Analysis of the clinical efficacy of continuous slow and low-efficiency dialysis in the treatment of end-stage renal disease complicated with refractory heart failure and refractory hypertension

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Abstract: To study the Sustained Low Efficiency Dialysis (SLED) in the treatment of end-stage renal disease with refractory heart failure and the clinical curative effect of refractory hypertension, choose department of Nephrology, third People's Hospital of Gansu Province of 54 cases of end-stage renal disease with refractory heart failure. The patients with intractable hypertension were randomly divided into control group and observation group, with 27 cases in each group. The control group was treated with Intermittent HemoDialysis (IHD), the observation group was treated with SLED for 2 weeks. The levels of Scr, mean arterial pressure (MAP), BUN, heart rate (HR), CRP, IL-1β, TNF-α, TP, Alb and Hb in the observation group were better than those in the control group, and Closer to normal. The continuous low-efficiency and slow approach is better than the intermittent approach for hemodialysis in the treatment of end-stage renal disease complicated by refractory heart failure and refractory hypertension, which has a better treatment and prognostic effect, and can be promoted in clinical treatment.

Key words: Continuous slow inefficient dialysis; End-stage renal disease; Heart failure; High blood pressure.

1. Introduction

Although the incidence of End-stage renal disease (ESRD) complicated with refractory heart failure and refractory hypertension is low, the optimal treatment is still uncertain, which is one of the major challenges facing the social medical system. Worldwide, the prevalence of ESRD varies from 5.0 to 84.4 per million age-related population. Hypertension (HTN) is a part of the clinical features of ESRD, and HTN is found in 27-79% of patients with end-stage renal disease (ESRD) [1-6]. The early characteristic phenomenon of ESRD patients, with the decline and decline of renal function, can lead to the accumulation of toxins, accompanied by a series of complications such as anemia, heart failure and hypertension, leading to the decline of the survival happiness index of patients. In recent years, significant progress has been made in hemodialysis for the treatment of ESRD, but patients are not satisfied with its clinical effect, and at the same time, the incidence is becoming increasingly prominent. Therefore, it is crucial to explore the mode of ESRD treatment by hemodialysis [7]. Therefore, it is urgent to study the better dialysis method in the comprehensive treatment of ESRD. This study mainly observed and compared the clinical efficacy of intermittent hemodialysis and slow low-efficiency dialysis in the treatment of end-stage renal disease complicated with refractory heart failure and refractory hypertension.

2. Research Methods

2.1 Research Objects

A total of 54 patients were selected and treated in the Department of Nephrology, the Third People's Hospital of Gansu Province from June 2018 to 20216. They were randomly divided into the control group and the observation group, 27 cases in each group. The observation group was treated with continuous low efficiency and slow dialysis therapy, while the control group was treated with intermittent hemodialysis. There were no significant differences in gender, age, body mass index and onset characteristics between the two groups (P>0.05), as shown in Table 1. Inclusion criteria: confirmed end-stage renal disease complicated with refractory heart failure and refractory hypertension; 60 or higher; Complete clinical data; Receiving dialysis for the first time; Free of cancer; Glomerular filtration rate ≤15ml
/min); Not suffering from fatal diseases such as malignant tumors; No liver dysfunction.

Table 1 Comparison of general clinical data of ESRD patients (x±s)

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Male/female (n)</th>
<th>Age (years)</th>
<th>BM (kg/m²)</th>
<th>Primary disease type (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The control group</td>
<td>27</td>
<td>13/14</td>
<td>65.2±3.4</td>
<td>22.0±2.3</td>
<td>16/3</td>
</tr>
<tr>
<td>The observation group</td>
<td>27</td>
<td>13/14</td>
<td>66.4±3.2</td>
<td>22.4±2.4</td>
<td></td>
</tr>
</tbody>
</table>

2.2 Effectiveness and safety assessment

General data of patients treated by SLED and IHD were collected: Gender, age, etc., Mean serum creatinine (Scr), albumin (Alb), hemoglobin (Hb), Na⁺, blood urea nitrogen (BUN), mean arterial pressure (MAP), Ca²⁺, heart rate (HR), C-reactive protein (CRP), tumor necrosis factor (TNF)-α, K⁺, total protein (TP), P3⁺, interleukin (IL)-1β, using C-reactive protein (CRP) level as a factor for exploratory analysis of mean Hb level.

2.3 Statistical Methods

SPSS 24.0 was used for statistical analysis of the results. Quantitative data were expressed as mean ± standard deviation, and categorical variables were expressed as numbers and percentages. When test level α=0.05, P < 0.10 indicates significance.

3. Results

3.1 Comparison of solute molecules between the two groups before and after dialysis

The results showed (Table 2) that before dialysis, there was no significant difference in the indexes between the two groups, but after dialysis treatment, the indexes of the observation group were better than the control group (P<0.05).

