Management of Anesthesia in Laparoscopy Cholecystectomy During First Trimester Pregnancy

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DOI: 10.55497/majanestcricar.v41i2.292

ABSTRACT

Introduction: Cholelithiasis complications during first trimester pregnancy associated with choledocholithiasis, acute cholecystitis, cholangitis and, gallstone pancreatitis that posing significant morbidity and mortality. Laparoscopy surgical techniques are no longer a contraindication to non-obstetric surgery for pregnant women although they still have a risk of developing fetal development disorders. Management of anesthesia in laparoscopy cholecystectomy during pregnancy must consider the risk of anesthesia itself.

Case Presentation: A case of 33-year-old female, presented with complaints of pain in the upper right abdomen that radiates to the right shoulder for a month, had history of pregnancy 10 weeks, Diabetes Mellitus Type 2 and hypertension. Blood pressure was 110/70 mmHg and had a murphy sign without any signs of distension or bloating. There is the increasing fasting blood sugar 174 mg/dL with HbA1c 7.7%, multiple cholelithiasis with the largest stones measuring 2.09 cm, and bilateral hydronephrosis grade I. Patient received laparoscopy cholecystectomy with no significant previous surgical/medical history. It was done with general anesthesia combined with epidural analgesia. After the procedure, there is no complaint about abdominal pain or vaginal bleeding. The patient was discharged 3 days aftercare

Conclusion: General anesthetic combined with epidural analgesia have some benefit include the effect vasodilatation of low dose volatile agent and regional anesthesia due to maintaining uteroplacental perfusion

Keywords: cholecystectomy; general anesthesia combined epidural analgesia; laparoscopy; non-obstetric procedure; pregnancy.

Manajemen Anestesi pada Laparoskopi Kolesistektomi Saat Kehamilan Trimester Pertama

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DOI: 10.55497/majanestcricar.v41i2.292

ABSTRAK

Pendahuluan: *Komplikasi kolelitiasis pada kehamilan trimester pertama berhubungan dengan koledokolitiasis, kolesistitis akut, kolangitis, dan pankreatitis batu empedu menimbulkan morbiditas dan mortalitas yang signifikan. Teknik bedah laparoskopi tidak lagi menjadi kontraindikasi untuk operasi non-obstetrik untuk wanita hamil meskipun mereka masih memiliki risiko terjadinya gangguan perkembangan janin. Penatalaksanaan anestesi pada kolesistektomi laparoskopi selama kehamilan harus mempertimbangkan risiko anestesi itu sendiri.*

Presentasi Kasus: *Seorang wanita berumur 33 tahun, datang dengan keluhan nyeri di perut kanan atas yang menjalar ke bahu kanan selama sebulan, memiliki riwayat kehamilan 10 minggu, Diabetes Mellitus Tipe 2 dan hipertensi. Tekanan darah 110/70 mmHg dan memiliki tanda murphy tanpa tanda-tanda distensi atau kembung. Terjadi peningkatan gula darah puasa 174 mg/dL dengan HbA1c 7,7%, kolelitiasis multipel dengan batu terbesar berukuran 2,09 cm, dan hidronefrosis bilateral grade I. Pasien menjalani kolesistektomi laparoskopi tanpa riwayat bedah/medis sebelumnya yang signifikan, dilakukan dengan anestesi umum yang dikombinasikan dengan analgesia epidural. Setelah prosedur, tidak ada keluhan sakit perut atau pendarahan vagina. Pasien dipulangkan 3 hari setelah perawatan.*

Simpulan: *Anestesi umum yang dikombinasikan dengan analgesia epidural memiliki beberapa keuntungan antara lain efek vasodilatasi agen volatil dosis rendah dan anestesi regional karena mempertahankan perfusi uteroplasenta.*

Kata kunci : *kolesistektomi; kombinasi anestesi umum epidural* ***k****ehamilan; laparoskopi; prosedur non obstetri; kehamilan.*

INTRODUCTION

Anesthetizing a pregnant woman does not always aim to facilitate labor. There are several conditions where a pregnant woman requires anesthesia due to her health condition. The incidence rate of surgery in pregnant women outside of delivery reaches 0.75% - 2%.[1,2] Appendectomy and cholecystectomy are the most frequently performed procedures in gastrointestinal cases, reaching 1 case over 500-2000 pregnant women and 1-8 cases over 10000 pregnant women. Historically, laparoscopy is a contraindicated procedure for pregnant women.[2] Since 2007, The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) recommended early surgical management with laparoscopy cholecystectomy for pregnant women with symptomatic gallbladder disease regardless of trimester.[3] When pregnant patients require a 'two-in-one' surgery, which consists of consisting of the patient herself and the fetus in utero, presents substantial anesthetic challenges. Laparoscopy is mostly recommended during the first two trimesters, as alternative diagnosis can be evaluated in case of cholelithiasis.[4]

CASE PRESENTATION

Woman, 33 years old, presented with complaints of pain in the upper right abdomen that radiates to the right shoulder for a month. The patient has complained about the intermittent pain in her upper abdomen for 1 year, and sometimes accompanied by nausea and vomiting. The patient underwent an ultrasound examination at the Jember Regional Hospital and found a 2.1 mm gallbladder stone. The patient had a history of pregnancy 10 weeks, diabetes mellitus type 2 and hypertension. On physical examination, the patient was conscious, blood pressure was 110/70 mmHg and had a murphy sign without any signs of distension or bloating. There was no jaundice, fever, and stable hemodynamics. Routine investigations including complete blood count, hepatic and renal function tests, arterial blood gases and coagulation profile were within normal limits. But there is the increasing fasting blood sugar 174 mg/dL with HbA1c 7.7%, abdominal ultrasound showed multiple cholelithiasis with the largest stones measuring 2.09 cm and bilateral hydronephrosis grade I. The patient was prepared for the urgent laparoscopy cholecystectomy with general anesthesia combined with epidural analgesia.

