



Bacterial infections in cirrhosis patients: a retrospective epidemiologic study in a greek university hospital

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Abstract

Introduction: Cirrhosis of liver is the end stage of multiple processes that lead to hepatic failure and eventually death. Patients with cirrhosis are immunocompromised and are predisposed to develop bacterial infections, sepsis and severe sepsis. The most common infections in cirrhosis are Spontaneous Bacterial Peritonitis (SBP, 25%-31%) followed by Urinary Tract Infection (UTI, 20%-25%), Pneumonia (15%-21%), Bacteremia (12%) and Cellulitis (11%). The aim of the study was to first identify the most frequent infections in patients with liver cirrhosis and evaluate the role of bacterial infections in clinical outcome of cirrhotic patients. We also tried to identify the most common cause of cirrhosis in our population.

Patients and methods: One hundred and ten (110) patients were included in our study. All of these patients had an established diagnosis of chronic liver failure and were admitted to the University hospital of Patras during a period of a year and a half. The following data were collected: Demographic characteristics (Age, Sex), Etiology of cirrhosis and the cause of admission. In specific interest the type of infection that was developed in all patients is included, as well as the frequency of those infections was observed.

Results: The mean age of all patients enrolled in our study was 61 ± 13 years. Alcoholic cirrhosis was the main factor-etiology of liver cirrhosis in our patient population. Male are significantly more than female patients (87.3% vs 12.7% retrospectively). In our study, the most frequent infections were Pneumonia (30.6%) and Spontaneous bacterial peritonitis (22.2%) followed by Gastrointestinal infections (GI) (13.9%) and Urinary tract infections (8.3%). Other types of infection were up to 13.9%. During the time of admission, there were 16 cases of bacterial infections diagnosed upon admission (<24 hours) and 5 cases of infections developed during hospitalization (>48 hours). Mortality rate was 9% (10 cases). Ten patients with sepsis or severe sepsis have died. All of them were treated with broad spectrum antibiotics within 24 hours from admission.

Conclusion: The present study showed a high incidence of Bacterial infections in patients with liver cirrhosis. Patients with chronic liver disease sustained impairment to their immune system (neutrophil and macrophage dysfunction) which worsens over time and disease progression and the reason predisposed for developing Bacterial infections. A high rate of suspicion is needed for an infectious process in all patients with liver cirrhosis. With early diagnosis of the site of infection and the appropriate antibiotic treatment the morbidity and mortality rate of bacterial infections in cirrhotic patients, can be decreased over the years.

Keywords: Bacterial infections, cirrhosis, cirrhosis complications, spontaneous bacterial peritonitis

Introduction

Cirrhosis of liver is the end stage of multiple processes that lead to hepatic failure [1]. Approximately 40% of patients with cirrhosis are asymptomatic. That means, cirrhosis often is a silent disease, with most patients remaining asymptomatic until decompensation occurs [2]. Although increased mortality

in cirrhosis is most often attributed to direct complications of the loss of liver function, a significant percentage mortality, succumb to bacterial infections, with infection-attributed mortality ranging from 7%-40% [1].

Patients with cirrhosis are immunocompromised and for that reason they are predisposed to developing bacterial infections,

sepsis and severe sepsis. The mechanisms of increased susceptibility to infections in cirrhosis are unclear: endothelial alteration, leukocytes dysfunction, bacterial translocation and iatrogenic factors are some of them [3].

Bacterial infection is a complication that occurs frequently in patients with cirrhosis. It may be present upon admission or it may appear during the hospitalization. It may be up to 30-60% of hospitalized patients [4,5]. In 30% to 50% of patients, infection is the cause for hospital admission in cirrhosis, while 15% to 35% develop nosocomial infections during their hospital stay as compared with 5% to 7% in the general hospital population [6]. The most common infections in cirrhosis are Spontaneous Bacterial Peritonitis (SBP, 25%-31%) followed by urinarytract Infection (UTI, 20%-25%), pneumonia (15%-21%), bacteremia (12%) and cellulitis (11%) [7,8].

The aim of the study was first to identify the most frequent infections developed in patients with liver cirrhosis, as well as the most common cause of cirrhosis mentioned in our population.

