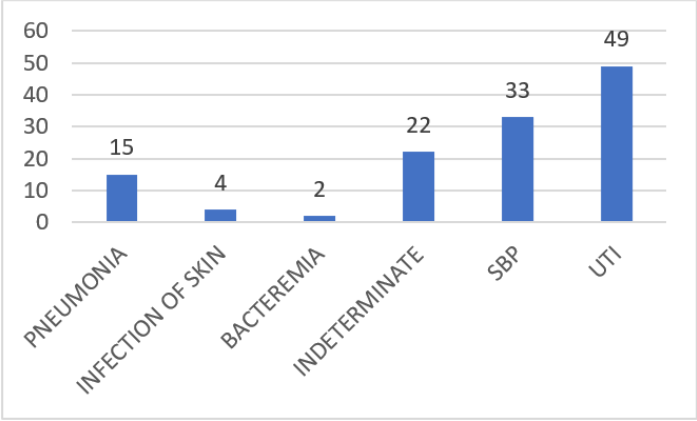
Results

During the study period 330 patients were enrolled, 125 were found to have bacterial infection (24,84%). Demographic and clinical characteristics of patients included in the study are presented in table 1. Most patients were men (n = 219, 66,36%) and their mean age was 51 ± 9 years. Hepatitis C viral infection was the most common cause of cirrhosis (n = 137, 41,52%) followed by hepatitis B viral infection (n = 64,19,39%), indeterminate cause of cirrhosis (n = 20, 16,36%) and auto-immune hepatitis (n = 18, 5,45%). Patients had advanced liver disease as shown by the high prevalence of gastrointestinal bleeding (n = 238, 72,12%), ascites (n = 109, 33,03%), hepatic encephalopathy (n = 64, 19,39%), icteric decompensation (n = 43,13,03%) and Child-Turcotte-Pugh score (7 ± 2).

Variable	Global (N = 330)	Percentage (%)	P value
Age (years)	51		0,45
Men	219	66,36%	0,81
Women	111	33,64%	
HCV	137	41,52%	0,11
HBV	64	19.39%	0,35
Auto-immune hepatitis	18	5,45%	0,92
Alcohol	9	4,24%	0,33
Wilson	2	0,61%	0,06
NASH	14	2,73%	0,68
Other	86	26,06%	0,09
Gastro-intestinal bleeding	238	72,12%	0,0003
Ascites	109	33,03%	0,002
Ictere	43	13,03%	0,92
Hepatic encephalopathy	64	19,39%	0,72
Child-Pugh score, mean	7±2		<0,001
Bilirubin (mg/L), median	5,3		0,56
Albumin (g/L), median	31		0,0005
Prothrombin (%)	45		0,01
b-Blocker use	237	69,70%	<0,001
Diuretics use	85	25,76%	0,04

Table 1: *Characteristics of patients included in the study at infection diagnosis.*

The most common infections were urinary tract infections (n = 49, 39%), SBP (n = 33, 26,4%) and pneumonia (n = 15, 12%), while bacteremia was present in 2 patients (1,6%). The type of infection remained undetermined in 22 patients (17,6%). Localization of bacterial infection in our patients is shown in graph 1.



Graph 1: *Identification of bacterial infection (n = 125).*

UTI: Urinary Tract Infection; SBP: Spontaneous Bacterial Peritonitis.

Microbiological cultures were positive in 52 patients (41,6%). These 52 positive bacterial cultures were as follows: 49 positive urine culture (100%), 2 positive hemocultures (100%) and 4 positive in ascitic fluid (12,12%). The ascitic fluid remained sterile (87,88%). Gram-negative bacteria were the most common isolates (94,23%).

Among gram-negative bacteria, the most commonly isolated were Enterobacteriaceae, such as *Escherichia coli* (59,62%) and *Klebsiella pneumoniae* (25%).

Patients with decompensated cirrhosis or Child B/C had a greater risk compared with those with compensated cirrhosis or Child A ($P < 0.001$). Presence of ascites was related to the development of infections compared with those without ascites ($P = 0.002$). History of variceal bleeding was also associated with the development of infections ($P = 0.0003$). History of hepatic encephalopathy was not associated with risk of develop infections ($P = 0.72$). No significant difference was found in age, sex, and cirrhosis etiology (Table 1).

Discussion

The present study confirms that cirrhotic patients are particularly prone to developing bacterial infections. Previous studies reported that bacterial infections are frequent in advanced cirrhosis and are diagnosed in 25% to 47% of hospitalized patients [4] which is 4-5 folds higher than hospitalized patients in general and is especially higher in those with gastrointestinal bleeding (45 - 60%) [5,6]. Numerous factors are associated with an increased risk of infections in cirrhotic patients: Hepatic dysfunction (class Child B and C), ascites, variceal bleeding (VB) and malnutrition [7,8]. This is also what we found in our study, 3 variables (Child-Pugh score B-C, presence of ascites and gastro-intestinal bleeding) reached a P value less than 0.05 in the univariate analysis as predictive factors. According to the literature the most common types of bacterial infections in patients with liver cirrhosis include urinary tract infections (52%), SBP (23%),

pneumonia (15%) and bacteremia (12%), followed by infections of the skin and soft tissue infections [9,10]. The distribution of types of bacterial infections in our study is consistent with the literature.

As we found in order and frequency: urinary tract infections (39%), SBP (26,4%) and pneumonia (12%).

The pathogenic mechanism for infections in cirrhotic patients is probably explained by bacterial translocation and immune dysfunction [11].

The results of bacterial cultures in our study agree with literature data which also indicate that Gram-negative bacteria, especially *Escherichia coli* are predominant. Whereas gram positive bacteria, especially *Enterococci* and *Staphylococcus aureus*, comprise about 20% and anaerobes only 3% [12,13].

Several limitations were observed in this study. First, this work was a retrospective study at a single center. Some data collections were limited, small number of positive bacterial cultures and bacterial infection might have been be affected by specific circumstance of our institution. Second, a considerable number of patients had been taking antibiotics before admission, which might affect the accuracy of bacterial infection rate.

Conclusion

Identification of the infective agent in about 1/3 of hospitalized patients with decompensated cirrhosis. Bacterial infections often occur in patients with liver cirrhosis. So, it's imperative to make an early diagnosis and introduce antibiotics that cover the most common gram negative bacteria for a great outcome.

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