Table 2 Comparison of solute molecular levels in ESRD patients (x±s)

<table>
<thead>
<tr>
<th>Group</th>
<th>BU (m mol/L)</th>
<th>Ser (μ mol/L)</th>
<th>Na⁺ (m mol/L)</th>
<th>K⁺ (m mol/L)</th>
<th>Ca²⁺ (m mol/L)</th>
<th>P³⁺ (m mol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The control group</td>
<td>After dialysis</td>
<td>19.1±3.6</td>
<td>73±4.8</td>
<td>145±10.4</td>
<td>5.35±0.2</td>
<td>2.54±0.6</td>
</tr>
<tr>
<td>The observation group</td>
<td>After dialysis</td>
<td>37±2.4</td>
<td>100±6.5</td>
<td>144±8.4</td>
<td>5.27±0.3</td>
<td>2.67±0.3</td>
</tr>
</tbody>
</table>

3.2 Comparison of MAP and HR before and after dialysis between the two groups

After treatment, the MAP and HR of the observation group were better than those of the control group (P<0.05), and more close to the normal MAP and HR. Similarly, the comparison between the two groups before dialysis was not statistically significant, as shown in Table 3.

Table 3 Comparison of MAP and HR before and after dialysis between two groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Before dialysis</th>
<th>After dialysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>The observation group</td>
<td>80.44±6.65</td>
<td>91.76±8.89</td>
</tr>
<tr>
<td>The control group</td>
<td>77.76±5.46</td>
<td>86.83±7.89</td>
</tr>
</tbody>
</table>

3.3 Comparison of TP, Alb and Hb before and after dialysis between the two groups

There was no difference in TP, Alb and Hb between the two groups before dialysis (all P>0.05). After treatment, the levels of TP, Alb and Hb in the two groups were significantly higher than those before treatment (all P<0.001). After treatment, the treatment effect of the
observation group was higher than that of the control group, with a significant difference. See Table 4 for details.

3.4 Comparison of CRP, IL-1β and TNF-α before and after dialysis between the two groups

There was no significant difference in the levels of three inflammatory factors detected before treatment between the two groups (P> 0.05), but the levels of inflammatory factors after treatment were lower than those before treatment (all P< 0.01). The indexes of CRP, IL-1β and TNF-α in the observation group were significantly lower than those in the control group, as shown in Table 4.

Table 4 Comparison of TP, Alb and Hb levels and CRP, IL-1β and TNF-α indexes between the two groups (x±s)

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Hb (g/L)</th>
<th>CRP (mg/L)</th>
<th>TP (g/L)</th>
<th>IL-1β (ng/L)</th>
<th>Alb (g/L)</th>
<th>TNF-α (ng/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before dialysis</td>
<td></td>
<td>98.69±15.63</td>
<td>17.55±11.14</td>
<td>20.54±7.62</td>
<td>29.67±7.46</td>
<td>46.32±4.63</td>
<td></td>
</tr>
<tr>
<td>After dialysis</td>
<td>27</td>
<td>115.56±15.69</td>
<td>2.36±0.12</td>
<td>63.67±6.67</td>
<td>14.12±4.12</td>
<td>66.67±6.67</td>
<td>36.67±6.67</td>
</tr>
<tr>
<td>Before dialysis</td>
<td></td>
<td>96.69±14.69</td>
<td>18.52±5.52</td>
<td>15.68±5.18</td>
<td>65.67±5.67</td>
<td>13.67±5.67</td>
<td></td>
</tr>
<tr>
<td>After dialysis</td>
<td>27</td>
<td>110.23±15.23</td>
<td>3.60±0.60</td>
<td>14.53±4.53</td>
<td>17.41±4.19</td>
<td>19.41±4.19</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
<td>&lt;0.00</td>
</tr>
</tbody>
</table>

4. Conclusion

The number of ESRD patients is increasing. The most common known cause of death in ESRD patients is cardiovascular events [8], and some risk factors, such as diabetes, hypertension, uremia, increased inflammatory markers, vascular calcification, secondary hypothyroidism and other comorbidities increase the risk [9]. ESRD is defined as eGFR < 15 ml/min/1.73 m2, and ESRD patients need dialysis to maintain life [10]. The prognosis of patients with ESRD treated with dialysis is consistently poor, but their increased life expectancy has shifted medical attention from life-threatening emergencies to long-term complications and sequelae (such as cognitive decline due to structural brain abnormalities) [11-12]. Therefore, routine dialysis is not effective and can not achieve a good prognosis. Continuous slow and inefficient dialysis can better control blood volume by reducing the ultrafiltration rate during hemodialysis [13-16]. The results of this study showed that MAP and HR in the observation group were more stable than those in the control group before and after treatment, and the improvement of TP, Alb and Hb levels and CRP, IL-1β and TNF-α index levels before and after treatment were higher than those in the control group. It indicates that the sequelae transferred by continuous slow and inefficient dialysis may be less severe or less complicated than the prognosis of intermittent dialysis. In addition, the improvement of serum creatinine (Scr) and blood urea nitrogen (BUN) is significantly higher than that of intermittent dialysis, indicating that continuous slow and inefficient dialysis can better treat end-stage renal disease [17-20].
In conclusion, SELD has a high efficacy in the treatment of end-stage renal disease complicated with refractory heart failure and refractory hypertension. Therefore, SELD in the treatment of ESRD is worthy of clinical promotion and application. Compared with ordinary dialysis, SELD may cause fewer prognostic symptoms, but its promotion and application still need to be verified by further clinical trials.

References


