



Research Article

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Hypertensive Crisis in Pregnancy



Suntorn Intapibool*

Department of Obstetrics & Gynecologist (RTCOG), Deputy Director of Medical Department, Srisangwornasukhothai Hospital, Thailand

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*Corresponding author: Suntorn Intapibool, Department of Obstetrics and Gynecology, Deputy Director of Medical Department, Srisangwornasukhothai Hospital, Amp-hour Srisamrong, Sukhothai Province, Thailand

Abstract

Hypertensive crises in pregnancy are associated with an increased risk of maternal and perinatal morbidity and mortality. Virtually all causes of maternal death are preventable. However, during pregnancy, also known by locals as pregnancy poisoning, hypertension is one of the three leading causes of maternal death. The objective of this research purposed to assess the successful outcomes of magnesium sulfate ($MgSO_4$) intramuscular protocol versus continuous intravenous protocol. The comparison retrospective descriptive study evaluated the successful results of $MgSO_4$ intramuscular protocol versus continuous intravenous protocol, which was used to treat the hypertensive crisis in pregnancy. This research started from January 2013 to January 2021, the number of seventy-two pregnant women with the hypertensive crisis in pregnancy. They were divided into two groups. Thirty-six patients were used the route of $MgSO_4$ by the intramuscular protocol in the 1st group, and Thirty-six patients were performed by continuous intravenous injection protocol in the 2nd group. Ten thousand three hundred thirty-six pregnant women were delivered during the study period, which was eight years. The hypertensive crisis in pregnancy was occurring in 72 patients (0.70 %) of both vaginal (8.3%) and cesarean deliveries (91.7%). The referral system was performed by about 56.9%, and no underlying disease (84.72%). Thus, the successful outcome of the two groups of care was not statistically different for both mothers and fetuses.

Finally, the route of the $MgSO_4$ protocol, intramuscular or continuous intravenous, should be a recommendation before the patients had transferred from the community to the general hospitals. Respectfully, early hypertensive crisis diagnosis and proper management could decrease maternal and fetal complications.

Keywords: Hypertensive crisis; Pregnancy-induced hypertension; Postpartum hemorrhage

Introduction

Hypertensive crises in pregnancy are associated with an increased risk of maternal and perinatal morbidity and mortality [1-6]. Virtually all causes of maternal death are preventable. However, during pregnancy, also known by locals as pregnancy poisoning, hypertension is one of the three leading causes of maternal death. Appropriate management of hypertension and its associated complications can optimize outcomes. Several antihypertensive agents can be used safely in pregnancy, although evidence from randomized controlled trials is lacking. A greater understanding of the pathophysiology, etiology and natural history of hypertensive disorders in pregnancy would improve prevention strategies and ultimate elimination of associated morbidity and mortality [1,2]. Magnesium sulfate ($MgSO_4$) effectively prevents eclampsia (a fit or seizure) in women with pre-eclampsia and for treating women who experience an eclamptic convulsion [3]. According to World Health Organization projections, in 2015, 830 mothers die a day, or about 303,000 deaths a year, almost all of

them in underdeveloped countries. Virtually all causes of death are preventable. It was found that hypertension during pregnancy, also known by locals as pregnancy poisoning, is one of the three leading causes of maternal death and more common among older patients, first pregnancy, and increased birth rate [2,4].

In combination with the coagulation system and platelet [4], medical management will be corrected in almost all patients, reducing pressure, preventing seizures, and giving birth together with adequate water and blood compensation. Correct shock and sustain symptoms such as oxygenation Treatment of inadequate uterine contractions include urinary gardening, monitoring, and avoiding medications to increase the contraction of specific uterine muscles [5-6]. Maternal mortality prevention and reduction were required to review maternal causes of mortality to plan the development of pregnant women and postpartum care systems to be more effective in the area's context [4,7]. This research purposed to assess the successful outcomes of

MgSO₄ intramuscular protocol versus continuous intravenous protocol for the emergency treatment of the hypertensive crisis in pregnancy to decrease maternal and fetal complications for the area situation.

