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To Analyze the Effect of Hemodialysis, Hemoperfusion, and Oral Olanzapine on Uremic Encephalopathy

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Abstract: *Objective*: To analyze the effects of hemodialysis, hemoperfusion, and oral olanzapine in patients with uremic encephalopathy. *Methods*: 70 patients with uremic encephalopathy admitted to the hospital from January 2023 to August 2024 were selected and divided into groups according to a random drawing method, with 35 cases in each group. The control group was treated with hemodialysis and olanzapine orally, and the observation group was treated with hemoperfusion. PANSS scores, biochemical indexes, and inflammatory factors were compared between the two groups. *Results*: PANSS score, biochemical indexes, and inflammatory factors in the observation group were significantly lower than those in the control group ($P < 0.05$). *Conclusion*: The triple therapy of hemodialysis, hemoperfusion, and olanzapine can obviously promote the improvement of the psychological state of the patients. In addition, this treatment can also relieve inflammation in the patients and accelerate the excretion of toxins in the body.

Keywords: Hemodialysis; Hemoperfusion; Oral olanzapine; Triple scheme; Uremic encephalopathy

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1. Introduction

Uremic encephalopathy is a disease of central nervous system dysfunction in patients with chronic renal failure due to toxin accumulation and electrolyte imbalance. This disease is characterized by insidious onset, high incidence, great harm, and high fatality rate, which not only threatens the life and health of patients and reduces their quality of life but also increases family pressure and economic burden [1]. Hemodialysis and blood perfusion are currently commonly used in the clinical treatment of this disease to help patients extend their survival time and improve their quality of life. However, the two treatment methods have a long course of treatment and are affected by many aspects, and the patient's psychological state is not ideal, resulting in poor treatment cooperation. Antipsychotics are needed to effectively inhibit the deterioration of uremic encephalopathy. As a new generation of antipsychotic drugs, Olanzapine has high safety and has shown good efficacy in changing mental and behavioral

aspects [2]. Therefore, this study selected 70 patients with urotoxic encephalopathy as the enrolled subjects to carry out a study on the clinical efficacy of triple hemodialysis plus blood perfusion plus olanzapine for this disease, as reported below.

2. Data and methods

2.1. General information

A total of 70 patients with uremic encephalopathy admitted to the hospital from January 2023 to August 2024 were selected and divided into groups according to a random drawing method, with 35 cases in each group. Observation group: 20 male and 15 female, 25–76 years old, mean 48.56 ± 6.71 years old. The control group: 19 male and 16 female, 26–77 years old, mean 48.36 ± 6.93 years old. Comparison of general data ($P > 0.05$).

2.2. Methods

After hospitalization, all enrolled subjects were given basic treatment such as hypotensive, hypoglycemic, and acid-base balance.

The control group was treated with hemodialysis + olanzapine orally, with hemodialysis for 4 h each time, twice a week; Olanzapine tablets, taken orally, 5 mg once a day. According to the actual situation of the patient, the drug should be reasonably increased, and the maximum daily dose should not exceed 10 mg [3–5]. Continuous treatment for 2 weeks.

In the observation group, hemoperfusion therapy was added to the above treatment, and the treatment lasted for 2 hours at first. After the perfusion apparatus reached saturation, the treatment was changed to hemodialysis therapy for 2 hours, twice a week [6–10]. The administration method of olanzapine tablets was the same as that of control group.

The hemodialysis machines, dialyzers, and olanzapine tablets used in both groups were supplied by the same manufacturer and had the same specifications and models.

2.3. Observation indicators

PANSS score was compared. The PANSS scale (full name: Positive and Negative Psychiatric Symptoms Rating Scale) was used for assessment, with a score range of 0–108 points. The higher the score, the worse the mental condition.

Biochemical indexes and inflammatory factors were compared.

2.4. Statistical analysis

SPSS 22.0 was used to analyze the relevant data.

3. Results

3.1. Comparison of PANSS scores

After treatment, the PANSS scores of the two groups were significantly different ($P < 0.05$) (**Table 1**).

