LIFE-THREATENING ARRHYTHMIAS AFTER INTRAVENOUS LIDOCAINE ALONE OR WITH MAGNESIUM IN MYOCARDIAL INFARCTION COMPLICATED BY VENTRICULAR FIBRILLATION

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ABSTRACT

To compare the effects of Lidocaine (LID) alone or with Magnesium Sulfate (M) on life-threatening ventricular arrhythmias which followed cardioverted prolonged ventricular fibrillation (VF) during an acute myocardial infarction (AMI), we studied 34 (24.63%) out of 138 patients aged from 52 to 83 years (mean: 66.92+8.82) with an anterior AMI, who had cardioverted prolonged VF. Twenty patients (58.8%) - Group A - received LID 2 mg/min at constant-rate infusion through a subclavian catheter following a bolus of LID 100 mg, whereas 14 patients (41.2%) - Group B - received LID at the same dose + M 2.5 mg/min. All the patients had continuous monitoring and LID serum level was measured daily by means of immunofluorescent method (TDX Abbot; range 1.5-5 μg/ml). Group A had the following mean serum levels of LID: 250+0.9; 1.52; 245±0.9; 3.20+1.1. Group B showed: 2.65+1.2; 2.80+1.8; 3.10+1.2; 3.25+1.1. Continuous monitoring displayed the following arrhythmias respectively for Group A and Group B: VT 37 times vs 16(P < 0.05, significant), transiently cardioverted VF during therapy 17 times vs 6(p < 0.01, significant), 8 deaths from VF vs 6 - 3 from VF and 3 from asystole - (p=NS). LID+M treatment seemed to be more effective than LID alone to reduce life-threatening arrhythmias following cardioverted prolonged VF of AMI but not the deaths. In addition, M would raise moderately LID serum level and this fact, not yet well known, needs further investigation.

Keywords : Lidocaine, magnesium infarction, life-threatening arrhythmias

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INTRODUCTION

After cardioverted prolonged ventricular fibrillation, patients with acute myocardial infarction (AMI) may undergo life-threatening arrhythmias as well as again ventricular fibrillation (VF). Consequently, antiarrhythmics are necessary for such patients to reduce these occurrences.

Intravenous Lidocaine alone or combined with other antiarrhythmic drugs may be commonly used even if there are controversies with regard to such therapy[1-3].

The purpose of this study was to compare the effects of Lidocaine alone or with Magnesium Sulfate on life-threatening arrhythmias following cardioverted prolonged VF during AMI.

METHODS

We studied (Table I) 34 (24.63%) out of 138 patients, 27 male (79.4%) and 7 female (20.6%), aged from 52 years to 83 years (mean: 66.92+8.82 years) with anterior AMI, who had cardioverted prolonged VF. In 20 patients - Group A - (58.8%), Lidocaine 2 mg/min at constant rate infusion through a subclavian catheter was administered by a micropump following a loading dose of 100 mg, whereas 14 patients - Group B - (41.2%) received Lidocaine at the same dose + Magnesium Sulfate 2.5 mg/min. All the patients had continuous cardiac monitoring and Lidocaine Serum level was measured daily by means of immunofluorescent method (TDX ABBOT; normal range: 1.5 - 5 μg/ml).

Standard statistical methods were used to compare the results (t-test). $P < 0.05$ was taken to denote statistical significance.

All data are presented as ± SD.

Table I
Studied Population

	No. of Patients	Sex M	Sex F	Total
Grp A	20	18	2	20
Grp B	14	9	5	14
Total	34	27	7	34

RESULTS

The data we obtained from this study are summarized in Tables II and III.

Table II
Mean Serum Level of Lidocaine (μg/ml) in Studied Population

Grp	No.	Hours 6	24	48	72
A	20	2.50±0.9	2.45±1.52	2.41±0.9	3.20±1.1
B	14	2.65±1.2	2.80±1.8	3.10±1.2	3.25±1.1

Table III
Incidence of Life-threatening Arrhythmias and Deaths

	Grp A (N = 20)	Grp B (N = 14)	t-test
V T	37	16	p < 0.05
V E B	1977	2099	p = NS
V F	17	6	p < 0.01
Death From:	8	6	
- V F	8	3	p = NS
- Asystole	0	3	

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Group A had the following mean serum levels of Lidocaine (Table II): 250 ± 0.9 µg/ml; 2.45 ± 1.52 µg/ml; 2.41 ± 0.9 µg/ml; 3.20 ± 1.1 µg/ml. For Group B Lidocaine serum concentration were 2.65 ± 1.2 µg/ml; 2.80 ± 1.8 µg/ml; 3.10 ± 1.2 µg/ml; 3.25 ± 1.1 µg/ml. Continuous monitoring (Table III) displayed the following arrhythmias respectively for Group A and Group B: VT 37 times vs 16 ($P < 0.05$), transiently cardioverted VF during therapy 17 times vs 6 ($P < 0.01$), 8 deaths from VF vs 6 - 3 from VF and 3 from asystole - (P=NS).

CONCLUSION

Lidocaine is known to be a drug widely administered in ventricular arrhythmias, but several factors can interfere with half life and drug plasma concentration. Therapeutic range is fixed between 1.5 µg/ml and 5 µg/ml. Lidocaine plasma concentration more than 0.5 µg/ml was considered to be effective.

The common dosing strategy is to give a loading dose, followed by a continuous intravenous infusion. Such "standardized" dosing strategy may, sometimes, fail to reach therapeutic concentrations. On the contrary, toxicity may occur in other cases[4-6].

Moreover, in some individuals it may be necessary to combine antiarrhythmic therapy to suppress or reduce life-threatening arrhythmias.

In our study, Lidocaine combined with Magnesium Sulfate seemed to be more effective than Lidocaine alone to reduce life-threatening arrhythmias following cardioverted prolonged VF of AMI but this did not significantly reduce the overall mortality rate.

In addition, a moderate raise of Lidocaine serum level was seen in those patients who had received Lidocaine combined with Magnesium Sulfate. This fact, not yet well known, should be carefully explained by further investigations in an attempt to establish the significance and responsible mechanism.

Several variables may indeed interfere with LID pathway.

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