Patients and methods

One hundred-ten (110) patients were included in that retrospective study. All of these patients had an established diagnosis of chronic liver failure and were admitted to the University hospital of Patras during a period of a one and half year.

The diagnosis of hepatic cirrhosis was based on clinical (splenomegaly, ascites, jaundice etc.), biochemical (increased liver enzymes), echographic findings (ultrasound) and/or data from liver biopsy.

The following data were collected: demographic characteristics (age, sex), etiology of cirrhosis and the cause of admission. In specific, interest, type of infection that was developed in all patients was included, as well as the frequency of those infections were observed. The diagnosis of Spontaneous bacterial peritonitis was made by finding more than 250 Neutrophils/ mm³ in ascitic fluid and/or positive cultures. Urinary tract infections were diagnosed through clinical symptoms (fever, haematuria, dysuria and frequent urination) and/or positive urine cultures and/or ultrasound findings. The diagnosis of pneumonia was established by symptoms and radiologic signs. For Bacteremia criteria like positive blood cultures, fever and hypotension were used and cellulitis was diagnosed by local sign (edema, redness, warmth) and/or fever. In case of wound secretion, we evaluated positive cultures from the trauma.

We also collected the cirrhotic patients who died upon admission or during hospitalization. A statistical analysis was performed by using the Software Statistical Package for Social Science (SPSS), version 11.5. The values of the variables were expressed in terms of the mean value plus or minus the standard deviation.

Results

Demographic characteristics: One hundred and ten (110)

patients with a history of cirrhosis were enrolled in our study. The mean age was 61±13 years. Most patients were male (87.5%). Female had a proportion about 12.7%.

Etiology of cirrhosis, demographic characteristics and frequency of infections can be seen in **Table 1**.

As it is shown in the above **Table 1**, Alcoholic Cirrhosis is the main factor-etiology of liver cirrhosis in our patient population. Male are significantly more than female patients (87.3% vs 12.7% retrospectively). In our study, the most frequent infections were Pneumonia (30.6%) and Spontaneous bacterial peritonitis (22.2%) followed by Gastrointestinal infections (GI) (13.9%) and Urinary tract infections (8.3%). As it was shown from our study, the proportion of uncommon infections such as: Cholecystitis, Cholangitis, Lung abscess and Cellulitis, was remarkable up to 13.9%. In 11% of cases the site of infection was not identified. The frequency of infection types are shown in **Figure 1**.

Table 1. Etiology of cirrhosis, Demographic characteristics and Frequency of infections developed in the group of patients.

Age(year)	61±13
Sex	
Male	87.3%
Female	12.7%
Etiology	
Alcohol	73%
Viral (Hepatitis B ,C ,Both)	18.9%
Unknown	2.7%
Other	5.4%
Etiology of admission	
Infection	21.5%
Gastrointestinal (GI) bleeding	19.1%
Other (ascetic fluid, nausea, anaemia.....)	59.1%

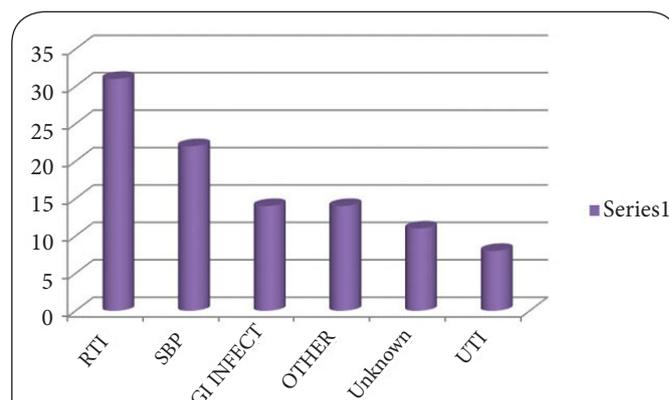


Figure 1. Frequency of infections.

RTI: Respiratory tract infections; SBP: Spontaneous bacterial peritonitis; GI: Gastrointestinal infections; Other: Cellulitis, Lung abscess, Bacteremia, Biliary infections and UTI: Urinary tract infections.