Table 1. Comparison of PANSS scores (Mean ± SD, points)

Group	*n*	Negative symptom		Positive symptom		General psychopathology		Total points	
		Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Observation group	35	24.18 ± 2.36	10.30 ± 2.11	27.20 ± 2.41	9.01 ± 2.33	28.27 ± 2.86	12.01 ± 2.17	82.36 ± 2.56	32.40 ± 2.09
Control group	35	24.25 ± 2.41	16.85 ± 2.20	27.26 ± 2.50	16.80 ± 2.40	28.33 ± 2.91	21.98 ± 2.25	82.44 ± 2.61	55.70 ± 2.27
t	-	0.123	12.712	0.102	13.778	0.087	18.869	0.129	44.673
P	-	0.903	0.000	0.919	0.000	0.931	0.000	0.897	0.000

3.2. The values of biochemical indexes and inflammatory factors were compared between the two groups

The values of biochemical indexes and inflammatory factors in the observation group were significantly lower than those in the control group ($P < 0.05$) (**Table 2**).

Table 2. Comparison of biochemical indexes and inflammatory factors between the two groups (Mean ± SD)

Group	*n*	iPTH (pg/mL)		β2-MG (mg/L)	
		Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Observation group	35	603.63 ± 220.10	171.30 ± 10.40	16.95 ± 2.60	6.01 ± 0.90
Control group	35	600.02 ± 221.24	196.30 ± 12.33	17.10 ± 2.75	7.08 ± 1.09
t	-	0.068	9.169	0.234	4.478
P	-	0.946	0.000	0.815	0.000

Group	*n*	hs-CRP (mg/L)		IL-6 (pg/mL)		TNF-α (pg/mL)	
		Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Observation group	35	16.80 ± 3.11	11.20 ± 1.90	14.39 ± 3.39	5.58 ± 1.21	86.13 ± 12.11	22.31 ± 3.41
Control group	35	16.85 ± 3.16	13.35 ± 2.10	14.44 ± 3.46	6.81 ± 1.40	86.20 ± 13.01	29.33 ± 4.44
t	-	0.067	4.491	0.061	3.932	0.023	7.418
P	-	0.947	0.000	0.952	0.000	0.982	0.000

4. Discussion

Uremic encephalopathy is a common clinical disease that has a great impact on patients' health and daily life. In the past, clinical treatment was mostly through hemodialysis and hemoperfusion, among which hemodialysis uses the semi-permeable membrane principle to remove metabolic waste, excess water, and toxins in the blood of patients, maintain electrolyte balance and acid-base balance, and reduce the symptoms of uremic encephalopathy. However, hemoperfusion further removes middle molecular toxins (such as β2 microglobulin, etc.) from the blood through adsorbents in the perfusion device, which are often difficult to clear through hemodialysis [10–15]. However, clinical findings show that hemodialysis and hemoperfusion treatment are not ideal for uremic encephalopathy

patients, and psychiatric drugs need to be added to improve the mental condition of patients and improve the curative effect. Olanzapine is a second-generation antipsychotic drug (SGA), which relies on blocking dopamine receptors in the central nervous system to effectively relieve positive symptoms (such as hallucinations, delusions, etc.) and negative symptoms (such as social withdrawal, emotional retarding, etc.) in patients with mental disorders. The triple regimen of hemodialysis, hemoperfusion, and oral olanzapine is applied to patients with urotoxic encephalopathy to give full play to their respective advantages and synergistic effect at the same time to improve the treatment compliance of patients, thus improving the effect of hemodialysis and perfusion on the removal of metabolic waste and toxins in the patients, reducing the inflammation of patients, and improving the quality of life of patients [15–20].

In summary, the triple regimen of hemodialysis, hemoperfusion, and oral olanzapine has significant advantages and effects in the treatment of uremic encephalopathy and is worthy of clinical promotion and application.

Disclosure statement

The author declares no conflict of interest.

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