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Analysis of perinatal outcomes of the pregnant women applied magnesium sulfate due to severe preeclampsia and eclampsia

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Abstract

Objective: In this study, we aimed to analyze the perinatal outcomes of the pregnant women who were applied magnesium sulfate due to the diagnosis of severe preeclampsia and eclampsia in our clinic.

Methods: The patients hospitalized in our clinic and administered with magnesium sulfate due to diagnosis of severe preeclampsia and eclampsia between January 2011 and January 2015 were included in this retrospective study. The data of perinatal outcomes of the patients were reviewed retrospectively through hospital's medical records. Ablatio placentae, oligohydramnios, maternal acute renal failure, maternal neurological deficits, intracranial hemorrhage, which are the maternal complications of preeclampsia and eclampsia, and fetal intracranial hemorrhage, fetal growth retardation, newborn's intense care need and neonatal necrotizing enterocolitis development, which are the potential fetal complications of preeclampsia and eclampsia, were considered as poor perinatal outcomes.

Results: A total of 207 patients were included in the study. When hospital records were reviewed, it was seen that 17 cases admitted to the hospital after eclamptic seizure, and 54 cases had eclamptic seizure when undergoing magnesium sulfate treatment due to the diagnosis of severe preeclampsia. Mean week of gestation was 32±2.4 in the severe preeclampsia group and 30±1.5 in the eclampsia group. While maternal death associated with disseminated intravascular coagulopathy (DIC) occurred in one of the 17 patients admitted with eclampsia diagnosis, a mass was identified in the frontal lobe in one patient. In 8 patients, various levels of HELLP syndrome developed. Mean hospitalization period of the patients with severe preeclampsia was 4±1.7 days while it was 6±2.2 days in patients with eclampsia.

Conclusion: The presence of severe preeclampsia and eclampsia is associated with poor maternal and fetal perinatal outcomes despite the appropriate treatment and close follow-up.

Keywords: Eclampsia, HELLP syndrome, magnesium, preeclampsia.

Özet: Ağır preeklampsi ve eklampsi nedeni ile magnezyum sülfat infüzyonu uygulanan gebelerin perinatal sonuçlarının incelenmesi

Amaç: Bu çalışmada kliniğimizde ağır preeklampsi ve eklampsi tanısı ile magnezyum sülfat infüzyonu uygulanan gebelerin perinatal sonuçlarını incelemeyi amaçladık.

Yöntem: Bu retrospektif çalışmaya Ocak 2011 – Ocak 2015 tarihleri arasında ağır preeklampsi ve eklampsi tanısı ile kliniğimize yatırılan ve magnezyum sülfat tedavisi uygulanan hastalar dahil edildi. Hastaların perinatal sonuçlarının verileri için hastane kayıtları geriye dönük olarak tarandı. Preeklampsi ve eklampsinin olası maternal komplikasyonlarından olan plasenta dekolmanı, oligohidramniyos, maternal akut böbrek yetmezliği, maternal nörolojik defisitler, intrakraniyal kanama, maternal ölüm ile olası fetal komplikasyonlarından olan fetal intrakraniyal kanama, fetal büyüme kısıtlılığı, yenidoğan yoğun bakım ihtiyacı ve neonatal nekrotizan enterokolit gelişimi kötü perinatal sonuçlar olarak kabul edildi.

Bulgular: Çalışmaya toplam 207 hasta dahil edildi. Hasta kayıtları incelendiğinde olgulardan 17 tanesinin hastaneye eklamptik nöbet sonrası başvurduğu, 54 olgunun ise ağır preeklampsi tanısı ile magnezyum sülfat tedavisi alırken eklamptik nöbet geçirdiği görüldü. Ortalama gebelik haftası, ağır preeklampsi grubunda 32±2.4, eklampsi grubunda ise 30±1.5 olarak saptandı. Eklampsi tanısı ile başvuran toplam 17 hastadan birinde dissemine intravasküler koagülopatiye (DIC) bağlı maternal ölüm gerçekleşirken, bir tanesinde ise frontal lobda kitle tespit edildi. Hastalardan 8'inde değişik derecelerde HELLP sendromu gelişti. Ağır preeklampsi olan hastaların hastanede yatış süresi ortalama 4±1.7 gün iken, eklampsi geçiren hastaların ortalama yatış süresi 6±2.2 gün olarak saptandı.

