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Original Article

Effect of intensive infection prevention on hepatitis B patients with cirrhosis who underwent hemodialysis

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Abstract: Objective: To observe and analyze the effect of intensive infection prevention on hemodialysis patients with hepatitis B complicated by cirrhosis. Methods: A total of 84 patients with hepatitis B complicated by cirrhosis admitted to our hospital between January 2015 and December 2016 were enrolled in the present study. They were randomly allocated into the control group (n=42) and the research group (n=42). Among them, the control group received routine hemodialysis and infection prevention whereas the research group received intensive infection prevention during hemodialysis. The improvement in lifestyle, the incidence of infection during hemodialysis, the length of hospital stay and the satisfaction degree after hemodialysis were observed and analyzed in the patients in the two groups during one-year follow-up. Results: After treatment, the performance of the patients in the two groups in reasonable diet, enforced exercise, emotional abnormalities and disinfection and isolation were significantly improved (All P<0.05). When compared to the control group, the improvement in lifestyle was significantly better among the patients in the research group (All P<0.05). The infection rates of the research group and the control group were 7.1% and 26.19%, respectively (P=0.019). Significantly shorter hospital stay was also found in the research group (P=0.000). Significantly higher scores of service attitude, prevention skills and components were observed in the research group, as well as higher overall satisfaction score (All P<0.001). Conclusion: Intensive infection prevention not only is effective in reducing the occurrence of infection and shortening the length of hospital stay, but also improves the satisfaction degree and the quality of life in the hepatitis B patients with combined with cirrhosis.

Keywords: Intensive infection prevention, hemodialysis, hepatitis B, cirrhosis, control effect

Introduction

Hepatitis B is an infectious disease associated with hepatitis B virus. The sign of infection is positive antigen on the surface of serum hepatitis B. Besides, persistent infection of hepatitis B virus may cause necrosis of hepatocytes, ending in cirrhosis. Therefore, hepatitis B virus infection is closely associated with posthepatitic liver cirrhosis [1, 2]. Hemodialysis is an effective technique for clinical treatment of liver diseases. It is a process of purifying the blood by a dialyzer to achieve the purpose of treatment. Over the years, hemodialysis is increasingly used in clinical practice. However, as posthepatitic liver cirrhosis is the end stage of a liver disease, the patient is, in the process of hemodialysis, prone to be infected, which further aggravates the patient's pain in the process of treatment, prolongs hospitalization time and seriously affects the quality of life of the patient [3-5]. With the aim to reduce the risk for nosocomial infection and provide reliable evidence for clinical prevention and treatment, 84 patients with hepatitis B complicated by cirrhosis who had hemodialysis were randomly enrolled in the study to explore the effect of the targeted intensive infection prevention in the course of dialysis.

Table 1. General data of two both groups

Variable	Research (n=42)	Control (n=42)	P
Gender (male/female, n)	29/13	27/15	0.125
Age (year)	53.26±4.31	51.33±4.24	0.138
Dialysis (month)	6.92±1.21	6.81±1.09	0.173
Previous blood transfusion (n)	13 (30.95%)	11 (26.19%)	0.089
MELD score	24.8±2.7	23.9±2.5	0.175

Note: the MELD denotes the Model for End-stage Liver Disease which is a scoring system developed to predict the mortality and postoperative survival in patients with end-stage liver disease. It is calculated according to the following formula: MELD=3.78 * ln (serum bilirubin (mg/dL)) + 11.2 * ln (INR) + 9.57 * ln (serum creatinine (mg/dL)) + 6.43 * (etiology: bile or alcoholic 0, and other 1). Higher R value indicates greater risk and lower survival rate.

Materials and methods

Subject inclusion and randomization

A total of 84 patients with hepatitis B complicated by cirrhosis who were treated in our hospital between January 2015 and December 2016 were enrolled in our study. All the patients were randomized into the research group (n=42) or the control group (n=42) in terms of a random number table. The patients were included if they met the diagnostic criteria for posthepatitic cirrhosis and needed dialysis, had no dysphasia, no hearing nor mental disorders, no serious acidosis, excessive load capacity, hyperkalemia or other complications, and had completed secondary school education or higher. The patients were excluded if they were long-term bedridden, pregnant, or complicated with severe hypertension, cardiovascular or cerebrovascular diseases. In addition, patients with any disease in the blood system, tumor or other diseases were also excluded. The study was conducted after it was approved by the Hospital Ethics Committee and each patient and their families had provided written informed consents.

