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Anesthesia Management for the Preeclampsia or Hypertensive Parturient

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Executive Summary

Introduction of the Problem

Preeclampsia is a maternal multisystem organ dysfunction caused by an abnormal placenta formation. Maternal hypertension manifests as part of a mismatch between maternal blood supply and fetal oxygen demand (Wang et al., 2019). Severe hypertension-induced eclamptic seizures can result if the condition is left untreated (Fardelmann & Alian, 2020; Siddiqui et al., 2019). Treatment modalities include antihypertensives, magnesium sulfate for seizure prophylaxis, and early delivery of the fetus (ACOG, 2020). Neuraxial anesthetic induced sympathectomy combined with circulating antihypertensives, magnesium sulfate therapy, and intravascular volume depletion in preeclampsia is thought to contribute to exaggerated hypotension. Since placental blood flow is not autoregulated and depends on maternal blood pressure, the uterine and fetal blood supply is compromised under maternal hypotension (ACOG, 2019).

Refractory hypotension after neuraxial anesthesia in parturients with preeclampsia or hypertension has been an ongoing issue affecting obstetric providers at the host facility. This project created a protocol to guide the anesthetic management for preeclamptic or hypertensive parturients. A communication tool was developed to facilitate early communication between the obstetrician and anesthesia provider regarding blood pressure management of a preeclamptic or hypertensive parturient. Early epidural placement, co-loading IV fluids during neuraxial anesthesia, and appropriately timed antihypertensive therapy can prevent exaggerated drops in blood pressure after neuraxial anesthesia.

Literature Review

The rate of preeclampsia in the United States increased by 25% from 1987 to 2004 (ACOG, 2020; Kasson, 2018). Increased maternal age and obesity contributed to the 67% increased rate of maternal chronic hypertension from 2000 to 2009 (ACOG, 2019). The pathogenesis of preeclampsia continues to be investigated, and there are currently limited strategies for prevention. Prophylactic low-dose aspirin therapy is used in women who have a higher risk or history of preeclampsia in a prior pregnancy (Siddiqui et al., 2019). Delivery of the fetus is the only definitive cure for the disease.

Best practice for intrapartum management for the preeclamptic parturient should include early referrals to anesthesia for optimal timing of neuraxial anesthesia. Shared goals between the obstetric and anesthesia teams include prompt control of hypertension, seizure prophylaxis in high-risk groups, and expedited fetus delivery in the presence of severe maternal disease features or fetal compromise (Hofmeyr et al., 2017). Anesthesia management involves awareness of the risk of abnormal hemostasis, judicious fluid administration, and eclamptic management should a seizure occur. Blood pressure monitoring and treatment during labor analgesia or anesthesia is one of the major tasks that anesthesia providers must manage (Overton et al., 2022).

Magnesium sulfate therapy is a standard treatment for eclampsia prevention in the preeclamptic patient. Magnesium sulfate can increase the severity of hypotension under neuraxial anesthesia. Hypotension can be further compounded if the patient is receiving treatment with antihypertensives as well as magnesium (Braveman et al., 2017; Hassell & Surendran, 2019). Magnesium can also prolong the duration of nondepolarizing neuromuscular relaxants should general anesthesia be necessary (Zhong & Zhang, 2018).

The first line antihypertensives used for preeclampsia are labetalol, hydralazine, and nifedipine. These medications have a long half-life of six hours, 12 hours, and 5 hours,

respectively. To gain normotension, the antihypertensives can be dosed as frequently as 20 minutes. The anesthesia provider should be aware of the last dose and timing of the antihypertensives before initiating neuraxial anesthesia. A labor epidural or a spinal anesthetic can be used as an alternative treatment modality to lower blood pressure. An anesthesia provider can recommend an early epidural for a preeclamptic parturient in labor. In collaboration with the obstetric team, the anesthesia provider can request an antihypertensive dose be held prior to initiation of a spinal anesthetic for cesarean section to avoid a dramatic drop in blood pressure due to the combined circulating antihypertensives and the sympathectomy produced by the spinal dose.

Anesthesia providers should aim to co-load IV fluid during neuraxial techniques with a 500 ml crystalloid or 300ml colloid solution (Dyer et al., 2018). Even though the parturient is hypertensive, preeclamptic parturients are volume contracted due to decreased oncotic pressure and capillary leak. Neuraxial-induced hypotension should be promptly treated with phenylephrine or ephedrine depending on the patient's heart rate (ACOG, 2020).