Materials and Methods

The ethics committee of the Sukhothai Provincial Health Office approved the present study (IRB 34/2020). The retrospective comparison descriptive research studied the sampling of pregnant women in the Labor (high risk) room and was treated for hypertension in pregnancy management. This retrospective research was studied to compare with the MgSO₄ intramuscular protocol versus continuous intravenous protocol to assess the treatment outcomes for the emergency treatment of the hypertensive crisis in pregnancy to decrease maternal and fetal complications.

Traditionally, the hypertensive crisis was defined as the American College of Obstetricians, and Gynecologists described that a hypertensive emergency in pregnancy as persistent (lasting 15min or more), acute-onset, severe hypertension, defined as systolic BP \geq 160mmHg or diastolic BP \geq 110mmHg in the setting of pre-eclampsia or eclampsia [2,3]. This research started from January 2013 to January 2021, the number of seventy-two patients in the samplings at Srisangwornasukhothai hospital (M1-the low resource general hospital). They were divided into two groups. Thirty-six patients were used the route of MgSO₄ by the intramuscular protocol in the 1st group, and Thirty-six patients were performed by the continuous intravenous injection protocol in the 2nd group.

The 1st group had performed the route of MgSO₄ intramuscular (IM) injection protocol. This protocol was as follows: 10% MgSO₄ 4g IV loading over 20-30min, then 50% MgSO₄ 10g (50%MgSO₄ 20 ml(10g)+ 2%Xylocaine 2ml IM 5g IM in each buttock) loading, and then 5g (50%MgSO₄ 10 ml(5g) + 2%Xylocaine 1ml) IMq 4 hours.

The 2nd group had performed the continuous intravenous injection (IV) protocol. This protocol was as follows: 10%MgSO₄ 4g IV loading over 20-30min, then (50%MgSO₄ 10g + 5%DW 980ml IV drip rate 100ml/hr.) IV drip 1g/hr. (monitor for Magnesium toxicity should be assessed deep tendon reflexes periodically, the patellar reflex was present, respirations were not depressed, and urine output the previous 4hrs. exceeded 100ml.).

Inclusion Criteria

- a) the pregnant women had a history of pregnancy-induced hypertension at the anti-natal care (ANC) unit and were delivered in Srisangwornasukhothai hospital
- b) the pregnant women were diagnosed with hypertension crisis in pregnancy
- c) the pregnant women were able to communicate in Thai

Language

Exclusion Criteria

- a) the pregnant women were Incompleted information
- b) the pregnant women who were transferred to another hospital for treatment.
- c) A review of the medical record was conducted to recruit the cases. Clinical data were extracted on risk factors; age, underlying diseases, gravid, body mass index (BMI) before pregnancy and during delivery, gestational age, fetal weight,
- d) outcomes of treatment; blood loss, fever after management, and
- e) several complications.

The sample size was calculated using a free online sample size calculator available at <https://clincalc.com/stats/samplesize.aspx> [8]. This research used the descriptive results of continuous variables as mean, range, standard deviation (SD), and categorical variables, shown as numbers and percentages. Statistical analysis used Independent T-Test, and a p-value <0.05 was considered statistically significant. The software program SPSS version 16 was used together with Windows version 10. Thirty-six pregnant women were required for each group.

Result

During the study period, total pregnant women were 10,336 deliveries, and this research started from January 2013 to January 2021. The hypertensive crisis in Pregnancy was occurring in 72 patients (0.70 %) of both vaginal (8.3%) and cesarean deliveries (91.7%). The referral system was performed by about 56.9% and no underlying disease (84.72%).

