

INTRAVENOUS ENALAPRIL INFUSION IN PATIENTS WITH HYPERTENSIVE CRISIS

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ABSTRACT

Background: This article reviews information about the efficacy and safety of intravenous angiotensin-converting enzyme (ACE) inhibitor Enalaprilate® (Enalapril) in patients with II degree hypertension, uncomplicated type II crisis, at emergency care. The frequency of calls to emergency medical service from patients, with hypertension, is up to 25% and keep steadily growing, which is actually and important nowadays. **Methods:** Comparative analysis about the efficacy of Enalaprilate© (main group) with generally accepted therapy (control group) at patients with II degree hypertension, uncomplicated type II crisis, at emergency care. The main group included 48 patients, aged from 48 to 67 years; the control group included 34 patients, aged from 51 to 69 years with primary II degree hypertension, uncomplicated type II crisis. The monitor was conducted the examination of the patient and blood pressure measurement, every 15 minutes, twice. The results of research are processed, using variation statistics with the main parameter determination of static series. **Results:** The average time, from the moment of the call to emergency medical service before its arrival, was 14.8 minutes. In the main group, reduction of blood pressure was rapid and gradual, therapeutic effect observed within 15 minutes. The meaningful reduction of blood pressure developed after half an hour, from the start of therapy. No patient's degree of blood pressure's reduction does not exceed 20%. There were no differences in the indices, before and after the treatment in the control group. **Conclusion:** Clinical trial proved an efficiency of Enalaprilate© in patients with II degree hypertension, uncomplicated type II crisis, at emergency care; reduction of blood pressure was rapid and gradual, therapeutic effect observed within 15 minutes. The meaningful reduction of blood pressure developed after half an hour, from the start of therapy. The above – mentioned information allows doctors, of emergency medical service, to arrest the crisis passing well and reduce the number of repeated calls to emergency medical service.

KEYWORDS

High Blood Pressure, Enalaprilate©, Angiotensin-Converting Enzyme Inhibitors, Emergency Treatment

How to cite this article: Almuhambetov MK, Almuhambetova EF, Dzhumanova AE, Altynbekova AB. Intravenous Enalapril infusion in patients with hypertensive crisis. *Int Stud J Med.* 2015; 1 (4): 19-22

INTRODUCTION

Hypertension (HT) occurs one-third of the adult population and it is one of the most important factors for ischemic heart disease (IHD) and stroke; the number of cases, according to the epidemiological data is steadily growing with age in Kazakhstan. In such case, at the majority of patients with hypertension, periodically appear deterioration in the health condition and number of complaints on the back of high blood pressure, which is recognized as a hypertensive crisis [1, 2, 3]. As a result, 20% of calls to emergency care accounts for hypertensive crises. According to statistics for 2013, in Kazakhstan, IHD accounts for 129 (7.1%) of 100 thousand of population. Hypertension accounts for 173 (9.5%) of 100 thousand of population [13, 16, 20].

Cardiovascular diseases (CVD) are the leading cause of death worldwide: not for any reason, whatsoever, people die from CVDs than from others, every year. At an estimated, in 2012, deaths from CVD of 17.5 million people, was representing 31% of all deaths in the world. From the above number, 7.4 million people died after coronary heart disease and 6.7 million were due to stroke. The majority of cardiovascular diseases should be prevented by taking measures to deal with such risk factors as tobacco use, unhealthy diet, obesity, physical inactivity and harmful use of alcohol, also providing qualified emergency care.

The essential drugs, which is used in the arrest of hypertensive crises, include angiotensin-converting enzyme (ACE) inhibitors. All ACE inhibitors lead the regression of hypertrophied myocardium, improve endocardium perfusion due to a decrease the diastolic pressure in the left ventricle and prevent or reduce arrhythmias, associated with left ventricular hypertrophy.

Received: 20 October 2015/ Accepted: 7 December 2015/ Published online: 30 December 2015

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Despite the spreading use of ACE inhibitors, in the treatment of hypertension and congestive heart failure, studies, about effect of these drugs, at emergency care, are not investigated well.

Enalaprilate® is an ACE inhibitor, which administered intravenously over 5-10 minutes 5 ml (1.25 mg in 1 ml), and the therapeutic effect is observing after 15 minutes. Significant effect appears after 30 minutes with duration about 6 hours; the second dose is administered within 60 minutes (if it is necessary).

Enalaprilate® suppresses the formation of angiotensin II, eliminates its vasoconstrictor effect, reduces gradually blood pressure without increasing in heart rate and cardiac minute output, reduces the total peripheral vascular resistance, while reducing afterload. In addition, Enalaprilate® reduces preload, pressure in the right atrium and the pulmonary circulation [4, 5, 6, 17, 18, 22].

Contraindications to the drug administration are hypersensitivity to ACE inhibitors, pregnancy, lactation, infancy and porphyria. There is caution in using of aortic and mitral stenosis, bilateral stenosis of the renal artery, stenosis of solitary kidney's artery, systemic connective tissue diseases and kidney failure in the elderly age [10,11,12,14].

METHODS

The aim of work was to investigate the efficacy for parenteral introduction of Enalaprilate® at emergency care with hypertension, type II hypertensive crisis.

For that end, the 2013-2014, was analyzed parenteral was analyzed parenteral introduction of Enalaprilate® at patients, who sought emergency medical service with II degree hypertension.

