Nursing Countermeasures of Adverse Reactions of the Treatment of Leosimendan for Acute Decompensated Heart Failure

Qi Gao [1], Yulan Zhou [2], Cuixiang Yu [2*]

[1] Nursing Department, Zhuhai City Hospital of Integrated Traditional Chinese and Western Medicine

[2] Nursing Department, the Fifth Affiliated Hospital Sun Yat-sen University, Guangzhou, Guangdong, 519000, P.R.China

* Correspondence should be addressed to Cuixiang Yu (13926932363@163.com)

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Abstract

This paper aims to analyze and summarize nursing countermeasures of adverse reactions of the treatment of leosimendan for acute decompensated heart failure. 82 cases of patients with acute decompensated heart failure were given the leosimendan treatment. During the treatment, patients' clinical symptoms were closely observed, nursing method and recovery of adverse reactions of patients were analyzed, and main nursing points were summarized and recorded. As a result, 8 to 12 hours after taking the medication, 73 cases such adverse reactions as dyspnea, chest congestion, shorten of breath, abdominal distension, and difficulty of lying flat at night were improved markedly with the increase of urine and the reduction of edema on both lower limbs. During the medication, 9 cases developed hypotension (as low as 60 / 90mmHg), 6 patients appeared arrhythmia, among which 5 cases had a headache, and 1 case had hypokalemia. Among 82 cases of patients, 76 cases of patients were gradually improved and discharged from hospital, who took the oral digoxin and diuretic medical instead of taking intravenous cardiac and diuretic, and 6 patients died during the hospitalization because of deteriorated condition. In conclusion, as a kind of new medicine in treatment of acute decompensated heart failure, levosimendan has a more obvious and rapid clinical effect. However, in order to ensure safety of patients and therapeutic effect of the medicine, indications and contraindications of the medicine should be strictly mastered before being taken, and strict test should be carried out during the medication, so as to prevent and handle adverse reactions actively.

Keywords Levosimendan; Acute decompensated heart failure; Nursing

1. Introduction

Acute decompensated heart failure is a cardiology clinical syndrome of acute exacerbation of chronic heart failure, which is the final pathway for various heart diseases. It is clinically acute, critically critical and requires urgent treatment [1][2]. Currently, the main drugs for clinical treatment of acute decompensated heart failure include intravenous positive inotropic drugs, vasodilators and diuretics. Levosimendan is a positive inotropic drug. Its pharmacological principle is to enhance the Ca2+ sensitivity of cardiomyocytes to improve myocardial contractility without affecting the calcium concentration in cardiomyocytes. This not only avoids myocardial calcium overload, but also has other beneficial pharmacological effects such as dilatation the coronary arteries and peripheral blood vessels, which is currently a new type of drug for the treatment of acute decompensated heart failure [3][4][5][6]. However, as the levosimendan was listed in 2010, and only used in a few hospitals, its related clinical application and nursing experience were insufficient. In this study, we collected the clinical data of 82 patients with acute decompensated heart failure and treated with levosimendan in our Department of Cardiology. Analysis and summary are reported as follows.

2. Materials

2.1 Clinical materials

A total of 82 patients with acute decompensated heart failure who visited our Department of Cardiology between January 2013 and December 2013 were selected as research object. Cases include 53 males and 29 females with their ages ranging from 16 to 82 years. Their average age was (59.4±13.26) years. All patients had different degrees of chest tightness, dyspnea and couldn't lie supine at night. 15patients had hypourocrinia and severe edema in their both lower limbs. Cardiac function classification: 75 cases with Iv and 7 cases with III. Eighty five heart disease cases included 39 dilated cardiomyopathy, 14 ischemic cardiomyopathy, 11 hypertensive heart disease, 8 valvular heart disease, 3 perinatal cardiomyopathy, 2 alcoholic cardiomyopathy, 2 pulmonary heart disease, 2 coronary heart disease myocardial infarction, and 1 myocardial damage after chemotherapy.

2.2 Inclusion criteria

(1) Patients had unconscious disorder or communication disorder; (2) Patients had no depression-like mental illness; (3) Patients who signed the informed consent involved the research actively.