Tables 1-4 demonstrated the demographic characteristics in both groups of pregnant women. Clinical data were risk factors, the average age in the 1st group (28.33 \pm 7.68 years) less than the 2nd group (30.17 \pm 6.59 years), but this was not statistically significant (P-value= 0.19). The body mass index (Post BMI) of the 1st group (32.60 \pm 5.78kg/m²) was less than the 2nd group (32.29 \pm 4.84kg/m²), However, this was not statistically significant (P-value =0.41). Most of the gravidity was one in the 1st group (50%) and two in the 2nd group (36.10%), while most of the gestational age was term pregnancies (43.10%). Fetal weight in the 1st group (2,762.66 \pm 524.85 kilograms) was higher than the 2nd group (2,740.28 \pm 869.01 kilograms), and this was statistically significant (P-value=0.004). Fetal Apgar scores 8-10(90.30%) in both groups of pregnant women. The systolic blood pressure for the 1st group (171.91 \pm 16.35mmHg.) was found less than the 2nd group (177.89 \pm 18.32mmHg.), but this was not statistically significant (P-value= 0.53). On the other hand, the diastolic blood pressure was found that the 1st group (108.97 \pm 9.88mmHg.) was higher than the 2nd group (108.78 \pm 10.29mmHg.), but this was not statistically significant (P-value=0.61).

Table 1: Demographic characteristics of hypertensive crisis in pregnant women.

Variable demographic data	1st group IM (N=36)		2nd group IV (N=36)		All (N=72)		P-value	
	N (%)	($\bar{x} \pm S.D.$)	N (%)	($\bar{x} \pm S.D.$)	N (%)	($\bar{x} \pm S.D.$)		
Age		28.33±7.68		30.17±6.59		29.25±7.17	0.2	
Age Group								
≤ 20	5 (13.90)		3 (8.30)		8 (11.10)			
21 - 34	20 (55.60)		24 (66.70)		44 (61.10)			
≥ 35	11 (30.60)		9 (25.00)		20 (27.80)			
BMI (Pre-pregnancy)			26.76± 0.45		25.78±4.88		26.27± 5.16	0.5
Post BMI (during delivery)			32.6± 5.78		32.29±4.85		32.44± 5.30	0.41
Weight Gain			14.2± 5.49		16.36±6.37		15.28± 6.00	0.14
Underlying Disease								
	Yes	5 (13.90)		6 (16.70)		11 (15.28)		
	No	31 (86.10)		30 (83.30)		61 (84.72)		
Gravida								
	1	18 (50.00)		13(36.10)		31 (13.10)		
	2	10 (27.80)		11 (30.60)		21 (29.20)		
	≥3	8 (22.20)		12 (33.30)		20 (27.80)		
Parity								
	0	20 (55.60)		14 (38.90)		34 (47.20)		
	1	11 (30.60)		14 (38.90)		25 (34.70)		
	2	2 (5.60)		8 (22.20)		10 (13.90)		
	≥3	3 (8.30)		0		3 (4.20)		

Table 2: Demographic characteristics of hypertensive crisis in pregnant women.

Variable Demographic Data	1st Group IM (N=36)		2nd Group IV (N=36)		All (N=72)		P-value
	N (%)	($\bar{x} \pm S.D.$)	N (%)	($\bar{x} \pm S.D.$)	N (%)	($\bar{x} \pm S.D.$)	
Gestational Age	≤ 35	5 (13.90)		12 (33.30)		17 (23.60)	
	36-37+6	11 (30.60)		13 (36.10)		24 (33.30)	
	≥ 38	20 (55.60)		11 (30.60)		31 (43.10)	
Referral System							
	Yes	13 (36.10)		28 (77.80)		41 (56.90)	
	No	23 (63.90)		8 (22.20)		31 (43.10)	
Blood Pressure							
	Systolic	171.94± 16.35		177.89±18.32		174.92±17.50	0.54
	Diastolic	108.97± 9.88		108.78±10.29		108.88±10.01	0.61
MgSO ₄ protocol							
	total 24 Hour	27 (75.00)		34 (94.40)		61 (84.70)	
	No total 24 Hour	9 (25.00)		2 (5.60)		11 (15.30)	
Birth Route							
	Vg route	2 (5.60)		4 (11.10)		6 (8.30)	
	C/S	34 (94.40)		32 (88.90)		66 (91.70)	

Table 3: Demographic characteristics of hypertensive crisis in pregnant women.

