

# Comparative Analysis of Intravenous Ceftriaxone and Ciprofloxacin for the Treatment of Bacterial Peritonitis in Liver Cirrhosis

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## ABSTRACT

The Purpose of the current study to Evaluate the efficacy of intravenous ciprofloxacin with ceftriaxone for the treatment of bacterial peritonitis in patients of liver cirrhosis at PIMS Hospital Islamabad from January 2021 to June 2021 at Department of Medicine .A total of 260 patients of liver cirrhosis were selected for this study. Patients were randomly allocated in two groups (Group A and B). Patients aged 13 to 60 years of both genders with established liver cirrhosis, diagnosed on ultrasound abdomen were included in this study. Patients with hemorrhagic or malignant ascites, peritonitis, tuberculosis peritonitis, hepatocellular carcinoma and diabetes mellitus were excluded from study. In group A, 130 patients were given intravenous ciprofloxacin 200mg 12 hourly and in group B 130 patients on ceftriaxone 1g 12 hourly. Treatment was given for 5 days and efficacy of treatment was determined by means of evaluating clinical symptoms. The mean age of the patients in group A was 43.4±10.4 years and in group B was 44.2±10.2 years. In group A there were 90(70%) patients and 95(73.3%) patients in group B in whom spontaneous bacterial peritonitis was settled down. The Result of the current study suggest that Intravenous is as effective as ceftriaxone in the treatment of spontaneous bacterial peritonitis in cirrhotic patients.

**Keywords:** liver cirrhosis, ciprofloxacin, bacterial peritonitis, ceftriaxone

## INTRODUCTION

Liver cirrhosis is defined as necrosis of the liver parenchyma followed by fibrosis and regeneration (1) Liver cirrhosis is sequel of chronic hepatitis e.g. chronic hepatitis "B", hepatitis "C", alcohol related liver damage, autoimmune hepatitis and haemochromatosis (2). Ascites is the most common complication of cirrhosis (3). Due to inadequate defense mechanism cirrhotic patients with ascites have an increased susceptibility to infections, the most frequent and the most severe one being spontaneous bacterial peritonitis (SBP) (4). Spontaneous bacterial peritonitis is the infection of ascitic fluid in patients with decompensated cirrhosis (5). It occurs in 10-30% of the patients with Ascites (6). Spontaneous bacterial peritonitis involves the translocation of bacteria from the intestinal lumen to the lymph nodes, with subsequent bacteremia and infection of the ascetic fluid. E. coli is the commonest organism followed by streptococcal pneumoniae (7) Symptoms of infection occur in most patients with spontaneous bacterial peritonitis including fever, abdominal pain, mental status changes and ileus (8).A symptomatic spontaneous bacterial peritonitis can be present as first presentation of ascites in chronic liver disease patients (9). Patients with spontaneous bacterial peritonitis has a mortality rate ranging between 30-50% (10).early diagnoses and prompt treatment with antibiotic can save patients lives(11). Different options in antibiotics are ceftriaxone, cefotaxime, ampicillin, ciprofloxacin, ofloxacin and metronidazole. Cefotaxime or ceftriaxone were considered the first choice antibiotic for empirical treatment in cirrhotic patients developing spontaneous bacterial peritonitis. It has been suggested that ciprofloxacin could be an alternative to cefotaxime or ceftriaxone in cirrhotic patients developing spontaneous bacterial peritonitis. The resolution of spontaneous bacterial peritonitis was found 80% vs. 83% in intravenous ciprofloxacin and ceftriaxone groups respectively. These results suggest that intravenous ciprofloxacin is as effective as cefotaxime and ceftriaxone in the empirical treatment of spontaneous bacterial peritonitis in cirrhotic patients, and is also less expensive (12). However, no study has been conducted uptill now to compare the efficacy of third generation cephalosporins (ceftriaxone) and quinolones (ciprofloxacin). The

present study is designed to compare the effectiveness of intravenous ciprofloxacin and ceftriaxone in the management of spontaneous bacterial peritonitis so as to determine the frequent use of one over the other.

