

Favorable Effects of 24 Hour-Infusion of Magnesium Sulphate in AMI on Early and Long-Term Outcomes of Disease

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Abstract

The aim of the study was to evaluate influence of 24 hour-infusion of magnesium sulphate on early and long-term outcomes in patients with Acute Myocardial Infarction (AMI). Patients were divided into two groups. In the study group they received magnesium sulphate in combination with traditional therapy (beta blockers, antiagregants, anticoagulants, nitrates) versus the control group, where patients received only traditional therapy. The favorable clinical effects were mentioned in the study group compared to control resulted in reduction one month and six-month mortality, rapid positive dynamics of ST segment changes. According to ultrasonography after a week of treatment segmental contractility improved mildly in the study group. The favorable advantage was seen at the end of the first month and especially by the end of six month.

Keywords: *acute myocardial infarction (AMI), mortality, ejection fraction, VCF, hibernation*

Introduction

The problem of mortality and morbidity conditioning by AMI and Coronary Artery disease (CAD) is still the main problem of cardiology. The discussion about the favorable effects of magnesium in AMI was started in the middle of XX [1,2,3] century and became more intensive by the end of this century [4,5,6,7,8,9]. In some trials authors proved the positive influence of magnesium in AMI [4,5,5,7]. In the other studies the results were negative or neutral. After analyzing of these trails we are considering that the negative and neutral results are caused by late infusion of magnesium, sometimes after revisualization [8]. In the "MAGIC" trial [9] it was estimated only one-month mortality and nothing else. The aim of the study was to evaluate effectiveness of Magnium Sulphate in acute stage of AMI, after one and six months.

Material and Methods

A total 45 patients were included in study (mean age 58 ± 13 , 28 male and 17 female). They were randomized into two groups: 23 patients in the study group and 22

patients in the control one there was no difference among patients by demographic and anamnesis data. The inclusion criterions were: 1mm and more elevation of ST segment in two and more standard leads, or 2mm and more elevation of ST segment in two and more precordial leads, early beginning of treatment with magnesium (not more than 4 - 6 hours). The exclusion criterions were sinus bradycardia ($P < 55'$), arterial hypotension (systolic blood pressure < 100 mmHg), first degree AV blockades (PQ interval > 24 msec) second and complete AV blockade, chronic renal failure and various genesis hypermagnemia. ST segment elevation (deviation was measured from point j +80 msec) was assessed by 12 lead ECG (electrocardiograph FUKUDA DENSHI Cardimax FX-3264) at the beginning of treatment, after 3, 7 and 48 hours and on the discharge. By ultrasound (ultrasound equipment Arzamas ITS-M 01) was estimated left ventricle segmental contractility, ejection fraction (EF) and VCF (velocity of circumferential fiber shortening), the measurement was performed in M and B modes at the beginning of treatment, after one week, one month and six month. The patients of both groups were receiving beta-blockers, antiagregants, anticoagulants, and nitrates. Besides, in the study group we began treatment with 8-

mmol magnesium sulphate bolus and following 24 infusion of drug with velocity 2mmol/hour. The significance between control and study groups were analyzes by t Student criterion.

Results

In the study group during one month of observation was only one case of mortality, after one week of discharge from hospital, presumable reason of death was ventricle fibrillation. Another patient of study group was died after 5 month. The reason of death was stroke. In the control group there were three intrahospital cases of death. In one case the reason of death was ventricle fibrillation, in two cases-cardiogenic shocks. During six month of observation in the control group there were more three cases of death. In first case the reason of death was repeated myocardial infarction complicated by cardiogenic shock, in the second case the patient died from stroke and the third case there was sudden cardiac death.

From *Tab.1* we can see rapid positive dynamics of ST segment already after 3 hours from beginning of treatment with magnesium and remaining of this tendency until the discharge.

Before beginning of treatment EF and VCF were similar in both groups. After one week these parameters improved mildly in the study group and after one month this tendency became more obvious. These advantage in the study group compare with control remained until six month.

In our opinion the results of ultrasound examination are indirectly evidences of existence of hibernated myocardium. Magnesium is the only natural antagonist of calcium and it prevents heart from damage causing by calcium aggression during acute phase of myocardial infarction and transfers some cardiomyocytes into the hibernation. These resulted in "awakening" after some time of hibernated myocardium and as a result improvement of left ventricle contractility at remote stages of myocardial infarction.

Conclusion

In patients with AMI 24 hours infusion of magnesium sulphate resulted in reducing of one and six month mortality, positive rapid dynamics of elevated ST segments, improving of left ventricle contractility after one and six month after starting of treatment with magnesium.

Groups	Before treatment	After 3 hours	After 7 hours	After 48 hours	On discharge
Study group	4.4±1.1	1.2±0.6	0.8±0.2	0.4±0.2	0.3±0.1
Control group	4.3±0.9	4.0±0.5	3.4±0.4	2.2±0.2	2.1±0.2

Tab.1 *The dynamics of elevation of ST segment (mm) in the study group comparing with control during AMI.*

Parameters	EF (%)		VCF (c ⁻¹)	
	Study	Control	Study	Control
Before treatment	44±4	46±5	0.84±0.11	0.85±0.12
After one week	47±4	43±6	0.89±0.13	0.79±0.11
After one month	53±3	47±4	0.99±0.12	0.87±0.11
After six month	54±3	48±4	1.0±0.15	0.91±0.21

Fig.1 *The dynamics of EF) and VCF in study and control groups during observation.*

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Положительные эффекты 24-часовой инфузии сульфата магния на ранние и отдалённые результаты лечения острого инфаркта миокарда

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Р Е З Ю М Е

При остром инфаркте миокарда 24-часовая инфузия сульфата магния снизила уровень летальности в течение одного и шести месяцев. Обнаружена быстрая позитивная динамика сегмента-ST; улучшилась сократимость левого желудочка к концу первого месяца, что косвенно указывает на существование "спящего" миокарда. Тенденция улучшения сократимости сохранялась вплоть до шестого месяца наблюдения.

Ключевые слова: *острый инфаркт миокарда, летальность, "спящий" миокард*