Sixteen (16) cases of Bacterial infections were diagnosed upon admission (<24 hours) and 5 of them were developed during hospitalization (>48 hours).

As it can be seen most infections were hospital acquired. Etiology agents were isolated in Blood cultures: *S. epidermidis* and *E.coli* and Urine cultures: *E.coli*, *Candida albicans*, *Klebsiella pn.* and *Enterococcus faecalis*.

Mortality rate was 9% (10 cases). Ten patients with sepsis or severe sepsis have died despite the fact that all were treated with broad spectrum antibiotics.

Discussion

The present study showed a high incidence of Bacterial infections in patients with Liver cirrhosis. Patients with chronic liver disease sustain impairment to their immune system (Neutrophil and Macrophage dysfunction) which worsens over time and with disease progression and the reason predisposed for developing Bacterial infections [5,9].

According to the literature data about the frequency and distribution of bacterial infections in liver cirrhosis, Spontaneous bacterial peritonitis is the most frequent infection, followed by Urinary tract infections and Pneumonia [3,4,6]. Our results are a little differentiated in order from what is already published: Pneumonia was the most common infection (30.6%), followed by Spontaneous bacterial peritonitis (22.2%) and gastrointestinal infections (13.9%), while Urinary tract infections frequency was (8.3%).

According to the literature, the incidence of Spontaneous bacterial peritonitis is 25%-31%, Urinary Tract Infections are observed in 20%-25% of cases of infection, Pneumonia amounts to 15%-21%, Bacteremia amounts to 12% and Cellulitis's frequency is 11% [7,8]. In our study, the prevalence of each infection is more or less the same with that described in the literature so far, except UTI. In our study, we had one case of Lung abscess and one case of Biliary tract infection. The proportion of cases where the location of infection was not identified was 11%. In conclusion, Urinary infections are less prevalent while Pneumonia is more prevalent in the present study, than in the literature.

It is written that 60% of Bacterial infections in cirrhotic patients are community acquired and 40% are Nosocomial [7]. According to Bruns et.al., Bacterial infections are diagnosed only in 25% to 47% hospitalized patients with cirrhosis [10]. Our results are similar to the data from literature, since 77% of infections were identified upon admission (less than 24 hours) and only 23% were developed during hospitalization (Nosocomial infections).

Bacterial infections are more frequent but also more severe in cirrhosis, causing an increase in the probability of death [3]. With Sepsis, mortality increases to more than 50% [11]. Leber et al., have published that the mortality of SBP has decreased from 90% to 30%. In contrast to non-cirrhotic subjects, Pneumonia has been shown to be more severe in patients with liver cirrhosis. Bacteremia is also a life-threatening disease in

cirrhotic patients population, which increases the fatality rate. Cirrhosis has been shown to predispose the development of Bacteremia and to further significant impairment of prognosis in Bacteremic patients [6,11].

Current study encountered some limitations. First, the sample size was small. Second, it was a clinical trial which took place in one center only. In the case of multi-center study, the results would be more representative. Third, in patients who died, we didn't take into account potential comorbidities.

In our study 10 deaths (9%) were encountered in severe decompensated patients with Sepsis through Pneumonia, Bacteremia and Spontaneous bacterial peritonitis. Our results are in agreement with all so far publications referring to fatality rate in cirrhotic patients. Development of any type of infection in patients with liver cirrhosis, results in high overall mortality [12-14].

Conclusion

Infections are a major problem in patients with liver cirrhosis. This is a complication that worsens the already bad prognosis in this category of patients. A high rate of suspicion is needed for an infectious process in all patients with liver cirrhosis. Knowing the most frequent infections, based on our data and the existing literature, it facilitates and accelerates the diagnosis, resulting in faster initiation of appropriate treatment. With early diagnosis of the site of infection and the appropriate antibiotic treatment the morbidity and mortality rate of Bacterial infections in cirrhotic patients, can be decreased over the years.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Authors' contributions	ML	CAG
Research concept and design	--	✓
Collection and/or assembly of data	✓	--
Data analysis and interpretation	✓	--
Writing the article	✓	✓
Critical revision of the article	--	✓
Final approval of article	--	✓
Statistical analysis	✓	✓

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