Intervention and comparison

Both groups received hemodialysis with the same model. The patients in the control group received routine hemodialysis and conventional infection prevention and control such as the use of disposable dialyzers, puncture needles and dialysis tubing; wore hats, masks and medical gloves during the dialysis.

The patients in the research group were given intensive infection prevention and control in the process of hemodialysis, and the procedures were as follows: firstly, a management system covering the establishment of reasonable procedures and improvements in the management and organization of all the staff in the hospital against the infections was established and improved; secondly, the staff in the hospital were trained for control of nosocomial infection, requiring them to acquire the knowledge on nosocomial infection, relevant laws and regulations as well as the skills on standardized operation on a monthly basis, so that all the staff could develop standard and institutionalized working styles; thirdly, the disinfection and isolation system were implemented strictly covering the disinfection of the air and the surface of the objects, and of dialyzers, along with the hand hygiene system; fourthly, the detection system was strictly followed on a monthly basis, controlling the total bacteria colony count ≤ 10 cfu/cm^2 on the object surface, total colony count ≤ 4 cfu/(5 min. 9 cm diameter culture dish) in the air and the hand hygiene of the staff ≤ 10 cfu/cm^2; finally, the occupational prevention and protection were enhanced, requiring the staff to receive regular tests of liver function, hepatitis B and hepatitis C viruses, to make sure their liver function normal, hepatitis B surface antigen negative and HCV antibody negative.

Follow-up

All the patients in both groups were followed for one year. They were required to pay regular clinical visits and receive telephone per month. The follow-ups covered improvements in reasonable diets, intensive exercise, emotional abnormality and disinfection and isolation, infection rates as well as satisfaction degree of the patients.

Criteria for therapeutic effect evaluation

The improvements of the patients in the lifestyles during 1-year follow-up, infection rates during hemodialysis, hospitalization as well as their satisfaction with the treatment after hemodialysis were observed and analyzed in the two groups.

Patient satisfaction evaluation: each satisfaction questionnaire was completed by one inves-

Table 2. Improvement in lifestyle in the patients of the two groups (n, %)

Group	Reasonable diet		Intensive exercise		Emotional abnormalities		Disinfection & isolation	
	Pre-p	Post-p	Pre-p	Post-p	Pre-p	Post-p	Pre-p	Post-p
Research	21 (50.00)	39 (92.86)*	20 (47.62)	38 (90.48)*	31 (73.81)	9 (21.43)*	11 (26.19)	40 (95.24)*
Control	19 (45.24)	31 (73.81)*	21 (50.00	29 (69.05)*	32 (76.19)	18 (42.86)*	13 (30.95)	33 (78.57)*
X^2 (same time point)	0.191	5.486	0.048	5.973	0.064	4.421	0.233	5.126
P	0.662	0.019	0.827	0.015	0.801	0.036	0.631	0.024

Note: In comparison with those before prevention, *P<0.05. Pre-p denotes pre-prevention and post-p post-prevention.

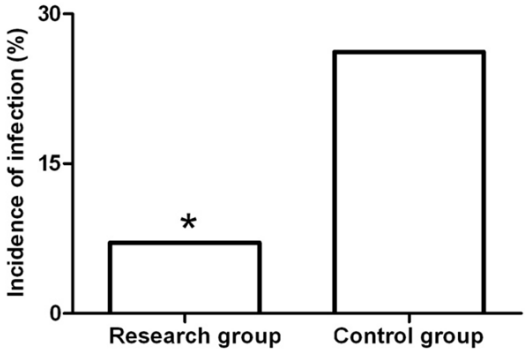

Figure 1. The incidence of infection in both groups. *Comparison with the control group, P=0.019.

tigator and one patient. The grades included dissatisfaction, satisfaction and extreme satisfaction.