Sonuç: Ağır preeklampsi ve eklampsi varlığı, uygun tedavi ve yakın takibe rağmen kötü maternal ve fetal perinatal sonuçlara ilişkilidir.

Anahtar sözcükler: Eklampsi, HELLP sendromu, magnezyum, preeklampsi.

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Introduction

Preeclampsia is the most common condition complicating pregnancy and it may occur at any period from the second half of pregnancy up to first two weeks after delivery.[1] It is known that preeclampsia is caused by generalized vasospasm as a result of vascular endothelium injury and disorder of endothelium nitric oxide release due to the insufficiency of syncytiotrophoblasts in the invasion of spiral arterioles within myometrium during early weeks of gestation.[2]

Depending on its severity, preeclampsia may cause many life-threatening organ and system damages such as renal failure, cerebral hemorrhage-edema, thrombocytopenia and liver function disorder in mother.[3] Also, preeclampsia may cause baby to develop growth retardation, oligohydramnios, prematurity, increase in newborn intense care need, necrotizing enterocolitis and intracranial hemorrhage.[3]

Addition of eclamptic seizure to severe preeclampsia may cause the increase in maternal mortality and morbidity.[2] The treatment widely used to protect against eclampsia or to prevent its reoccurrence is magnesium sulfate infusion. Magnesium sulfate infusion complying with the protocol is a treatment accepted for its activity in the prophylaxis of eclampsia seizure.[4]

Based on the association of preeclampsia and eclampsia with poor perinatal outcomes, we aimed in this study to review and analysis the perinatal outcomes of pregnant women undergoing magnesium sulfate treatment in our clinic with the diagnosis of severe preeclampsia and eclampsia between January 2011 and January 2015.

Methods

A total of 207 patients hospitalized in Ümraniye Training and Research Hospital and administered with magnesium sulfate between January 2011 and January 2015 due to diagnosis of severe preeclampsia and eclampsia were included in this study.

For the severe preeclampsia diagnosis, 2014 criteria of American College of Obstetricians and Gynecologists, which were the presence of arterial blood pressure over 140/90 mmHg after 20 weeks of gestation and/or proteinuria or target organ failure, were taken into consideration.[5] Occurrence of tonic-clonic seizure in the presence of hypertension was considered as eclampsia. Conditions causing tonic-clonic seizure except the eclampsia were excluded from the study.

Before the magnesium sulfate treatment, blood hemoglobin levels, hematocrit count, platelet count, and serum liver enzyme levels of the patients are checked as a routine practice in our clinic. During the treatment, fetal well-being is checked every 4 hours by non-stress test (NST), daily biophysical profile and fetal umbilical Doppler (if necessary) examinations.

It was seen in the medical files of the patients included in the study that alpha-methyldopa and nifedipine were used as antihypertensive medication for patients appropriate for oral intake, and that magnesium sulfate infusion was performed to all patients in accordance with the protocol. The infusion was carried out as 2 g per hour after 4.5 g loading within 100 cc isotonic fluid in 20 minutes.

While the maternal reasons of labor indications were blood pressure being >160/110 mmHg despite the antihypertensive treatment, persistence and exacerbation of the symptoms, presence of severe acid, ablatio placenta, oliguria, pulmonary edema, premature rupture of membrane, HELLP syndrome and eclampsia, the fetal reasons were the variability loss in NST, presence of recurrent late decelerations, growth retardation, oligohydramnios, diastolic flow lost or presence of reverse flow in the umbilical Doppler screening.

