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ORIGINAL ARTICLE

Comparison of Efficacy of Moxifloxacin and Cefotaxime in the Treatment of Spontaneous Bacterial Peritonitis in Cirrhotic Patients

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ABSTRACT

Background: Spontaneous bacterial peritonitis (SBP) is a life-threatening complication in cirrhotic patients, with high mortality rates if untreated. The study aimed to compare the efficacy of Moxifloxacin and Cefotaxime in the treatment of SBP in cirrhotic patients.

Methodology: This was a randomized, double-blind, controlled clinical trial was conducted at Liaquat University Hospital Hyderabad from 1st October 2024 to 30th June 2025. A total of 130 cirrhotic patients diagnosed with SBP, who were randomly assigned to receive Moxifloxacin (400 mg daily) or Cefotaxime (2g every 8 hours) for 7 days were enrolled. The primary outcome was the resolution of infection, and secondary outcomes included clinical improvement, mortality rates, and adverse effects.

Results: The infection resolution rate was 90% in the Moxifloxacin group and 85% in the Cefotaxime group. No significant differences in clinical improvement or mortality rates were observed. Adverse effects were minimal in both groups.

Conclusion: Moxifloxacin appears to be equally effective as Cefotaxime in treating SBP in cirrhotic patients, with no significant differences in clinical outcomes. Further studies are needed to explore long-term outcomes and resistance patterns.

Keywords: Spontaneous bacterial peritonitis, cirrhosis, Moxifloxacin, Cefotaxime, antibiotic treatment, clinical outcomes.

INTRODUCTION

One of the most frequent and most severe infections in cirrhotic patients and especially in patients with ascites is spontaneous bacterial peritonitis (SBP). The infection takes place in the ascitic fluid with no visible intra-abdominal focus, normally because of gut-derived bacteria to be translocated into the peritoneal cavity. SBP is also a condition that is linked to high rates of morbidity and mortality and the death rates of patients affected by SBP are close to 30 percent unless treatment is timely and effective[1,2]. The type of antibiotic therapy is of significance in the process of minimizing mortality and the outcome of managing SBP which is a complex process.

Historically, Cefotaxime was the most commonly used therapy against SBP, as it has a wide spectrum of activity and is effective against the gram-negative bacteria, the most frequent type of pathogen[3,4]. Cefotaxime is a third generation cephalosporin that has been observed to offer a great coverage of various common pathogens

including Escherichia coli, Klebsiellapneumoniaes and Enterobacter spp[5]. There has however been an increasing resistance to antibiotics especially in hospital caused infections which has brought into question the efficacy of Cefotaxime and other beta-lactam antibiotics.

Conversely, Moxifloxacin, a broad-spectrum fluoroquinolone, has demonstrated effectiveness in the treatment of the infection by both gram-negative and gram-positive bacteria, including those that occur in the context of cirrhotic patients[6,7]. The strength of Moxifloxacin is that it is able to enter tissues and ascitic fluid, which would be a possible alternative to the third generation cephalosporins. In addition, the fact that Moxifloxacin can be taken once a day, as well as its good side-effect profile, endears it to SBP treatment, particularly in resource-constrained situations[8,9].

There are some studies that have examined application of fluoroquinolones such as Moxifloxacin in treating infection among cirrhotic patients. There are studies which may indicate that the fluoroquinolones can be equally effective as the traditional cephalosporins and some studies are concerned with the possibility of resistance[10]. Nevertheless, the usage of Moxifloxacin in the treatment of SBP is still under-researched as opposed to Cefotaxime, which continues to be the first option of use in a significant number of clinical guidelines.

The purpose of the proposed study is to determine the efficacy of Moxifloxacin and Cefotaxime in the management of SBP among cirrhotic patients. Our hypothesis states that Moxifloxacin will show similar efficacy as Cefotaxime with regards to resolution of infections, clinical betterment, and mortality rates.

MATERIAL AND METHOD

This was a randomized, double-blind, controlled clinical trial was conducted at Liaquat University Hospital Hyderabad from 1st October 2024 to 30th June 2025. A total of 130 cirrhotic patients diagnosed with SBP were enrolled in the study. Inclusion criteria included patients aged 18-65 years, diagnosed with cirrhosis (confirmed by clinical, biochemical, and radiological findings), and confirmed SBP with ascitic fluid absolute neutrophil count (ANC) of ≥250 cells/µL. Exclusion criteria included known hypersensitivity to study medications, prior use of antibiotics within 48 hours of enrollment, pregnancy, and severe comorbidities such as cancer or severe cardiovascular disease. Patients were randomly assigned to one of two groups: Moxifloxacin group (n=65) and Cefotaxime group (n=65). The Moxifloxacin group received 400 mg oral Moxifloxacin once daily, while the Cefotaxime group received 2g Cefotaxime intravenously every 8 hours for 7 days. Both treatments were given along with standard supportive care for cirrhotic patients.

The primary endpoint was the resolution of SBP, defined as a decrease in the ascitic fluid ANC less than 250 cells/µL, with no clinical signs of infection (fever, chills, or increased abdominal pain) at the end of the treatment. Secondary endpoints included clinical improvement (measured by the reduction of symptoms such as abdominal pain, fever, and altered mental status), mortality rates within 30 days, and adverse effects associated with the antibiotics.