Statistical analysis

The SPSS 18.0 for windows software was applied for statistical analyses. The patients' improvements in lifestyle and other count data were described as rates and the differences across the groups were compared using a chi-square test. The comparisons of improvements in lifestyle within the group before and after treatment were made with the use of paired chi-square tests whereas the comparisons between groups before and after treatment were performed with conventional chi-square tests. The measurement data were described as mean ± standard deviation. An independent t-test was utilized to make comparisons between groups. A *P* value less than 0.05 was considered to be statistically significant.

Results

Comparison of general data of two both groups

Forty-two patients (27 males and 15 females) were enrolled in the control group, with an age ranging from 41 to 85 years (mean age, 51.33±4.24 years), dialysis time varied from 3 to 11 months (mean, 6.81±1.09 months), and previous blood transfusion in 11 patients. By contrast, Forty-two patients (29 males and 13 females) were enrolled in the research group, aged 39-86 years (mean, 53.26±4.31 years), dialysis time ranging from 4 to 12 months (mean, 6.92±1.21 months), and previous blood transfusion in 13 patients. No significant differences in general data including gender, age, dialysis time, previous blood transfusion and MELD scores were found between the two groups , and they were comparable (P>0.05, **Table 1**).

Comparison of the improvement in lifestyle in patients of the two groups

The variables of lifestyle (reasonable diet, intensive exercise, emotional abnormalities and disinfection and isolation) in the research group improved significantly after intensive prevention as compared to those before prevention (All P<0.05). Likewise, the variables of lifestyle in the control group were also improved more considerably after general prevention (All P<0.05). No significant differences in improvements in lifestyle were shown before prevention between the two groups. However, improvement in lifestyle after prevention was significantly greater in the research group than in the control group (All P<0.05, **Table 2**).

The incidence of infection and hospitalization in hemodialysis between the patients of the two groups

The incidence of infection and hospitalization of the two groups were observed in the patients during hemodialysis. Intervention occurred in three patients in the research group. Among them, two were puncture-site skin infections and one was catheter-related infection, with an infection rate of 7.1%. In the control group, 11

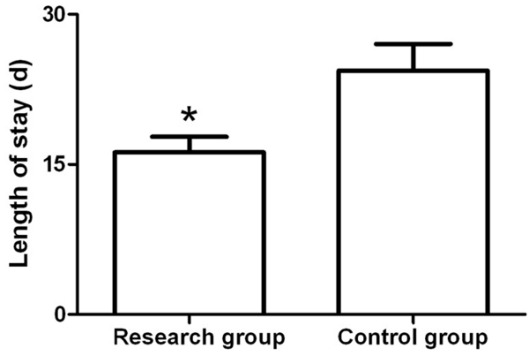

Figure 2. The hospitalization time in both groups. *Comparison with the control group, P=0.000.

patients were infected, in whom four had puncture-site skin infections, four respiratory infections, and three catheter-related infections, with an infection rate of 26.19%. The two groups were significantly different (X^2=5.486, P=0.019; **Figure 1**).

Significant difference in the hospitalization time was found between the control group (24.37±2.67 d) and the research group (16.31 ±1.54 d), as shown in **Figure 2** (t=17.157, P=0.000).

Results of post-prevention satisfaction surveys of patients in the two groups

After treatment, patient satisfaction surveys were performed conducted to the patients of the two groups, and satisfaction of the patients to the intensive infection prevention was analyzed. The rate of satisfaction was significantly higher, but that of dissatisfaction was significantly lower in the research group than in the control group. As a result, the overall scores of satisfaction were also significantly higher in the research group (P<0.05, **Table 3**).