The study was included 48 patients, (17 males and 31 females), aged of 48 to 67 years (middle age is 59.9 ± 3.9 years), the control group included 34 (10 males and 24 females), aged of 51 to 69 years (middle age is 58.9 ± 9.2 years) with II degree essential hypertension, uncomplicated type II crisis. The average duration of disease was (12.4 ± 7.5) years (11.9 ± 8.5) years. At 37.5% of the patients was sharp rise in blood pressure and 16.6% of patients hospitalized with hypertension early. Such case of the disease, usually caused by inadequate antihypertensive therapy, more than a one - third of patients did not receive regular treatment. Others were getting the forms of mono

- and combination therapy, but most of them had used outdated medicines (Adelphanum, Clonidine), or insufficient dosage. The main group received Enalaprilate® injection, intravenous, slow of 5-10 ml (1.25 mg in 1 mL), the control group received Magnesium Sulfate to 25% - to 5.0 with solution of Sodium Chloride 0.9% - 5.0, intravenous, slow.

The average time, from the moment of the call to emergency medical service before its arrival, was 14.8 minutes. In the main group, reduction of blood pressure was rapid and gradual, therapeutic effect observed within 15 minutes.

The results of research are processed, using variation statistics with the main parameter determination of static series: arithmetical mean (M), mean-square deviation (G), errors of arithmetical mean (m). It was appraised statistical significance in data; validity coefficient was rated according to Student's formula.

RESULTS

Indices of blood pressure (BP), systolic blood pressure (SBP) and diastolic blood pressure (DBP) at patients after the introduction of Enalaprilate® are presented in Table 1.

As the Figure 1 shows, the main group was significant ($p < 0.05$, $p < 0.001$), quick and gradual; therapeutic effect observed after 15 minutes, a significant reduction in blood pressure occurred half an hour from the start of therapy.

It is important to note, that there is no degree of blood pressure decreasing about 20%. In the control group (both decrease of systolic and diastolic blood pressure) was no significance of differences, before and after treatment.

The symptoms onset was in accord with the dynamics of changes in blood pressure. Symptoms was disappeared at majority patients of the main group (Figure 2) - headache (93.8%), dizziness (85.4%) and nausea (81.2%); in the control group, 88.2%, 82.4% and 76.4%, correspondingly. It was reducing their intensity at other patients.

At the moment of drug's administration, there were reactions in the form of fever sensation (12.5 %). There were no side effects at patients. All patients were followed up by the supervision of the local doctor for further examination and treatment.

	Group	Initial	After 15 minutes	After 30 minutes
SBP, mm Hg	Main	169.3± 4.8	145.4± 4.6**	130.9± 3.6**
	Control	167.9± 6.4	155.4± 6.7	147.5± 5.5
DBP, mm Hg	Main	96.4± 2.1	87.9± 1.5*	86.6± 3.6**
	Control	95.3± 4.1	91.6± 3.6	88.9± 6.1

Figure 1. Comparative dynamics at patients before and after treatment

* statistical significance in data before and after treatment, $p < 0.05$; ** - $p < 0.001$

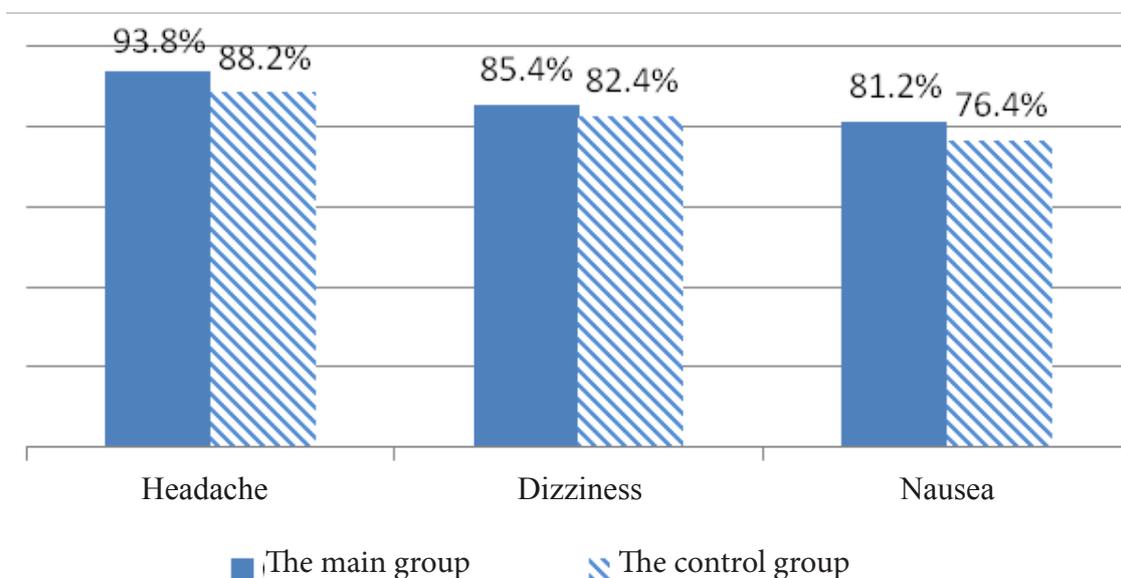


Figure 2. Comparative index of decreasing clinical signs at patients main and control groups, after treatment, %

CONCLUSION

Clinical trials had proved an efficiency of Enalaprilate® at patients with II degree hypertension, uncomplicated type II crisis, at emergency care; reduction of blood pressure was rapid and gradual, therapeutic effect observed within 15 minutes. The meaningful reduction of blood pressure developed after half an hour, from the start of therapy. The above – mentioned information allows doctors, of emergency medical service, to arrest the crisis passing well and reduce the number of repeated calls to emergency medical service.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflicts of interest.

AUTHOR CONTRIBUTION

All authors contributed to the study design, interpretation of the literature data, and the manuscript

drafting. All authors read and approved the final version of the manuscript for publication.

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