

Management of Anesthesia in High Risk Pregnancy

Hamid Zahedi^{1,*}

¹Retired Associate Professor of Anesthesiology, Department of Anesthesiology, Tehran University of Medical Science, Tehran, Iran

*Corresponding author: Hamid Zahedi, Department of Anesthesiology, Retired Associate Professor of Anesthesiology, Iran. E-mail: hamidzahedi80@yahoo.com

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Dear Editor,

1 to 2% of all pregnant women in the United States undergo surgical procedures unrelated to pregnancy. The most frequent nonobstetric procedures are excision of ovarian cysts, breast biopsy, adenexal masses, appendicitis, biliary tract disease, small bowel obstruction, and diverticular disease.

If emergency surgery is required, any anesthetic technique is not preferred to another, although regional anesthesia should be considered as it minimizes fetal exposure to medications. If general anesthesia (GA) is needed, one must maintain normal oxygenation and blood pressure and avoid hyperventilation. Left uterine displacement should be used during the second and third trimesters along with the use of aspiration prophylaxis. Pre- and post-operative F.H.R and uterine activity must be assessed.

1. Management of Anesthesia in Pregnancy-Induced Hypertension (PIH)

Particular attention should be paid to airway assessment. Facial edema or stridor may indicate airway edema and difficult intubation (1).

Preeclamptic patients are hypovolemic and prone to hypotension with neuraxial anesthesia. They are at risk of pulmonary edema; thus, judicious hydration is indicated. A 500- to 1000-mL crystalloid preload is appropriate before neuroaxial anesthesia. Invasive central monitoring may be indicated if the patient develops either pulmonary edema or oliguria unresponsive to a fluid challenge. Intra-arterial blood pressure monitoring is indicated for refractory hypertension, especially if an antihypertensive infusion is needed (2).

Laboratory assessment includes a complete blood count (CBC). An elevated hematocrit (Hct) suggests hypovolemia. Thrombocytopenia occurs in approximately 15% of preeclamptic patients. A platelet count of less than 70,000/mm³ indicates an increased risk of epidural hematoma. Platelet function test is useful in evaluating the

patient's eligibility for regional anesthesia if the platelet count is in the range of 70,000 to 100,000/mm³.

Liver function tests, blood urea nitrogen, and creatinine are essential in determining the severity of the preeclampsia or identifying the presence of hemolysis, elevated liver enzymes, and low platelets (HELLP) syndrome. Arterial blood gas and chest radiograph will be indicated if there are signs or symptoms of pulmonary edema.

2. Labor Analgesia

Vaginal delivery in the presence of PIH and absence of fetal distress is an acceptable anesthetic plan. Cesarean section is necessary in the presence of fetal distress, which may reflect progressive deterioration of the uteroplacental circulation. Regardless of the anesthetic technique of choice, it is important to continue fetal heart rate (FHR) monitoring until the start of surgery.

Epidural analgesia (EA) is the preferred technique for labor analgesia, if not contraindicated. EA reduces maternal catecholamine levels and can facilitate blood pressure control in labor. Preeclampsia compromises uteroplacental perfusion because of the vasospastic component of the disease. EA improves intervillous blood flow in preeclampsia, improving uteroplacental performance and as a result, fetal well-being (2).

Epidural anesthesia can avoid the risks of GA EA is accomplished with local anesthetic (without epinephrine) containing ropivacaine or bupivacaine combined with an opioid, while maintaining left uterine displacement and FHR monitoring.

General anesthesia is indicated for preeclamptic patients undergoing cesarean section who refuse regional anesthesia or who are coagulopathic. Parturients requiring emergency cesarean section for fetal distress have been managed most often with GA. Spinal anesthesia (SA) can avoid the possible depressant effects of drugs on the fetus and eliminate the risk of failed or difficult intubation. General anesthesia is selected when hemorrhage or sepsis is the reason for emergency cesarean section. In the presence

of fetal distress, one should monitor the FHR continuously until the start of surgery.

The risk of GA in preeclampsia includes potentially difficult intubation owing to laryngeal edema, potential aspiration of gastric contents, increased sensitivity to nondepolarizing muscle relaxants, exaggerated pressor responses to direct laryngoscopy and intubation, and impaired placental blood flow. Mortality from GA is almost exclusively due to difficult airway management or failed intubation.

Before induction of anesthesia, it is essential to restore intravascular fluid volume and control blood pressure. Induction of anesthesia is usually accomplished using thiopental plus succinylcholine to facilitate intubation. Use of defasciculating doses of nondepolarizing muscle relaxants before the administration of succinylcholine is not necessary, as magnesium therapy attenuates the fasciculations produced by succinylcholine.

Exaggerated edema of the upper airway structures may interfere with visualization of the glottic opening, and laryngeal swelling may result in the need to insert a smaller tracheal tube. Laryngeal edema often occurs as part of the generalized edema and facial swelling that accompanies preeclampsia, but it may also occur with few warning signs. It is important to avoid repeated attempts at direct laryngoscopy, as this may worsen the existing edema. In preeclamptic parturients with impaired coagulation, any trauma associated with direct laryngoscopy could result in bleeding. Systemic blood pressure responses to direct laryngoscopy and intubation are likely to be exaggerated in preeclamptic parturients, thereby increasing the risk of cerebral hemorrhage or pulmonary edema. Short-duration laryngoscopy is the most predictable method for minimizing the magnitude and duration of blood pressure and heart rate responses evoked by intubation. Hydralazine (5 - 10 mg IV, 10 - 15 minutes before induction of anesthesia), labetalol (10 - 20 mg IV, 5 - 10 minutes before induction of anesthesia), or nitroglycerin (1 - 2 $\mu\text{g}/\text{kg}$ IV, just before direct laryngoscopy) may be administered to attenuate systemic blood pressure responses. Volatile anesthetics (0.5 - 1.0 minimum alveolar concentrate) with or without 50% nitrous oxide can be used for maintenance of anesthesia. The major determinant of neonatal depression is a prolonged interval between the uterine incision and delivery (> 20 minutes). After delivery, the anesthetic is typically supplemented with opioids. Potentiation of muscle relaxants by magnesium may occur and hence, a peripheral nerve stimulator is essential for monitoring neuromuscular function (3).

3. Spinal Anesthesia

Spinal anesthesia has been discouraged in preeclampsia because of the risk of severe hypotension. In patients with severe preeclampsia, the magnitude of decrease in maternal blood pressure is similar to what observed in the administration of either spinal or epidural anesthesia for SA. Institution of intravenous hydration before performing SA is essential. Should systolic blood pressure decrease more than 30% from the preblock value, treatment should consist of left uterine displacement along with increased rate of fluid infusion combined with a small dose of either phenylephrine (100 μg IV) or ephedrine (5 mg IV). A T4 sensory level is needed for cesarean section. Anesthetic requirements decrease in parturients. Bupivacaine (12 - 15 mg) is adequate to achieve the desired T4 sensory level and 120 minutes of anesthesia. Meperidine (10 mg) or morphine (0.1 - 0.2 mg) should be added for postoperative analgesia (4).

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