Variable Demographic Data	1st Group IM (N=36)		2nd Group IV (N=36)		All (N=72)		P-value
	N (%)	($\bar{x} \pm S.D.$)	N (%)	($\bar{x} \pm S.D.$)	N (%)	($\bar{x} \pm S.D.$)	
Anesthesia							
	Spinal	32 (88.90)		25 (69.40)		57 (79.20)	
	GA	2 (5.60)		7 (19.40)		9 (12.50)	
	Local	2 (5.60)		4 (11.10)		6 (8.30)	
Fetus		N = 36		N = 36		N = 72	
	Male	23 (63.90)		14 (38.90)		37 (51.40)	
	Female	13 (36.10)		22 (61.10)		35 (48.61)	
Fetal Apgar score							
	8-10	34 (94.40)		31 (86.10)		65 (90.30)	
	6-7	2 (5.50)		3 (8.30)		5 (6.90)	
	≤5	0		0		0	
	DFIU	0		2 (5.50)		2 (2.70)	

Table 4: outcome measurement hypertensive crisis in pregnant women.

Outcome Measurement	Group 1: IM (N=36) ($\bar{x} \pm S.D.$)	Group 2: IV (N=36) ($\bar{x} \pm S.D.$)	All (N=72) ($\bar{x} \pm S.D.$)	P-value
Estimated blood loss (ml.)	427.78 ± 182.62	513.89 ± 316.14	470.83 ± 259.98	0.07
Fetal Body Weight (gram)	2,762.66 ± 524.85	2,740.28 ± 869.01	2,751.47 ± 712.88	0.004

Figure 1 demonstrated the total weight gain average of 15.28±6.00kg and no difference in both groups. (P-value=0.14). Furthermore, Figure 2 demonstrated that blood loss for the 1st group (427.78±182.62 ml.) was found less than the 2nd group

(513.89±316.14 ml.), but this was not statistically significant (P-value=0.07). The successful outcome of the two groups of care was not statistically different for both mothers and fetuses.

