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Original Article

Effects of Magnesium Sulfate on Bleeding Time in Premature Labor

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Abstract

Background: Several studies have shown that administration of magnesium sulfate prolongs the bleeding time.

Objective: To investigate such effects in pregnant women in Shiraz, southern Iran.

Methods: This study was conducted on 30 pregnant women aged between 18 and 32 yrs, with a gestational age of 20 to 37 weeks, who presented to Hafez and Zeynabiyeh Emergency Units affiliated to Shiraz University of Medical Sciences between January and August 1999, with premature labor pain or complaining of abdominal or back pain. The patients received tocolytic treatment with magnesium sulfate ($MgSO_4$) in absence of any contraindication. The blood pressure and bleeding time of patients were measured upon admission to the labor room and before any intravenous infusion of $MgSO_4$. Platelet count and serum magnesium level were also determined for each case. The aforementioned measurements and samplings were repeated following administration of 10 g $MgSO_4$.

Results: A significant difference was observed between the mean serum magnesium level and mean arterial blood pressure, before and after $MgSO_4$ infusion. The mean bleeding time showed an increase of 27 seconds (15%) after infusion of Mg. Nevertheless, this value still remained in the normal range of 120–420 s. A direct relationship was found between the increase in serum magnesium level and the bleeding time. No change was observed in the mean platelet count.

Conclusion: Magnesium therapy is associated with an increase in bleeding time in pregnant women, with no change in platelet count. This increase had no clinical significance and dose-independent.

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Keywords ● Preterm delivery ● Premature uterine contractions ● Mg ● Bleeding time

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Introduction

Birth of neonates between the 20th and 37th weeks of gestation (preterm delivery) is one of the major medical problems affecting pregnant women. With a prevalence rate of 5–8% of all deliveries, millions of newborns die each year due to prematurity.[1] Preterm delivery induced mainly by

initiation of regular uterine contractions before the end of 37th week of gestation, after congenital malformations, is considered to be the second cause of morbidity and mortality among newborns.[2] Faced with premature contractions, every effort is made to prolong the duration of gestation when there are no contraindications. In this regard, the infusion of magnesium sulfate ($MgSO_4$) is proved to alter the contractility of uterine smooth muscle.[3]

Mg acts mainly as a calcium antagonist in a dose-dependent manner. For exerting its inhibitory action on uterine contractions, the serum level of Mg needs to be kept at 8–10 meq/l.[3,4] While the drug has minor adverse effects when its level is less than 10 meq/l, it causes signs of toxicity at higher doses.[5]

A study performed by Fuentes *et al*, on 24 women receiving $MgSO_4$ for premature labor, prevention of eclamptic seizure and external rotation of fetus showed that $MgSO_4$ treatment was associated with a decrease in mean arterial blood pressure and an increase in the bleeding time without any significant changes in platelet number.[6] Other reports also showed an increase in the bleeding time after $MgSO_4$ therapy of pregnant women.[7,8] The present study, therefore, was conducted to evaluate the effect of magnesium sulfate on the bleeding time, platelet number, and blood pressure in pregnant women.

Patients and Methods

Randomly selected pregnant women with a gestational age of 20–37 weeks, determined by a reliable last normal menstrual period date or sonographic report, complaining of abdominal or back pain and who referred to Hafez or Zeynabiyeh Hospital Emergency Rooms, affiliated to Shiraz University of Medical Sciences between January and August 1999, were enrolled into this study. These patients were regarded as having premature labor and admitted for tocolytic therapy provided that they had four uterine contractions over a period of 20 minutes, each lasting for at least 30 seconds; or a cervical effacement of >80%. The exclusion criteria were the presence of ruptured membranes, uterine bleeding, possibility of amniotic or chorionic infections, fever, a systolic blood pressure >140 or a diastolic pressure >90 mmHg, the history of taking any medication during the preceding month, personal or familial history of bleeding disorders, intra-uterine growth restriction and any doubt about the exact age of gestation. A total of 30 women were eligible for inclusion in the study. The age, gestational age, number of previous pregnancies and parity were recorded for each patient.