## MATERIAL AND METHODS

A total of 260 patients of liver cirrhosis who fulfilled the inclusion criteria were selected from all Medical Wards of PIMS Hospital Islamabad from January 2021 to June 2021. Informed consent was taken for taking part in the study and confidentiality was ensured to all the patients. Demographic characteristics like age and sex were recorded. Patients aged 13 to 60 years of both genders with established liver cirrhosis, diagnosed on ultrasound abdomen were included in this study Patients with hemorrhagic or malignant ascites, peritonitis, tuberculosis peritonitis, hepatocellular carcinoma and diabetes mellitus were excluded from study. Liver cirrhosis was confirmed on ultrasound abdomen. Diagnosis of spontaneous bacterial peritonitis was suspected on history and relevant clinically examination as mentioned above and were confirmed on the ascitic fluid routine examination. Patients were randomly allocated in two groups using random number table (Group A and B). In group A, 130 patients were given intravenous ciprofloxacin 200mg 12 hourly and in group B 130 patients on ceftriaxone 1g 12 hourly. Treatment was given for 5 days and efficacy of treatment was determined by means of evaluating clinical symptoms, i.e., decrease in temperature to normal 98.6°F, no abdominal pain, determining the ascitic fluid neutrophil count after consecutive 5 days. All the collected data was entered into SPSS versions 11 and analyzed. Qualitative variables like sex were presented as frequency and percentage. Quantitative variable like age was presented as mean and standard deviation. The final outcome i.e. resolution of spontaneous bacterial peritonitis (Yes, No) was compared between the two groups by Chi Square test. P<0.05 was considered as significant.

## RESULTS

The mean age of the patients in group A was 43.4±10.4 years and in group B was 44.2±10.2 years. In group A, there are 95(75%)

male patients and 35(25%) female patient and in group B 83(69.2%) male patients and 37(30.8%) female patients. In the ascitic fluid polymorph nuclear count (AFPC), on day 5 the mean AFPC in group A was  $243.9 \pm 35.1$  cells/cubic millimeter and in group B was  $245.7 \pm 17.1$  cells/cubic millimeter. In the spontaneous bacterial peritonitis settled down, in group A 92(70%) patients in whom spontaneous bacterial peritonitis settled down and in group B 93 (73.3%) patients in whom spontaneous bacterial peritonitis settled down.

## DISCUSSION

Due to inadequate defense mechanism cirrhotic patients with ascites have an increased susceptibility to infections, the most frequent and the most severe one being spontaneous bacterial peritonitis (SBP) (13). Spontaneous bacterial peritonitis is the infection of ascitic fluid in patients with decompensated cirrhosis (14) It occurs in 10-30% of the patients with Ascites (15). Spontaneous bacterial peritonitis involves the translocation of bacteria from the intestinal lumen to the lymph nodes, with subsequent bacteremia and infection of the ascitic fluid. *E. coli* is the commonest organism followed by streptococcal pneumoniae (16). Symptoms of infection occur in most patients with spontaneous bacterial peritonitis including fever, abdominal pain, mental status changes and ileus. A symptomatic spontaneous bacterial peritonitis can be present as first presentation of ascites in chronic liver disease patients (17). Patients with spontaneous bacterial peritonitis has a mortality rate ranging between 30-50% (18). Early diagnoses and prompt treatment with antibiotic can save patients lives (19). Different options in antibiotics are ceftriaxone, cefotaxime, ampicillin, ciprofloxacin ofloxacin and metronidazole. Cefotaxime or ceftriaxone were considered the first-choice antibiotic for empirical treatment in cirrhotic patients developing spontaneous bacterial peritonitis. It has been suggested that ciprofloxacin could be an alternative to cefotaxime or ceftriaxone in cirrhotic patients developing spontaneous bacterial peritonitis. The resolution of spontaneous bacterial peritonitis was found 80% vs. 83% in intravenous ciprofloxacin and ceftriaxone groups respectively. These results suggest that Intravenous ciprofloxacin is as effective as cefotaxime and ceftriaxone in the empirical treatment of spontaneous bacterial peritonitis in cirrhotic patients, and is also less expensive (20). In our study the mean age of the patients in group A was  $43.4 \pm 10.4$  years and in group B was  $44.2 \pm 10.2$  years. As compared with the study of Fransa et al (21). The mean age of the patients was 45 years, which is comparable with our study. In our study, in group A, 75% male patients and 25% female patients. In group B 69.2% male patients and 30.8% female patients. As compared with the study of Fransa et al (11) 70% male and 30% female patients, which is comparable with our study. In our study, in group A, 70% patients in whom spontaneous bacterial peritonitis was settled down and in group B, 73.3% patients in whom spontaneous bacterial peritonitis was settled down. As compared with the study of Tuncer et al (10) the resolution of spontaneous bacterial peritonitis was found 80% vs. 83% in intravenous ciprofloxacin and ceftriaxone groups respectively. According to the study of Angeli et al (22). Intravenous oral step-down schedule was possible in 82% patients who received ciprofloxacin in which 74% patients were