Maternal age, gravida, parity, week of gestation and gestational outcomes were recorded. While ablatio placentae, olygohydramnios, maternal acute renal failure, maternal neurological deficits and maternal death were considered as poor maternal outcomes, fetal intracranial hemorrhage, growth restriction, newborn intense care need and neonatal necrotizing enterocolitis were considered as poor fetal outcomes.

The analysis of the data was done by SPSS 15.0 (SPSS Inc., Chicago, IL, USA). The data obtained were presented as percentage, mean and standard deviation.

Results

It was found that 71 of 207 patients included in the study had eclampsia seizure, and while 17 of these 71 patients admitted to hospital for eclampsia, other 54 patients had eclampsia seizure during magnesium sul-

fate treatment due to severe preeclampsia. Mean age of the patients diagnosed to have severe preeclampsia was 28±2.6, mean gravida was 2±1.1, and mean parity was 1±0.4. In the eclampsia group, mean age was 30±1.2, mean gravida was 2±0.8, and mean parity was 1±0.2 (**Table 1**). While 62 (29.9%) patients were primigravida, 21 patients had pregestational hypertension. One hundred and thirty-four patients were undergoing antihypertensive treatment due to the diagnosis of pregnancy-induced hypertension. Mean week of gestation was 32±2.4 in severe preeclampsia group and 30±1.5 in the eclampsia group, and two doses of betamethazone were administered with 24-hour interval to patients in accordance with the protocol whose pregnancy was less than 34 weeks of gestation.

Maternal death occurred due to disseminated intravascular coagulopathy (DIC) in one of the patients admitted after eclampsia seizure, and a mass was identified in the frontal lobe in another patient. In 8 (3.8%) patients, various levels of HELLP syndrome developed, and blood and blood product transfusion was carried out. Mean hospitalization period of the patients with severe preeclampsia was 4±1.7 days while it was 6±2.2 days in patients with eclampsia. A total of 95 (45.9%) patients who were decided to deliver due to severe preeclampsia diagnoses had a normal delivery while 46 (22.2%) patients due to previous cesarean section history and 68 (32.8%) patients due to ablatio placentae (n=13), fetal distress, eclampsia and maternal general condition disorder had cesarean section. All patients who had eclampsia underwent cesarean section.

Mean magnesium sulfate intake periods of the patients before delivery was calculated as 8±4.2 hours. During magnesium sulfate treatment, some patients complained about increased heat and decrease in baby movements. In order to monitor the toxic effect of the drug, hourly blood pressure, respiratory rate, urine volume, deep tendon reflexes (patella) of the patients were checked. Fetal well-being was checked every 4 hours by NST, and daily biophysical profile examination. Growth retardation was identified in 28 (13.5%) patients and oligohydramnios was identified in 38 (18.3%) patients. After the delivery, 94 (45.4%) babies needed follow-up in newborn intense care unit.

Magnesium sulfate infusion continued for 24 hours after delivery for all patients. While all patients who underwent eclampsia were followed up in the intense care unit after delivery, 15 (7.2%) patients diagnosed to have severe preeclampsia were hospitalized in the adult intense care service for close monitoring purpose. While none of the patients who underwent severe preeclampsia had eclampsia seizure after the delivery, one case had eclampsia seizure in the intense care unit and her magnesium sulfate treatment following the last eclampsia seizure was ended after 48 hours by consultant neurologist and diazepam treatment was initiated. Mean hospitalization period of the patients with severe preeclampsia was 4±1.7 days while it was 6±2.2 days in patients with eclampsia. Except the maternal death case, all cases were discharged with well-being after informing them about eclampsia risk and blood pressure follow-up information. Poor perinatal outcomes are summarized in the **Table 2**.

Table 1. Comparison of the patients diagnosed with severe preeclampsia and eclampsia.*

	Severe preeclampsia n=136	Eclampsia n=71
Mean age	28±2.6	30±1.2
Mean gravida	2±1.1	2±0.8
Mean parity	1±0.4	1±0.2
Mean week of gestation	32±2.4	30±1.5
Mean hospitalization period (day)	4±1.2	6±2.2

*Mean variables and their standard deviations were provided.

