

Maternal Outcome with Discontinuation of Magnesium Sulfate immediately Postpartum in Severe Preeclampsia

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ABSTRACT

Objective: To assess the effectiveness of discontinuation of magnesium sulfate (MgSO₄) infusion in patients with severe preeclampsia immediately postdelivery.

Materials and methods: In a prospective-randomized study, women with severe preeclampsia attending the Jawaharlal Nehru Medical College, Aligarh, India, between January 2013 and September 2014 were enrolled. The inclusion criteria were blood pressure of at least 160/110 mm Hg after 24 weeks and either of the following: Proteinuria (dipstick value ≥ 1), platelet $< 100,000$, and serum transaminase levels twice as normal. Participants were assigned to control and study groups according to the time of enrollment (6-month blocks). All patients received MgSO₄ loading dose (4 gm intravenously), followed by maintenance doses (1 gm/hour) until delivery (study group) and 24 hours (control group). The primary outcome was occurrence of convulsions after completion of MgSO₄ therapy. Patients with treatment failure were excluded from analyses.

Results: Analyses included 48 patients in the study group and 43 patients in the control group. No convulsions occurred in either group after the completion of treatment.

Conclusion: For women with severe preeclampsia, discontinuing MgSO₄ immediately after delivery could effectively prevent convulsions.

Keywords: Convulsions, Magnesium sulfate, Severe preeclampsia.

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INTRODUCTION

Preeclampsia is a preventable cause of maternal morbidity and mortality, and with evolving terminologies, definition,

and classification of hypertension in pregnancy, its diagnostic prevalence is expected to increase by 20%.¹ Hypertensive disorders complicate 5 to 10% of all pregnancies,² as concluded by the Magpie trial.³ Magnesium sulfate (MgSO₄) is the drug of choice in the management of severe preeclampsia. Recommendations for the least possible dosing schedule that can effectively prevent convulsions in patients with preeclampsia still have prospects of scientific scrutiny as there have been multiple randomized controlled trials which speculate that seizures can be effectively controlled by only loading dose of MgSO₄ in patients with preeclampsia and eclampsia.⁴⁻⁷ With an intention to decrease the duration of treatment and monitoring and the risk of side effects of MgSO₄, we have planned this study to determine the effectiveness of short-duration MgSO₄ by discontinuing the maintenance dose immediately after delivery to improve maternal and neonatal outcomes in severe preeclampsia.

MATERIALS AND METHODS

In the present prospective-randomized study, women with severe preeclampsia attending the Department of Obstetrics and Gynecology at Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh, India, were enrolled between January 1, 2013, and September 30, 2014. The inclusion criteria were antenatal patients beyond 24 weeks gestational age with a systolic blood pressure ≥ 160 mm Hg or diastolic blood pressure ≥ 110 mm Hg after 24 weeks of pregnancy with either of the following symptoms: Proteinuria (dipstick value ≥ 1), platelet $< 100,000$, and serum transaminase levels twice as normal. Patients with severe preeclampsia with cerebral symptoms, such as headache, visual symptoms, and convulsions, serum creatinine > 1.2 mg/dL, previous history of eclampsia, and associated maternal medical diseases were excluded from the study. Patients with contraindication to MgSO₄ (e.g., drug hypersensitivity, myasthenia gravis, anuria, or oliguria), prior intake of any other anticonvulsant, and a history of epilepsy were also excluded from the study. The exclusion of serum creatinine > 1.2 mg/dL and cerebral symptoms was owing to nonanalysis of serum magnesium levels and since the study was being conducted for the first time respectively. A total of 258 patients with severe preeclampsia reported to the labor room during the entire duration of study. A total

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of 167 patients were excluded due to the presence of exclusion criteria, such as serum creatinine >1.2 mg/dL and cerebral symptoms. The Ethical Committee of the Institution approved the study, and the patients provided informed consent before the administration of MgSO₄.

Patients with severe preeclampsia, who were admitted during the study period, were randomly assigned to either the study group (0 hour group) or the control group (24-hour MgSO₄) as follows: Patients admitted in the first 6 months were enrolled into the control group, and those admitted in the next 6 months were enrolled into the study group alternately for the entire duration of study. Participants were not told which group they had been assigned to, but because the groups received treatments for different lengths of time, full masking was not possible. Investigators and data analysts were not masked to group assignment.