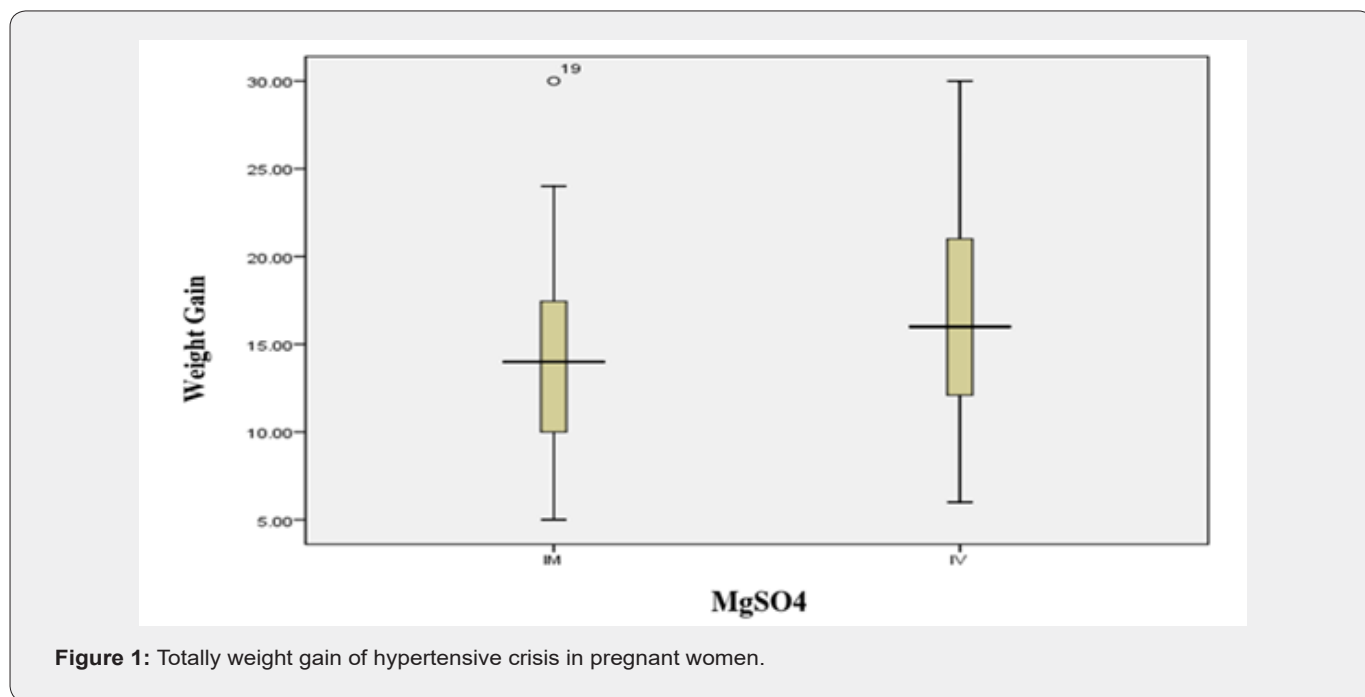


Figure 1: Totally weight gain of hypertensive crisis in pregnant women.

Discussion

National Healthcare System, Thailand's Public Health has managed 12 health zones and assigned the Inspector-General of The Ministry of Public Health to work in the health zone and perform the work as authorized by the Permanent Secretary of The Ministry of Public Health. The government inspection and monitoring of the performance of government agencies under the Ministry of Public Health in the government inspection zone following the regulations or cabinet resolutions. The Maternal and

Child Health Group, Department of Health [4] reported maternal mortality from 2019. The 2019 maternal mortality analysis and data analysis showed that maternal mortality was 20.3 per 100,000 live births. From October 2018 to September 2019, the cause of maternal death revealed that the mothers died from a direct cause of 56%, 36% of indirect causes, and 8% unknown cause. The leading direct cause of death was bleeding (obstetric hemorrhage), hypertensive disorder in pregnancy, suicide, amniotic fluid embolism, while the indirect cause was an infection, influenza, heart disease, and stroke.

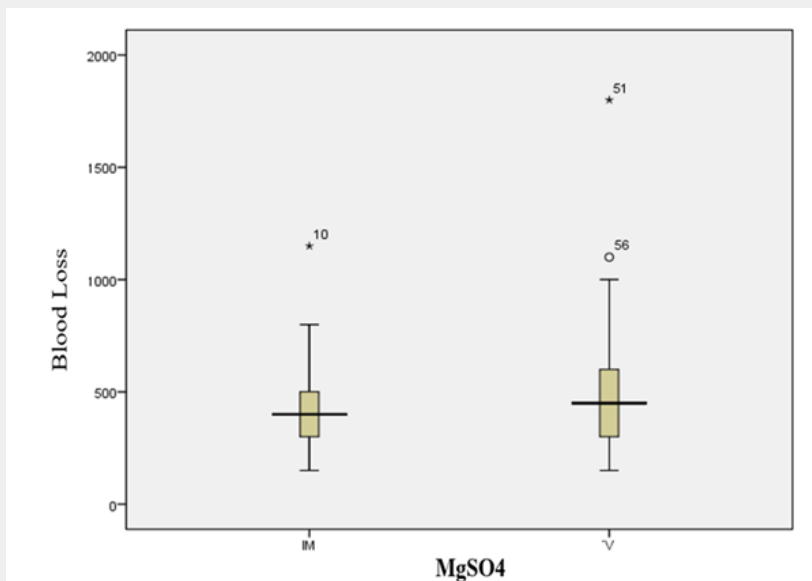


Figure 2: Estimated blood loss of hypertensive crisis in pregnant women.

In addition, maternal mortality surveillance results were conducted. It reflects the scale and severity of the problem in each area. Proactive situational information and performance reports have been returned to the agency to determine the direction of surveillance and prevent re-emergencies, establish policies and measures, and plan to integrate with the relevant authorities. Preventing and reducing maternal mortality requires a review of the cause of maternal mortality to plan to improve the care system for pregnant, maternity, and postpartum mothers more effectively according to

the context of the area. Focus on individual management, especially obstetric risk screening systems. The department of health executives presents the surveillance results to the Department of Health every month to recognize, acknowledge and manage, contribute to learning into practice and development. That leads to a visit to empowerment. Exchange of experiences, analyze problems, provide feedback. The solution fits the context of the area and provides support according to the Department of Health's mission. In addition, other contributing factors of maternal mortality were knowledge, understanding, and awareness of the health of pregnant women and their families [4,7].