discharged before the end of antibiotic treatment and completed it at home. Eighty patients were allocated to receive ciprofloxacin. Intravenous 200 mg/12 h for 7 days (group A, n= 40) or i.v. 200 mg/12 h during 2 days followed by oral 500 mg/12 h for 5 days (group B, n=40). All patients with spontaneous bacterial peritonitis admitted to the hospital were included. The infection resolution rate was 76.3% in group A and 78.4% in group B (23).

## CONCLUSION

These results suggest that intravenous ciprofloxacin is as effective as ceftriaxone in the treatment of spontaneous bacterial peritonitis in cirrhotic patients, and is also less expensive. Short course (5 days) of intravenous ciprofloxacin and ceftriaxone are useful therapy for SBP. If the polymorph nuclear differential count in ascitic fluid is less than 250 cells/mm<sup>3</sup> on day 5 of treatment, the antibiotic can be discontinued.

## REFERENCES

- Nazish Z, Inayatullah M, Nasir SA, Arshad M, Tanveer S, Naqvi AB. Liver cirrhosis: clinical presentation. *Professional Med J* 2002; 9: 207-12.
- Van Erpecum KJ. Ascites and spontaneous bacterial peritonitis in patients with liver cirrhosis. *Scan J Gastroenterol* 2006; 243: 79-84.
- Gines P, Cardenas A, Arroyo V, Rodes J. Management of cirrhosis and ascites. *N Engl J Med* 2004; 350: 1646-54.
- Caruntu FA, Benea L. Spontaneous bacterial peritonitis: Pathogenesis, diagnosis treatment. *J Gastrointestin Liver Dis* 2006; 15: 51-6.
- Sheer TA, Runyon BA. Spontaneous bacterial peritonitis. *Dig Dis* 2005; 23: 39-46.
- Iqbal S, Iman NU, Alam N, Rahman SU. Incidence of spontaneous bacterial peritonitis in liver cirrhosis, the causative organisms and antibiotic sensitivity. *J Postgrad Med Inst* 2004; 18: 614-9.
- Khan DM, Shah AR, Ashfaq M, Waheed I, Bhatti T, Ahmed S. Frequency of Asymptomatic spontaneous bacterial peritonitis in chronic liver disease patients with first presentation of ascites. *Ann KE Med Coll* 2004; 10: 144-5.
- Thevenot T, Cadranet JF, Nguyen-Khac E, Tilmant L, Tiry C, Welty S, et al. Diagnosis of spontaneous bacterial peritonitis in cirrhotic patients by use of two reagent strips. *Eur J Gastroenterol Hepatol* 2004; 16: 579-80.
- Sarwar S, Alam A, Izhar M, Khan AA, Butt AK, Shafiqat F, et al. Bedside diagnosis of spontaneous bacterial peritonitis using reagent strips. *J Coll Physicians Surg Pak* 2005; 15: 418-21.
- Tuncer I, Topcu N, Durmus A, Turkdogan MK. Oral ciprofloxacin versus intravenous cefotaxime and ceftriaxone in the treatment of spontaneous bacterial peritonitis. *Hepatogastroenterology* 2003; 50:1426-30.
- Fransa A, Giordano HM, Seva-Pereira T, Soares EC. Five days of ceftriaxone to treat spontaneous bacterial peritonitis in cirrhotic patients. *J Gastroenterol* 2002; 37: 119-22.
- Angeli P, Guarda S, Fasolato S, Miola E, Craighero R, Piccolo F, et al. Switch therapy with ciprofloxacin vs. intravenous ceftazidime in the treatment of spontaneous bacterial peritonitis in patients with cirrhosis: similar efficacy at lower cost. *Aliment Pharmacol Ther* 2006; 23:75-84.
- Terg R, Cobas S, Fassio E, Landeira G, Raos B, Vasen W, et al. Oral ciprofloxacin after a short course of intravenous ciprofloxacin in the treatment of spontaneous bacterial peritonitis: results of a multicenter, randomized study. *Hepatol* 2000; 33: 564.