A detailed history and examination was done for all women at the time of admission. Complete blood counts, coagulograms, liver and renal function tests, and urine protein measurements were performed. Women in the study group were given a loading dose of 4 gm of intravenous MgSO₄, followed by a maintenance dose of 1 gm per hour until the patient delivered. Those in the control group were given a loading dose of 4 gm of intravenous MgSO₄, followed by a maintenance dose of 1 gm per hour for 24 hours after delivery.

Monitoring of the patients for the entire duration of MgSO₄ infusion was done by trained obstetricians with documentation of blood pressure, patellar reflexes, respiratory rate, urine output, and occurrence of convulsions. In the case of MgSO₄ toxicity, the plan of management was to stop further MgSO₄ infusion and to inject 1 gm of calcium gluconate (10 mL of 10% solution) intravenously, followed by switch to another anticonvulsant therapy. These patients were considered to have treatment failure. After completion of the MgSO₄ infusion, patients were monitored every 4 hours until normalization of blood pressure, and then every 12 hours until discharge.

Labetalol was used as an antihypertensive drug as per the management protocol of the study institute. The participants were induced, allowed to undergo spontaneous labor, or underwent cesarean delivery depending on the obstetric indication and the patient's general condition.

The primary outcome was occurrence of convulsions once the MgSO₄ therapy was completed. If a convulsion occurred before completion of therapy, the patient was infused with a 2 gm loading dose of MgSO₄, and women in the study group were switched to a maintenance dose of MgSO₄ for 24 hours postdelivery. If a second convulsion was observed during the therapy, the treatment was switched from MgSO₄ to phenytoin and considered as an MgSO₄ failure.

Patient recovery was analyzed in terms of total dose of MgSO₄ given, duration of hospital stay, and duration of Foley catheterization as secondary outcome. The patients were followed up until discharge from hospital.

The study data were analyzed by Statistical Package for the Social Sciences version 21 (IBM, Armonk, New York, USA). The study and control groups were compared by t test and χ^2 test as appropriate. Patients who did not fulfill the inclusion criteria were excluded from analysis. The $p \leq 0.05$ was considered significant.

RESULTS

All patients with severe preeclampsia after fulfillment of the inclusion criteria were included in the study. In our study, 55.1% cases belonged to rural background and 49.1% cases were literate and 80.2% were not booked.

Among the study participants, 48 were assigned to the study group and received no MgSO₄ infusion following delivery, and 43 were assigned to the control group and received the conventional 24-hour regime of MgSO₄. The baseline characteristics of cases are depicted in Table 1. With respect to baseline characteristics in terms of age, number of previous pregnancies, and length of pregnancy of cases, no significant differences were found between the groups. In addition, systolic blood pressure, diastolic blood pressure, and albuminuria on admission and at discharge were similar in the two groups.

Regarding the primary outcome, no convulsions occurred in either group after the completion of MgSO₄. Regarding the secondary outcomes, significantly higher total amounts of MgSO₄, duration of Foley catheterization, and duration of monitoring were noted in the control group when compared with the study group ($p \leq 0.001$ for all) (Table 2).

In our study, 51 (56.04%) patients had vaginal delivery and 40 (43.95%) had cesarean section. Overall, 77 (84.6%) patients had live births, and 14 (15.4%) patients had intrauterine fetal death on admission.

The mean duration of hospital stay for cases of vaginal delivery and cesarean section in study group was 2.82 ± 0.77 days and 5.05 ± 1.96 days respectively, whereas the mean duration of hospital stay in control group was 4.04 ± 1.47 days and 11.11 ± 3.14 days respectively, which is statistically significant (t -value = 3.8 for vaginal deliveries, t -value = 7.1 for cesarean section cases, $p < 0.001$).

No toxic effects or treatment failures were noted with MgSO₄ infusion in either group.