Fundamental principles of care for hypertension crisis in pregnancy from the past to the present still exist that:

- a) Prevention of convulsions
- b) Blood pressure control
- c) Consideration of care during pregnancy, including childbirth, for the mother's safety.

The decision to plan for care must link to gestational age. Currently, preparations are made before pregnancy, during pregnancy, during childbirth, and after birth (Flow chart).

Conceptual Frameworks of Referral System

Community hospitals would likely transfer the critical patients to the general hospital, such as hypertensive crises in pregnancy associated with an increased risk of maternal and perinatal morbidity and mortality. Therefore, the Obstetricians in general hospitals must improve knowledge, skills, and experience for critical thinking worldwide. Referral system operation continues to adhere to the conceptual framework. Zoning is responsible for the northern and southern zones, where the feature makes it

easier to pass on decades of practice. However, in some cases, this behavior may create unnecessary risks, and delays in providing care, as the hypertension crisis in pregnancy must be rushed to provide timely care to meet the standards in common with the availability and potential of multidisciplinary teams and blood depots.

The desired results for obstetrics are:

- a) Pregnant women deposit pregnancy early and deposit the pregnancy according to quality standards.
- b) Increase access to target and vulnerable services

- c) Public health facilities provide quality pregnancy and maternity services following the standards.
- d) Link service of all levels of service and the availability of an efficient forwarding system.
- e) Pregnant women and their families can take care of themselves during pregnancy and after birth correctly. suitable
- f) All service units have mother and child health operations under six value programs (6 value maternal and child health; 6 V-MCH) to build Thai children are of the same quality in the same direction.



Intrapartum Management in Patients with the Hypertensive Crisis in Pregnancy: [1,9-12]

When diagnosing Severe features, be hospitalized and monitor the symptoms closely. Outpatient treatment is not recommended. In case of termination of pregnancy in pregnant women diagnosed with severe features, there are the following treatment guidelines:

Lower Blood Pressure: [1,12-15]

Pharmacologic Treatment: Short-acting antihypertensive drugs. The purposes are congestive heart failure, myocardial infarction, renal injury, and ischemic or hemorrhagic stroke.

When SBP ≥ 160mmHg or DBP ≥ 110mmHg measures twice as long as short (about 15 minutes), consider short-acting antihypertensive drugs within 30-60 minutes, maintaining blood pressure levels less than 160/110mmHg. The most common use: Labetalol (IV), hydralazine (IV), Nifedipine (Oral), which is effective in lowering blood pressure (efficacy) no differently, has the following methods and precautions:

Non-pharmacologic treatment includes reducing interference, giving pregnant women rest, pain control, avoid painful tests or procedures, such as not checking internally while blood pressure is not controlled, and properly aligning the environment.

Seizure Prophylaxis: [1,12-15]

Prevention of seizures in pregnant women diagnosed as preeclampsia: MgSO₄ is a drug of choice in preventing seizures and reducing placental abruption, giving immediately. When Diagnosis is a patient in the "Pregnancy-induced hypertension with severe features" group. Diazepam or Phenytoin is considered an antiepileptic drug (in case of seizures and then non-stop seizures) or contraindications of using MgSO₄ such as myasthenia gravis

hypocalcemia, moderate to severe renal failure, cardiac ischemia, heart block, and myocarditis.

MgSO₄ Administering Medications and Dosage: [1,12-15]

Preparation: 50% MgSO₄ (popular IV drip mix), 20% MgSO₄, and 10% MgSO₄ (iv loading is common) Intravenous route (IV): MgSO₄ 4 - 6g IV loading over 20-30min then IV drip 1-2g/hour write treatment instruction as follows:

- 10% MgSO₄ 40ml(4g) Sig. IV loading over 30min or
- 20%MgSO₄ 20ml(4g) + NSS up to 30ml Sig. IV loading over 30min or
- 50% MgSO₄ 8ml(4g) + NSS up to 30ml Sig. IV loading over 30min.
- 50%MgSO₄ 80 ml + 5%DW 920ml Sig. IV drip rate 50ml/hr (2g/hr)

In case of renal failure (Serum Cr 1.0-1.5mg/dL) or oliguria (urine output < 30ml/hour), loading 4- 6g and IV maintenance drip 1g/hour should be used to prevent magnesium toxicity.