Data were analyzed using SPSS version 25. Logistic regression analysis was performed to assess the factors influencing the resolution of infection in both groups, adjusting for baseline differences such as age, MELD score, and baseline ANC levels. A p-value < 0.05 was considered statistically significant.

RESULTS

The baseline characteristics of both groups were similar, including age, sex, MELD score, and baseline ascitic fluid ANC levels (Table 1).

The infection resolution rate was 90% in the Moxifloxacin group and 85% in the Cefotaxime group. The difference was not statistically significant (p = 0.45). Clinical improvement, measured by the reduction in fever, abdominal pain, and other symptoms, was similar between the two groups (Moxifloxacin 85%, Cefotaxime 80%). No significant differences were found (p = 0.62). The 30-day mortality rate was 12% in the Moxifloxacin group and 15% in the Cefotaxime group. No significant difference was observed (p = 0.62). Adverse effects were minimal in both groups, with 2 patients in the Moxifloxacin group experiencing mild gastrointestinal disturbances and 3 patients in the Cefotaxime group experiencing mild allergic reactions. None of the adverse effects were severe. [Table 2].

Table 1: Baseline Characteristics of Study Participants

Characteristic	Moxifloxacin Group (n=65)	Cefotaxime Group (n=65)	p-value
Age (years)	55±9	56±8	0.45
Male/Female	40/25	42/23	0.56
MELD Score	14±4	13±5	0.37
Baseline ANC (cells/µL)	450±50	448±52	0.81

Table 2: Clinical outcomes among groups

Outcome	Moxifloxacin Group (n=65)	Cefotaxime Group (n=65)	p-value
Infection Resolution	90%	85%	0.45
Clinical Improvement	85%	80%	0.62
30-day Mortality Rate	12%	15%	0.62
Adverse Effects	2 (3%)	3 (4%)	0.75

Table 3: Logistic Regression Analysis for Factors Influencing Infection Resolution

Variable	OR (95% CI)	p-value
Age (years)	1.02 (0.98-1.06)	0.42
MELD Score	0.94 (0.88-1.00)	0.07
Baseline ANC (cells/µL)	0.99 (0.98-1.00)	0.15
Antibiotic (Moxifloxacin)	1.22 (0.81-1.83)	0.34

DISCUSSION

This paper has compared the effectiveness of Moxifloxacin and Cefotaxime on SBP in cirrhotic patients. The two antibiotics had high infection resolution rates (90% when using Moxifloxacin and 85% when using Cefotaxime), and this means that Moxifloxacin is as effective as Cefotaxime when treating this condition. These results are in line with the research findings which have indicated that fluoroquinolone agents such as Moxifloxacin have the capability of giving effective coverage against gram-negative infections to cirrhotic patients and no significant differences were observed between them and the third-generation cephalosporins when it comes to treating the infection[11,12]. This is demonstrated by the high rate of infection remission in both groups, which helps to emphasize that prompt and correct antibiotic treatment is a key factor in the mortality and morbidity reduction of cirrhotic patients with SBP.

In 85% of the Moxifloxacin group and 80 percent of the Cefotaxime group, the clinical improvement was observed, which is in line with other studies that compared fluoroquinolones and cephalosporins in treating infections among cirrhotic patients[13,14]. It is also true that the two clinical improvement rates were slightly different, but not statistically significant, which implies that the two antibiotics are equally effective, in mitigating symptoms like fever and stomach pains, among others.

The 30-day mortality rates did not differ significantly between the two groups (12% in the Moxifloxacin and 15% in Cefotaxime) as well, which once again helps to prove that the two antibiotics provide similar survival rates. The general results of the past have indicated that the mortality rate among SBP patients depends more on the liver functionality and severity of the illness than on the antibiotics therapy used[15,16].

The safety effects of both groups were quite low, which is not unusual considering the safety profiles of Moxifloxacin and Cefotaxime. The most frequent side effects noted are gastrointestinal disturbances and allergic reactions, although both antibiotics have a fairly good safety profile in cirrhotic patients[17,18].

The logistic regression analysis revealed that the age, MELD score, and baseline ANC did not have a significant effect on the resolution of infection, thus showing that both Moxifloxacin and Cefotaxime were effective in various patient groups. This implies that the selection of antibiotic might not require any manipulation according to these factors, and both drugs should work as a treatment of SBP in patients with cirrhosis[19].

Although these results are encouraging, additional research with bigger sample size and long-term follow-up is required to assess the long-term consequences of Moxifloxacin especially with regards to antibiotic resistance and emergence of multidrug-resistant organisms[20]. Also, newer antibiotics and combination therapy should be examined in the future on the effectiveness of these methods on the treatment of SBP in patients with cirrhosis.

CONLUSION

Moxifloxacin is as effective as Cefotaxime in treating SBP in cirrhotic patients, with no significant differences in clinical outcomes, infection resolution, or mortality rates. Both antibiotics were safe, with minimal adverse effects. Given its once-daily dosing regimen and broad spectrum of activity, Moxifloxacin may be a suitable alternative to Cefotaxime in treating SBP in cirrhotic patients.

DECLARATION

Conflict of Interest: The authors declare no conflict of interest.

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Author's Contribution: All authors contributed equally in the complication of current study.

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Data Availability Statement: The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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