Discussion

In recent years, with a trend of yearly increase in the incidence of liver disease, patients with hepatitis B complicated by cirrhosis have become a growing population in China. For this reason, how to treat the disease effectively is a major difficulty in the medical world [6, 7]. Hemodialysis is a process of purifying the blood of a patient to achieve the extracorporeal removal of metabolites from the blood and maintenance of the acid-base and electrolyte homeostasis by replacing the blood of a patient with the electrolyte solution similar to that in the body with a dialyzer, which has a positive impact on the recovery of patient [8, 9]. Hemodialysis is one of the main alternative methods for management of patients with hepatitis B complicated by cirrhosis. Infection is a major complication of hemodialysis. Previous studies have shown that the rate of virus infection in patients with hepatitis B during hemodialysis maintains extremely high [10-14]. Long-term hemodialysis may cause certain damage to the patient's cellular and humoral immune functions. In addition, as the hemodialysis room is also a high-risk area for infection in the hospital, the patients undergoing hemodialysis are at higher risk for infection than ordinary inpatients [15-17]. Moreover, among the patients undergoing dialysis, elderly patients, due to their low immunity, were more vulnerable to infection in the process of dialysis, seriously affecting the patient's long-term survival and quality of life. In addition to autoimmunity of the patients, their nutritional status, hospital environment and self-protection awareness are also closely associated with the presence of infection in patients in the process of hemodialysis. This exerts detrimental impacts on both recovery and the quality of clinical treatment in patients, leading to great damage to the patients [18-20].

In the present study, we analyzed the dialysis picture of the enrolled patients with hepatitis B complicated by cirrhosis, conducted corresponding intensive infection prevention and comprehensive management and monitoring, trying to control and prevent infection in the process of dialysis.

The results in the study revealed that patients receiving intensive infection prevention were significantly less likely to develop infection during hemodialysis after treatment than those who received conventional care interventions, which was consistent with the findings in the previous studies [21-23]. Markedly shorter treatment time was required in patients with hepatitis B complicated by cirrhosis due to the lower incidence of infection, so they needed shorter length of hospital stay than those receiving conventional care. In the present study, we also found that after intensive infection prevention in patients with hepatitis B complicated by cirrhosis, a good understanding of the knowledge-related infection of both

Table 3. The results of satisfaction surveys of patients in the two groups after treatment (n, %)

Group	Case	Dissatisfaction	Satisfaction	Extreme satisfaction	Overall satisfaction
Research	42	10 (23.81%)	21 (50%)	11 (26.19%)	32 (76.19%)
Control	42	1 (2.38%)	14 (33.33%)	27 (64.29%)	41 (97.62%)*
X^2 value		17.409	22.672	20.524	25.167
P value		0.000	0.000	0.000	0.000

Note: In comparison with those before prevention, *P<0.05.

patients and their health care workers and effective measures for prevention from dual infection by the health care workers during dialysis contributed to a lower infection rate and shorter hospital stay in the patients. Furthermore, the findings of the study also demonstrated after intensive infection prevention, the patients' lifestyle was improved significantly. The patients could consciously follow a reasonable diet in daily lives, reinforced their exercise and conducted corresponding disinfection and isolation. Moreover, the rate of emotional abnormalities dropped to 21.43% from 73.81% of that before treatment. What's more, in the surveys of satisfaction of the patients at the end of the treatment, the overall score for satisfaction with hemodialysis was significantly higher in the patients receiving intensive infection prevention than those without intensive infection prevention, suggesting that intensive infection prevention could made great improvements in the service attitudes of the medical workers, preventive skills and components of prevention, ultimately improving the effectiveness of treatment and bettering the doctor-patient relationship as it was targeted at solving the problems arising in the process of treatment.

The application of intensive infection prevention had a significant effect on infection control in patients with hepatitis B complicated by cirrhosis, who had undergone hemodialysis. Therefore, we can extensively use it in the clinical treatment, conduct dissemination and education concerning in-hospital infection control among the patients and their family members in the hospital, deepen the understanding concerning the presence of in-hospital infection and hazards of the patients, their families and health care workers, and perform dialysis in strict following of the operating norms. Besides, the company of the patients' family members in the process of dialysis should be under strict control to avoid the occurrence of infection caused by increased bacterial concentration in the ward.

In conclusion, the application of intensive infection prevention during hemodialysis could improve the lifestyle of patients with hepatitis B complicated by cirrhosis, reduce the incidence of infection and length of hospital stay, and improve the patient's sense of satisfaction. Therefore, intensive infection prevention is effective and worthy of promotion in clinical practice.

Disclosure of conflict of interest

None.

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