An initial infusion of Ringer's solution was administered, and if contractions did not stop, a bolus dose of 4 g of $MgSO_4$ in 200 ml 5% dextrose solution was given over a period of 20 min followed by a maintenance dose of 10 g in 500 ml of dextrose solution at a rate of 2 g/h.

Blood pressure and bleeding time (BT) were recorded upon admission to the labor room and before iv $MgSO_4$ infusion. Repeated blood pressure measurements, as well as blood samplings were carried out following the administration of 10 g $MgSO_4$ and for up to 4–6 hrs.

Statistical Analyses

Data are presented as Mean±SD. The mean arterial blood pressure (Pa), platelet count (PC), BT and serum magnesium (Mg) level were compared using paired Student's *t* test before and after $MgSO_4$ infusion. The correlation between changes in the aforementioned parameters and serum magnesium level was determined using regression analysis.

Results

The present study comprised 30 women aged from 18 to 32 years and had a gestational age of 21–36 weeks of whom half were nulliparus and none with more than four pregnancies. Nearly, 67% of the patients were in the 28th to 34th weeks of gestation. Mg level, PC, and Pa measured before and after $MgSO_4$ infusion are shown in Table 1. None of these patients suffered from the adverse effects of $MgSO_4$ therapy. Statistical analyses showed a significant difference between the serum Mg level and Pa before and after $MgSO_4$ infusion ($p<0.05$). PC did not change significantly after $MgSO_4$ infusion (Table 1). Likewise, as shown in Table 1 no significant relationship was found between Pa and serum Mg levels ($p=0.759$). As shown in Table 1 a direct relationship was observed between the increased serum Mg level and BT ($p<0.05$), whereas, the 15% increased BT (27 s; $p<0.05$) remained within normal physiological range (120-420 s). The concentrations of hemoglobin measured 6–22 hrs after the delivery were not different from those of measured prior to that of delivery.

Discussion

Serum magnesium level would reach 4–7 meq/l, four to six hrs after the administration of the maintenance dose.[6] In our study, we also found a significant increase in serum magnesium level after the initiation of the infusion. This level however exceeded 4 meq/l only in nine (30%) subjects and remained between 3

Table 1: Serum Mg (Mg; meq/l) level, platelet count (PC; count/ml), mean arterial blood pressure (Pa; mmHg) and bleeding time (BT; second) before and after magnesium sulfate infusion.*

infusion	Mg	PC	Pa	BT
Before	2.2 ± 0.4	262,325±88	88±7	187±54
After	3.8±0.4	264,086±84	84±6	214±64**

* Data are presented as Mean±SD
** Significantly different at p<0.05

and 4 meq/l in the others. This might be in part, due to physiological variations in drug excretion, ethnical and geographical differences. The platelet count did not show any significant changes before and after magnesium sulfate infusion. Therefore, the increases in bleeding time cannot be attributed to the changes in platelet count.

Although the BT showed a significant increase of 27 seconds (15%), it remained within normal physiological range, caused no hemorrhagic event, and therefore it is perhaps of no clinical importance. BT was directly correlated to serum magnesium level. Other studies in other countries have reached different results.[6-8]

Similar changes in the serum Mg level, Pa, PC, and BT (with an increase of 57 seconds) were reported by Fuentes, *et al*.[6] In their studies $MgSO_4$ infusion was used for the external rotation of the fetus and the prevention of eclamptic seizure. Kynczl, *et al*, who did not measure the serum Mg level, showed that the BT doubled, while it remained unchanged in three control women.[7] Nonetheless, they could not show any relationships between the amount of infused $MgSO_4$ and the BT.[7] In both of these studies, BT was increased by values higher than that observed in this study. A significant increase (82%) in BT was also found in a study performed by Assaley, *et al*, on a group of pre-eclamptic patients.[8] This difference in results observed might be due to ethnicity or differences in the methods used for measuring the bleeding time.

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