DISCUSSION

Erstwhile, substantiated 24 hours infusion of MgSO₄ postpartum is highly effective in preventing convulsions in women with severe preeclampsia during labor, when

Table 1: Baseline characteristics

	Group A (n = 48)	Group B (n = 43)	t-value	Significance
Age (years)	24.90 ± 4.2	25.8 ± 4.7	0.95	NS
Gravidity				
1	28	20	52.7	
2–4	14	14	30.7	
≥5	6	9	16.6	
Gestational age at delivery (weeks)	37.04 ± 3.1	37.2 ± 3.5	0.27	NS
Systolic blood pressure (SBP) on admission (mm Hg)	176.8 ± 15.2	172.9 ± 10.2	1.4	NS
Diastolic blood pressure (DBP) on admission (mm Hg)	112.3 ± 9.9	111.1 ± 5.2	0.70	NS
Platelet on admission				
Aspartate aminotransferase (AST)/alanine aminotransferase (ALT) on admission				
SBP on discharge (mm Hg)	117.17 ± 5.56	115.26 ± 5.11	1.7	NS
DBP on discharge (mm Hg)	80.1 ± 5.3	79.3 ± 5.0	0.72	NS
Platelet on discharge				
AST/ALT on discharge				

NS: Not significant

Table 2: Secondary outcome

	Group A	Group B	t-value	Significance
Amount of MgSO ₄ (gm)	12.6 ± 8.3	42.3 ± 7.3	18.5	p < 0.001
Duration of Foley catheterization (hours)	10.9 ± 8.7	38.3 ± 7.3	16.1	p < 0.001
Duration of monitoring (hours)	8.5 ± 8.2	38.4 ± 7.2	18.6	p < 0.001
Hospital stay (days)				
Vaginal delivery	2.82 ± 0.77	4.04 ± 1.47	3.8	p < 0.001
Cesarean	5.05 ± 1.96	11.11 ± 3.14	7.1	p < 0.001

propensity to develop convulsions is high. In our study, MgSO₄ loading 4 gm was injected intravenously followed by infusion of MgSO₄ at the rate of 1 gm/hour to all patients of severe preeclampsia during the antenatal period, which was subsequently stopped immediately after delivery in patients randomized to study group and continued for 24 hours in patients randomized to control group. No occurrence of convulsions was observed in any case of severe preeclampsia in either of our study groups, after stopping postpartum MgSO₄ infusion irrespective of duration of therapy, i.e., 0 hr/24 hours, which may be because our study size was small. Larger trials may be needed to assess the effectiveness of short-course postpartum MgSO₄ therapy. A similar result with 0% seizure incidence had been reported by Jiraphol et al.⁴ In another study by Ranganna et al,⁸ rate of occurrence of convulsions was 2% in both study and control group. The mean amount of MgSO₄ used in the study group, i.e., 12.6 ± 8.3 gm, was very less as against 42.3 ± 7.3 gm used in the 24-hour therapy group. In our study, by reducing the duration of MgSO₄ infusion, we have achieved reduction in the total amount of MgSO₄ gone, thereby safeguarding the patients against the untoward effects of MgSO₄ toxicity, which could be beneficial to patients with higher serum creatinine values as well; however, this needs further study. In the study group, patients had an early removal of Foley's catheter with a mean duration

of 10.9 ± 8.7 hours, which further helped mothers in early mobilization, whereas, the risk of infection prevails with prolonged Foley's catheterization as in patients of control group where the mean duration was 38.3 ± 7.3 hours. With an intention to decrease the duration of monitoring and hospital stay of the patient, our study speculates that shortened duration of MgSO₄ decreases the overall cost of treatment, unnecessary exposure to iatrogenic infections, and allows better utilization of available health resources, where the mean duration of monitoring in study group was 8.5 ± 8.2 hours, whereas in control group, the mean value is 38.4 ± 7.2 hours.

CONCLUSION

Evidence-based medicine accepts MgSO₄ to be the prime drug in the management of women with severe preeclampsia. With a conation to reduce overall burden of health care system and provide patient congenial management, we conclude that reducing the duration of MgSO₄ infusion in patients with severe preeclampsia to 0 hour postpartum is as effective as conventional 24 hours of infusion as in Zuspan regimen. Although larger randomized trials in multiple centers are needed before making a definitive guideline, the findings of our study support the use of reduced duration of MgSO₄ therapy for preventing convulsions in severe preeclampsia.

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