Discussion

Severe preeclampsia and eclampsia are the most critical clinical conditions observed during pregnancy, and there are many studies in the literature about screening and preventing these conditions.[6] Initiating acetylsalicylic acid by identifying Doppler abnormality during early weeks of gestation, reasonable use of antihypertensives, informing patients about symptoms before eclampsia are the methods for early diagnosis, treatment and prevention of these conditions.[7] Despite all,

Table 2. Comparison of the poor perinatal outcomes in patients diagnosed with severe preeclampsia and eclampsia.

Poor perinatal outcomes	n	%
Ablatio placentae	13	6.2
Oligohydramnios	38	18.3
Newborn intensive care	94	45.4
HELLP	1	0.4
Growth retardation	28	13.5

the incidence rates of severe preeclampsia and eclampsia are among the leading reasons for maternal deaths worldwide while the rates are not clearly defined in Turkey.[8]

Primiparity, young age and low socioeconomical status are the known risk factors for preeclampsia.[9] In our study group, 62 of the cases were primigravida and the mean age of the patients was 28±2.6. Socioeconomical profiles of our patients were consistent with the literature, and it was found that 38 patients did not come to their antenatal follow-up visits during their pregnancies.

Maternal mortality and morbidity risk increases in pregnancies complicated with severe preeclampsia and eclampsia.[2] The most significant reasons for the increase of maternal morbidity are severe hemorrhage due to detachment, pulmonary edema development, acute kidney failure, cerebrovascular hemorrhage and liver rupture.[2] In 13 of the pregnant women that we monitor, emergency cesarean section was performed due to ablatio placentae, and it was found that one patient had cerebrovascular hemorrhage.

The addition of HELLP syndrome to the severe preeclampsia and eclampsia conditions increases the mortality risk. There are many studies in the literature supporting the maternal mortality increase where HELLP syndrome is added to the severe preeclampsia and eclampsia conditions.[10] Poor perinatal outcomes are observed more frequently especially in cases which develop disease before 34 weeks of gestation as well as HELLP condition.[11] According to our data, it was seen that 6 cases which were diagnosed to have severe preeclampsia before 34 weeks of gestation were also diagnosed to have HELLP syndrome, and maternal death occurred in one patient due to intracranial hemorrhage.

Severe preeclampsia may cause placental blood flow to decrease due to the insufficiency of trophoblastic invasion, and it results in fetal growth restriction and oligohydramnios.[12] Decreasing placental flow may appear as the loss of umbilical end diastolic flow and reverse flow in fetal Doppler screening.[13] We found that 28 of our patients included in the study had growth restriction and 38 of them were diagnosed with oligohydramnios by ultrasound measurements.

Although magnesium sulfate infusion is used successfully today for protecting against eclampsia, its adverse effects should be taken into consideration.[14] It is known that the medication, of which therapeutic serum level is with 4–6 mg/dL, causes renal function disorder and even respiratory distress. During the treatment, urination, deep tendon reflexes and respiratory rate should be followed up at serum level.[14] In our clinic, we carry out close follow-up for the patients undergoing magnesium sulfate treatment in terms of toxicity. Toxicity due to magnesium sulfate was not detected in any of the patients included in the study.

According to the previous studies, prematurity is among the poor fetal outcomes for severe preeclampsia and eclampsia.[15] Since the definite treatment of these conditions is delivery, premature labor rate increases. Mean delivery week of the patients, who underwent magnesium treatment due to severe preeclampsia and eclampsia in our clinic, was 32±2.4 and it was seen that 94 (45.4%) babies needed newborn intense care unit. Although it has been reported in the literature that the babies of women who underwent magnesium sulfate treatment had better neurological outcomes compared to the babies whose mothers did not undergo the magnesium treatment, all mortality and morbidity risk to be caused by prematurity will continue.[16]

Conclusion

In conclusion, the patients who underwent magnesium sulfate treatment in our clinic due to severe preeclampsia and eclampsia treatment were analyzed and poor perinatal outcomes were summarized. Based on our findings, it is required to highlight that these clinical conditions can be associated with poor maternal and fetal perinatal outcomes despite the appropriate treatment and close follow-up.