2.3 Exclusion criteria

(1) Patients with severe liver and kidney dysfunction; (2) Patients with mechanical obstructive disease that significantly affected cardiac ejection function or ventricular filling; (3) Patients who had end-turn ventricular tachycardia, severe hypotension, or tachycardia.

2.4 Shedding criteria

(1) Patients who died or transferred to other hospitals; (2) Patients who proposed to withdraw from the experiment.

3. Methods

3.1 Treatment method

82 patients in this group were with acute compensatory heart failure. After admission, they were routinely treated according to the patient's condition, such as cardiac, diuretic, vasodilator, and cardiac load reducing treatments. After the two-week treatment, patients with unrelieved symptoms (dyspnea, chest tightness, bloating, edema and other symptoms) were treated with levosimendan after the patient's family agreed with senior cardiologist's explanation. The levosimendan was given through a continuous intravenous pumping using a micropump. The patient's blood pressure was measured before medication. For patients with systolic blood pressure higher than 120 mmHg, the

initial medication was 6-12/zg/kg according to the doctor's advice. 10 minutes later, a maintenance dose of 0.05~0.2 was given again. If patients with systolic blood pressure were lower than 120mmHg, the intravenous dose of 0.05~0.2 could be directly provided with. The medication should be maintained for 24-36h.

3.2 Responses and treatments to adverse drug reactions during medication

3.2.1 Blood pressure reduction

In this group, 12 patients out of 85 cases experienced different degrees of blood pressure drop during medication, and 9 cases exceeded 20/5 mmHg (as low as 60/90 mmHg). The blood pressure declined within 3 to 4 hours in 10 out of 12 cases after the infusion of levosimendan, and after 12 hours in the other 2 cases after patients took levosimendan. In 7 cases, the blood pressure increased slightly after slowing venous pumping speed, and maintained between 90~95/60~65mmHg. In another 2 cases, 40~60mg dopamine dissolved in 50mg of 5% glucose solution was injected into the micropump at a rate of 5~10ml/h. Then their blood pressure was maintained between 90~95/60~65mmHg and stabilized after 10~12h due to dopamine hydrochloride treatment.

3.2.2 Arrhythmia

In 82 cases, there were 6 cases were observed and found to have different degrees of arrhythmia. Rapid atrial fibrillation was observed in 2 cases by ECG monitoring. An immediate slow-down of the intravenous levosimendan injection rate was performed. Among the 2 cases, 1 patient gradually showed sinus rhythm, while the other patient changed to atrial flutter with a ventricular rate as high as 150 times / min. However, the ventricular rate in the latter patient was still 135 times / min after stopping the drug. 300mL of amiodarone hydrochloride in 250ml 5% glucose solution was immediately given at 10 ~ 15 drops / min. After 4 hours, the patient showed sinus rhythm. Frequent ventricular premature beats was shown in 3 cases, among which, 2 were ventricular premature beats and 1 was multi-source ventricular premature beats. Since all cases were paroxysmal, and no special discomfort was observed, we only slowed down the intravenous pumping rate with no other treatment. In 1 case with atrial fibrillation, the ventricular rate fluctuated form 115 - 130/150 beats/min. The nursing staff closely monitored the venous pumping rate during mediation and the ventricular rate gradually decreased to 90-105 times/min.

3.2.3 Other adverse reactions

Among the 82 patients, 5 patients showed headache symptoms during medication. According to pain classification from the World Health Organization, 1 patient had degree 1 pain and 4 patients had degree 2 pain. Among them, 4 patients relived their symptom after slowing the rate of drug pumping with continued intravenous injection of levocitabine. In the other case, the patient was still not able to tolerate the headache and the medication was stopped. Hypokalemia was observed in 1 patient during medication. After oral or intravenous potassium supplementation, the patient continued to be intravenously injected with levocitabine with close monitoring their serum potassium.

4. Results

4.1 At 8~12 h in the medication, 73 cases with symptoms such as dyspnea, chest tightness, hernia, abdominal distension, couldn't lie supine at night were significantly relieved. Urine volume increased than before medication. Edema of both lower extremities was also gradually relieved. Hypotension (as low as 60/90 mmHg) was observed in 9 cases during medication. 6 patients developed arrhythmias during medication, including 5 patients felt headache and 1 showed hypokalemi. Out of 82 patients, 76 patients were gradually discharged from the hospital after cardiotonic and diuretic treatment. The medication was changed to digoxin and diuretics. However, the other 6 patients died in the hospital due to worsened illness.

