

Non-Obstetric Anesthesia

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Abstract

Non-obstetric surgery is usually only conducted when it is absolutely necessary for the wellbeing of the mother and the fetus. Due to the high risks for these types of patients, maternal physiological changes and fetal safety concerns during surgery will be addressed. When surgery is indicated, the best approach is to avoid fetal exposure to unnecessary medication to avoid potential adverse effects to the mother and fetus and therefore, anesthetic considerations will be addressed as well to ensure safety and successful outcome after surgery. Different types of surgeries and management during those surgeries to decrease maternal morbidity and fetal mortality will also be mentioned. Studies have been done to evaluate the efficacy of surgical intervention by examining patient records of non-obstetric surgeries. These studies have proven that non-obstetric surgeries can occur during any stage of pregnancy with minimal adverse effects. This review is intended to inform and educate the anesthesia provider, surgeon and pregnant patients about the benefit and risks of emergency surgery.

Introduction

Non-obstetric surgery is normally recommended during the second trimester because the first trimester is a critical period for organogenesis and surgery during the third trimester could increase the risk of preterm labor. According to a Upadya and Nayak (2016), “42% of surgery during pregnancy occurred during the first trimester, 35% during the second trimester, and 23% during the third”. Therefore, surgery can be required during any stage of the pregnancy depending on its indication; and may be critical for the safety of the mother and the fetus. Due to the high risks for these types of patients, anesthetic management is required for the considerations of both mother and fetal physiological changes to ensure safety and successful outcome during surgery. When surgery is indicated, the best approach is to avoid fetal exposure to unnecessary medication and consider regional versus general anesthesia to avoid potential adverse effects to the mother and fetus. Currently, there are no compelling evidence that any anesthetic drug is toxic in humans even though all general anesthetic drugs cross the placenta (Reitman and Flood, 2011, p. i72).

Indications

Non-pregnancy related indications include surgeries for appendicitis, cholecystitis, bowel obstruction, trauma related, severe cardiac and neurologic diseases. Acute appendicitis is the most common problem during pregnancy with a higher incidence in the second trimester; and the treatment for this is appendectomy. Appendectomy is indicated due to increased risk of perforation if surgical intervention is delayed for more than 24 hours after the symptoms first appear. Risk of sepsis, preterm labor, and fetal loss increases in the presence of an appendiceal perforation. With surgical intervention, maternal morbidity and mortality associated with appendicitis is low compared to non-pregnant women. Therefore, laparoscopic appendectomy is the standard of care for pregnant patients since they are considered safe with a 2% risk of fetal loss during uncomplicated surgeries and a 4% risk of preterm labor (Aptilon and Mohny, 2021).

Anesthetic Consideration

According to Chandrasekhar et al. (2009), “all inhaled anesthetics and most IV anesthetics are highly lipid soluble and freely cross the placenta” and can potentially harm the fetus. Propofol is the most common induction drug used in the operating room. During induction, propofol can cause hypotension. This is significant in that propofol use can decrease maternal blood pressure leading to a decrease in uterine blood flow which is necessary for uteroplacental circulation to prevent fetal ischemia. To prevent maternal hypotension during induction, according to Reitman and Flood (2011) ephedrine and phenylephrine are considered safe treatments.

Another anesthetic agent that could cause maternal hypotension is the use of volatile agents at MAC values greater than 1.5. “Pregnancy is associated with an increased sensitivity to volatile anesthetic agents” (Upadya and Nayek, 2016, p. 235). Therefore, MAC values should decrease for the safety of both the mother and fetus since volatile agents are known to reduce uterine tone which is important for the integrity of the cervix for the entire duration of the pregnancy.

Of all the drugs given perioperatively, muscle relaxants and reversal drugs may be the safest as they do not cross the placenta due to their structures. “Neuromuscular blocking drugs are quaternary ammonium salts which are highly ionized and do not readily crosses the placental barrier. Therefore, these drugs generally do not affect neonatal muscle tone. However, large doses of succinylcholine when given repeatedly, or when the fetus has pseudocholinesterase deficiency, can cause neonatal muscle blockade” (Chandrasekhar et al., 2009, p. 783).

Discussion

According to the one study, it seems that when surgery is indicated, choosing to delay surgery versus immediate surgical intervention could potentially increase risk of preterm labor, spontaneous abortions and maternal morbidity and mortality. In addition, there was no difference in the overall adverse outcome among the trimesters. Therefore, non-obstetric surgeries do not need to be delayed to mid-gestation. Another study showed that there is an increased risk of adverse birth outcomes following non-obstetric surgery during pregnancy. However, the overall results showed that the increased risk is minimal when they are compared to those that did not have non-obstetric surgery during pregnancy; and if they had to undergo laparoscopic surgery under general anesthesia it is considered relatively safe with minimal to little adverse fetal outcome.

Conclusion

The anesthetist along with a team of obstetrician, neonatologist and a surgeon must work together to ensure an adequate standard of care. For the anesthetist, they should formulate an anesthetic plan for the pregnant patients that considers both maternal and fetal safety during pre-operative preparation, peri-operative procedure, and post-operative recovery. Antibiotic, glucocorticoids, thromboprophylaxis and prophylactic tocolytics should be considered during pre-operative preparation. During the procedure, rapid sequence induction with cricoid pressure should be used as well as considering lower MAC values for anesthetic agents while avoiding nitrous oxide and benzodiazepines. Post-operative recovery requires close monitoring of the patient for potential premature labor.

References

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