Intramuscular route (IM): MgSO₄ 10g IM (5g IM in each buttock) loading then 5g IM q 4 hour (20) 50%MgSO₄ 20ml(10g) + 2%Xylocaine 2ml Sig. 11ml IM in each buttock Then 50%MgSO₄ 10ml(5g) + 2%Xylocaine 1ml Sig. IM in buttock q 4 hour Magnesium toxicity is found over IV routes, considering the intramuscular route when an intravenous catheter cannot be inserted.

MgSO₄ Therapeutic Level: [1,12-15]

Magnesium excretion, therefore, when administering the drug, there are things to follow:

Urine output: Should wear Foley catheter, keep urine output > 0.5ml/kg/hr.

Deep tendon reflex: monitor hyporeflexia/areflexia at Patellar reflex only

Respiration: keep RR > 14 /min

Serum Mg: Should be tracked in cases with renal failure, monitor every 4 hours.

Magnesium Toxicity: [1,12-15]

If serum mg > 8mEq/L stops giving MgSO₄ to penetrate Serum Mg every 2 hours until Serum Mg is < 7mEq/L, consider starting a new MgSO₄ at a reduced rate.

In case of symptoms

Stop giving MgSO₄ serum mg drilling every 2 hours.

Respiratory depression: Endotracheal intubation may be required.

Increased renal excretion: May consider giving furosemide IV to excrete Magnesium through the urine.

May consider anti-dote: 10% Calcium gluconate 10ml IV over 3min.

Termination of Pregnancy: [1,12-15]

Vaginal delivery is recommended for cesarean section when there are other obstetric indications such as fetal distress, severe placental abruption, or while waiting for birth, pregnant women have worse disease progression. In addition, it is expected that it will take a long time to give birth by itself through the vagina. Start induction or augmentation after maternal stabilization (lower blood pressure, MgSO₄ IV loading) for at least 4 hours. Prostaglandin and Oxytocin can be used typically.

Consider painless labor birth: Labor pain can stimulate hypertension and seizure, recommend spinal or epidural anesthesia with little chance of epidural hematoma in platelet ≥ 70,000 x 10⁹/L, no platelet dysfunction, no coagulopathy, and no antiplatelet or anticoagulant medications.

Continue MgSO₄: MgSO₄ maintenance during labor induction, progression of labor, 2nd stage of labor to post-partum 24 hours, for Cesarean section, mgSO₄ is recommended as well, although MgSO₄ causes prolonged muscle relaxation.

Shortening 2nd Stage of Labor

May consider using assisted birth procedures such as Forceps extraction or vacuum extraction to reduce congenital disabilities, reduce hypertension stimulation, prevent seizures, but control pain. Fetal monitoring Continuous fetal monitor, fetal distress surveillance, and placental abruption

Maternal monitoring Monitor both progressions of disease, progression of labor, and magnesium toxicity, to be intensively

observation and be careful as follows.

Blood Pressure

After giving short-acting antihypertensive drugs until BP is down, continue monitoring if BP exceeds 160/110mmHg. Consider continued medication according to chart 2, such as Labetalol 20mg IV, control of BP. BP high birth 160/110mmHg will be considered labetalol 40mg IV.

Balance fluid intake/output: Although urine output is more than 0.5ml/kg/hour, Total IV intake is based on a large amount of water and medicines, which is more water entering the body than the amount of urine. Fluid balance positive can cause pulmonary edema to be prevented by mixing the required medications such as Oxytocin, MgSO₄ more intensively to reduce total IV intake.