5. Discussion

At present, because of the obvious and rapid effects from levosimendan, its application in the clinical treatment of acute decompensated heart failure is increasing gradually. However, due to its late introduction in China, it is currently used in a few hospitals. During its clinical application, the nursing work has not been standardized. The adverse reactions occurred in the medication cannot be ignored [7]. In this study, clinical data from 82 patients with acute decompensated heart failure suggested that during medication, 9 patients had hypotension, 6 patients had arrhythmia, 5 patients had headache, and 1 patient had hypokalemia, which are consistent with the results of relevant research reports [5]. However, in this study, other adverse reactions, such as nausea and vomiting, dizziness, diarrhea, etc., were not observed when using levosimendan. This might result from the limited samples collected for this study.

Results of this study showed that the highest incidence of hypotension was 10.9%. The hypotension after taking levosimendan was due to its vasodilator effect. The initial loading dose or maintenance dose of levosimendan caused a significant change in the hemodynamics of the human body. The hemodynamic effect changes might cause a large decrease in systolic and diastolic blood pressure, resulting in hypotension [8]. Therefore, the caregiver must closely monitor the patient's blood pressure and heart rate within 1 hour after the patient is given a loading dose of levosimendan or continuous medication. The patient's vital signs should be recorded every 10 to 15 minutes. After 1 hour, the patient's vital signs were recorded every 30 minutes. After the medication was done, continuous non-invasive monitoring was conducted for another 24h. For patients with fluctuations in blood pressure and heart rate, the monitoring time should be extended to more than 48 hours until the vital signs were stable. Especially for patients with low base blood pressure or patients with risk of hypotension, caregivers must be vigilant during medication. In addition to improve the basic nursing, vital signs of patients were closely monitored. According to the actual situation of patients, life and psychological nursing was strengthened to avoid the occurrence of adverse reactions such as orthostatic hypotension. During the medication, if there was obvious abnormality in heart rate or blood pressure, the superior doctor had to be informed immediately. Then the intravenous pumping rate was slowed down according to the doctor's advice. For patients whose blood pressure dropped below 90/60mmHg, the booster drug dopamine should be used or the medication should be temporarily discontinued according to the doctor's advice. Then the pumping plan was adjusted according to the patient's blood pressure recovery [9].

Considering that the incidence of arrhythmia during the medication of levosimendan in this study was 7.3%, all patients underwent continuous ECG monitoring during the medication with antiarrhythmic drugs prepared. During the medication, once a new arrhythmia occurred, it should be reported to the physician immediately, following by slowed intravenous pumping rate and the usage of antiarrhythmic drugs at the same time [10][11]. Additionally, when the patient showed a serious arrhythmia, the medication was temporarily stopped if we cannot rule out that the levosimendan was the cause. Patients with previous cardiac and atrial fibrillation or other arrhythmias should be highly focused and well planned for medication.

In this study, the incidence of headache during levosimendan medication was 6.1%. This is possibly related to vasodilation according to literatures. To address this, when patients felt headache during the medication, we should first evaluate the headache degree, and explain the cause to the patient to distract the patient's attention. If the patient's headache is severe, the venous pumping speed can be slowed down. If the headache cannot be relieved, temporary withdrawal can be considered. The incidence of hypokalemia was 1.2%, which may be related to the transfer of extracellular potassium ions into the cells after activation of the sympathetic nervous system by levosimendan. Therefore, blood biochemistry as well as liver and kidney function must be monitored before and after medication. In addition, because many patients know little about levosimendan, they

are worried about the adverse reactions and pharmacy principles before taking levosimendan. Therefore, before medication, a positive explanation and comfort should be given, relieving the tension and anxiety of the patient. To a certain extent, the patient's psychological tolerance can be improved [12].

As long-term clinical nursing staff, we deeply understand that scientific and correct nursing services can effectively improve the treatment effect and ensure medical safety. Therefore, it's important for us to adapt to the development of the medical era, constantly update the existing medical care services, improve the scientific quality of nursing services from all aspects, so as to further provide strong support to improve the clinical treatment effect.

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Competing Financial Interests

The authors declare no competing financial interests.

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