Conflicts of Interest: No conflicts declared.

References

1. Erden AC. Gebelikte hipertansiyon: terminoloji ve sınıflama. Perinatoloji Dergisi 1994;2:12.
2. Kurdoglu Z, Ay G, Sayin R, Kurdoglu M, Kamaci M. Eclampsia with neurological complications: a five-year experience of a tertiary centre. Clin Exp Obstet Gynecol 2013;40: 240–2.
3. Yücesoy G, Özkan S, Bodur H, Tan T, Çalışkan E, Vural B et al. Maternal and perinatal outcome in pregnancies complicated with hypertensive disorder of pregnancy: a seven year experience of a tertiary care center. Arch Gynecol Obstet 2005;273:43–9.

4. Vest AR, Cho LS. Hypertension in pregnancy. Curr Atheroscler Rep 2014;16:395.
5. Woelkers D, Barton J, Dadelszen Pv, Sibai B. The revised 2013 ACOG definitions of hypertensive disorders of pregnancy significantly increase the diagnostic prevalence of preeclampsia. Pregnancy Hypertens 2015;5:38.
6. Liu Y, Zhao Y, Yu A, Zhao B, Gao Y, Niu H. Diagnostic accuracy of the soluble Fms-like tyrosine kinase-1/placental growth factor ratio for preeclampsia: a meta-analysis based on 20 studies. Arch Gynecol Obstet 2015;292:506–18.
7. Çamlı L, Karamani H, Şenyurt H, Bostancı A, İnan İ. Preeklampside düşük doz aspirin profilaksisi. Turkiye Klinikleri Journal of Gynecology and Obstetrics 1994;4:89– 91.
8. Berg CJ, Callaghan WM, Syverson C, Henderson Z. Pregnancy-related mortality in the United States, 1998 to 2005. Obstet Gynecol 2010;116:1302.
9. Wright D, Syngelaki A, Akolekar R, Poon LC, Nicolaides KH. Competing risks model in screening for preeclampsia by maternal characteristics and medical history. Am J Obstet Gynecol 2015;2013:62.e1–10.
10. Vigil-De Gracia P, Rojas-Suarez J, Ramos E, Reyes O, Collantes J, Quintero A, et al. Incidence of eclampsia with HELLP syndrome and associated mortality in Latin America. Int J Gynaecol Obstet 2015;129:219–22.
11. Sadaf N, Haq G, Shukar-ud-Din S. Maternal and foetal outcome in HELLP syndrome at tertiary care hospital. J Pak Med Assoc 2013;63:1500–3.
12. Dekker GA, Sibai BM. Etiology and pathogenesis of preeclampsia: current concepts. Am J Obstet Gynecol 1998; 179:1359–75.
13. Polat I, Gedikbasi A, Kiyak H, Gulac B, Atis A, Goynumer G, et al. Double notches: association of uterine artery notch forms with pregnancy outcome and severity of preeclampsia. Hypertens Pregnancy 2015;34:90–101.
14. El-Khayat W, Atef A, Abdelatty S, El-Semary A. A novel protocol for postpartum magnesium sulphate in severe preeclampsia: a randomized controlled pilot trial. J Matern Fetal Neonatal Med 2014;29:1–5.
15. Fardiazar Z, Ramin M, Madarek EO, Atashkhouei S, Torab R, Goldust M. Complications in premature labor beween severe preeclampsia and normal pregnancies. Pak J Biol Sci 2013;16:446–50.
16. Berger R, Söder S. Neuroprotection in preterm infants. Biomed Res Int 2015;2015:257139.