Serial PIH Blood Test

To see the progression of the disease, in general, if the symptoms are stable, the first period will be sent to the laboratory every 6 hours, but if there is a change, HELLP syndrome or DIC may consider sending a more thorough test.

HELLP Syndrome

Treatment Guidelines Unlike "Pregnancy-induced hypertension with severe features," HELLP syndrome has a worse prognosis. Therefore, patients should be sent to Tertiary care hospitals.

HELLP syndrome can occur or have a progression of disease that worsens during post-partum.

Most platelets and Liver enzymes return to normal within seven days of birth. Detecting AST ≥ 2,000 IU/L and serum LDH ≥ 3,000 IU/L increase mortality risk. Eclampsia Treatment guidelines are no different from "Pregnancy-induced hypertension with severe features."

Postpartum Management

New-onset Hypertension, Exacerbated Hypertension, Progression of disease, pulmonary edema, stroke can occur during postpartum because of postpartum physiology, and frequent medications during postpartum cause volume retention, sympathomimetic activation, and direct vasoconstriction.

Postpartum Hemorrhage Prevention: [1,7,12-16]

However, methylergonovine (Methergine-R) is prohibited because it provokes hypertension. In cases where severe features are diagnosed, continue MgSO₄ until 24 hours after birth or 24 hours after diagnosis. Severe features (in case of diagnosis in postpartum range) Monitor BP, clinical, fluid intake/output surveillance progression of the disease, eclampsia, exacerbated hypertension, and pulmonary edema. Pain control during postpartum: Recommended non-steroidal anti-inflammatory drugs; No effect on blood pressure control, observed the symptoms in the hospital at least 72 hours after disposing of the patient from

the hospital, schedule a follow-up appointment 7-10 days after birth to assess blood pressure, symptoms, and laboratory results. After six weeks, as usual, follow-up after postpartum 12 weeks also has hypertension to diagnose chronic hypertension in pregnancy is a group of significant diseases that cause harm to mothers and babies. An obstetrician should take close care. Currently, there are guidelines for effectively screening pregnant women at high risk of preterm preeclampsia.

Aspirin is available in high-risk groups to prevent the occurrence of the disease. There are several levels of disease in this group. Diagnosis relies on the diagnostic criteria of New-onset Hypertension, New-onset Proteinuria, and Severe features. When diagnosing severe features, treatment is to terminate the pregnancy due to the high risk of causing seizures and harming mothers and babies. Monitoring and monitoring during the postpartum period remain essential because the first 24 - 48 hrs. Onset and Progression of the disease can also occur. When a 12-week postpartum follow-up appointment is also detected, hypertension is diagnosed with Chronic Hypertension, and patients with hypertension in pregnancy increase the risk of cardiovascular diseases in the future. Consider corrective surgical surgery to correct postpartum hemorrhage from the uterus, not contraction, by considering the patient's condition. The availability of a blood bank was performed, the availability of teams that maintain obstetricians' skills and expertise, and the need to have children of patients. It should start with conservative approaches to reduce the incidence of postpartum uterine surgery from non-clotting uterine diseases, such as B-lynch suture, internal iliac arteries, and condom balloon technique [15,16]. The obstetrician can always follow a senior doctor who specializes in surgical assistance.

However, the limitations of this research are:

- a) Population data were retrospective collection. The selection of sampling varied according to the patient's symptoms and treatment experience of physician, caregiver according to the vision and context of the area.
- b) Some critical information was not recorded in medical records.
- c) Equipment and laboratory examinations in essential data Not all of them could submit the same analysis.
- d) The number of patients was relatively small and severe.

As a result, the research could not be designed in a randomized, grouped experimental research style. Instead, randomized controlled trial (RCT) double-blinded is between research faculty and samples, producing proper and standardized research. If this research can spark interest, it can be to design research to control variables and sample them. The researchers succeeded in being the model for research in creating opportunities to develop a routine to research (R2R).

Conclusion

The route of the MgSO₄ protocol, intramuscular or continuous intravenous, should be a recommendation before the patients had transferred from the community to the general hospitals. Respectfully, early hypertensive crisis diagnosis and proper management could decrease maternal and fetal complications.

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