Close communication between the obstetric and anesthesia team is paramount in properly timing neuraxial anesthesia with the current antihypertensive regimen. Collaborative management is essential in providing the best care and ensuring optimal outcomes for both the mother and baby. The obstetric team should initiate a consultation with anesthesia early in the labor process to establish a collaborative role in blood pressure management. Collaborative management should include a plan for both administration of antihypertensives and initiation of neuraxial anesthesia or analgesia based on the patient's wishes and clinical status. Antihypertensives should be appropriately timed with initiation of neuraxial anesthesia to prevent significant decreases in maternal blood pressure and potential fetal effects.

Project Methods

The project conducted an extensive review of the current evidence regarding anesthetic management for the preeclamptic or hypertensive parturient. The purpose of the project was to develop a communication tool to facilitate early communication between obstetric providers and the anesthesia team in planning antihypertensive management for preeclamptic or hypertensive parturients. The project was implemented at a Level 3 perinatal center in central Illinois. This quality improvement project was deemed exempt by the SIUE Institutional Review Board (IRB).

Evaluation

The literature review findings and the communication tool were presented to the host facility's anesthesia department and the obstetric team. The team members attending the verbal educational presentation were asked to complete a seven-question post-implementation survey. The survey questions evaluated the education presentation and communication tool, assessing its applicability to the intended setting.

Results

Nine anesthesia providers (one anesthesiologist and eight CRNAs) completed the post-implementation survey. A ten-point Likert scale, ranging from “not at all” to “very much,” was used to assess knowledge of the problem, the communication tool, and its applicability in practice. All attendees (100%) completed the survey.

Most participants (89%) strongly agreed that they had previous knowledge of refractory hypotension in preeclamptic parturients treated with antihypertensives prior to neuraxial anesthesia. In addition, 89% of participants strongly agreed that the educational presentation improved their knowledge of the diagnostic parameters and treatment guidelines for

preeclampsia. All the participants (100%) rated the guideline as very user-friendly and that they were very likely to incorporate the guideline into their clinical practice. The majority of participants (89%) rated the communication tool as effective in improving the communication between the obstetric team and anesthesia provider in caring for preeclamptic parturients.

Limitations

Limitations to this project include sampling bias and the limited number of staff participation. The survey results are from a convenience sample of voluntary participants in attendance on the day of implementation due to time restraints and staff member availability. Thus, the results of this project are not generalizable to a larger population.

Impact on Practice

Improved communication between obstetric and anesthesia providers about the timing of antihypertensives for hypertensive or preeclamptic parturients can facilitate decision-making for the anesthetist. The anesthesia provider can make the informed decision to assist in blood pressure management by advocating for early epidural placement, co-load IV fluid during neuraxial anesthesia, or promptly administer vasopressors such as phenylephrine or ephedrine to treat neuraxial-induced hypotension. Both novice and experienced anesthesia providers can benefit from this project as the maternal incidence of preeclampsia continues to rise.

Overall, the results of the project were positive. Survey responses demonstrated the educational presentation was informative, and the communication tool was user-friendly and likely to be incorporated into practice. The project's immediate impact is enhanced knowledge for the obstetric and anesthesia teams of the problem of exaggerated and refractory hypotension in the preeclamptic population. Early anesthesia involvement can facilitate hemodynamic control in a variety of approaches. While this project aimed to improve multidisciplinary

communication, future projects can focus on collecting data and monitoring patient outcomes to evaluate the effectiveness of the strategies discussed.

Conclusions

Maternal morbidity and mortality can be reduced by aggressive treatment of hypertensive disorders of pregnancy. Evidence-based interventions include prompt treatment of hypertension, seizure prophylaxis with magnesium, timely delivery, and vigilant monitoring in the postpartum period (Siddiqui et al., 2019). Neuraxial analgesia and anesthesia are preferred over general anesthesia for maternal and fetal safety. However, neuraxial anesthesia and circulating antihypertensive medications can lead to profound hypotension and negative maternal and fetal side effects. Close communication between the obstetric and anesthesia team is paramount in properly timing neuraxial anesthesia with the current antihypertensive regimen. Collaborative management is essential in providing the best care and ensuring optimal outcomes for both the mother and baby.

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