Preoperatively, rapid-acting insulin (novorapid) 6 IU 3 times every take a large meal and methyldopa 250 mg every 8 hours one day before surgery. Blood glucose and blood pressure measurement every 12 hour before operating. Pre-operative obstetrical evaluation was done and fetal well-being ascertained. Injection terbutaline intravenous (i.v.) at 250 mcg was administered pre-operatively to relax the uterus. Written and informed consent was obtained from the patient and her husband. The patient was kept in supine position with a left lateral tilt of 15° to relieve aortocaval compression. Evaluation of vital sign like blood pressure was 120/70 mmHg, heart rate 89 x/min, Respiratory rate 18 x/min, axillary temp 36.5 °C. We administered fentanyl 100 mcg, propofol 100 mg for induction then atracurium is used to facilitate intubation. Epidural insertion at 10th-11th thoracic space with paramedian approach. Bupivacaine plain 0.2% 10 ml injection was given after the insertion. Sedation was maintenance with sevoflurane 2 vol% during procedure. The procedure took time for about 30 minutes with carbon dioxide insufflation limited at 12 mmHg. Intra-operative monitoring included pulse oximetry, capnography, electrocardiogram, non-invasive blood pressure, intra-abdominal pressure, respiratory dynamics curves, and loops. Arterial blood gases and fetal heart rate were monitored pre- and post-operatively. During procedure hemodynamically stable with $ETCO_2$ range between 32-35 mmHg. After the procedure, we administered morphine 1 mg via epidural catheter to manage postoperative pain. Extubation was done in operating theatre and the patient is allowed to move to the obstetric ward.

DISCUSSION

Pregnant women have a higher risk of cholelithiasis, increased estrogen, and progesterone hormone levels may cause biliary stasis. Increase progesterone reduces gallbladder emptying due to smooth muscle relaxation of the gallbladder. Increase estrogen level cause increase cholesterol secretion and bile

Figure 1. Gallblader and the gallstone

saturation. Combination of this condition leads to increase of gall stone formation. Complication of cholelithiasis includes acute cholecystitis, cholangitis, and gallstone pancreatitis which can lead to be preterm labor and fetal loss or spontaneous abortion. If symptomatic cholelithiasis occurs, surgery must be performed to avoid maternal and fetal complication.[2,3] In this patient, urgent cholecystectomy per laparoscopy was performed considering the advantages of laparoscopy over laparotomy. A study conducted by James was showed that all patients undergoing laparoscopy remained in the hospital for one day compared with a mean of 4.4 ± 1.1 days in the laparotomy group ($P < 0.0001$). Pregnancy outcomes were similar and uniformly good.[4]

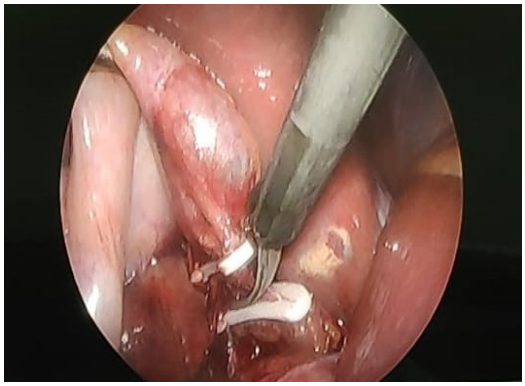

Figure 2. Laparoscopy procedure

The advantages of laparoscopy over open cholecystectomy are decreased narcotic use, decreased fetal depression, decreased post-operative pain, early ambulation, early return of bowel function and decreased hospital stay.[4] Laparoscopy has some effect of fetal well-being include uterine or fetal trauma, fetal acidosis from absorbed carbon dioxide and decrease maternal cardiac output, and uteroplacental perfusion due to iatrogenic increase in abdominal pressure. Utero-placental perfusion can decrease by 61% by increase CO_2 pneumoperitoneum at level 20 mmhg.[4] Especially in laparoscopy there is some anesthetic consideration like avoiding hyperventilation, end tidal CO_2 should be maintained in the normal range 28 to 33 mmHg for pregnancy, Rapid intravenous infusion of crystalloid or colloid with prophylactic vasopressor or early treatment of hypotension, and limit CO_2 insufflation at level 12-15 mmHg.[4,5] For this patient, during procedure hemodynamically stable with $ETCO_2$ range between 32-35 mmHg.

According to American College of Obstetricians and Gynecologists Committee on Obstetric Practice, regardless of trimester, pregnant woman should not be denied indicated surgery like in this patient. The choice of anesthetic technique(s), and the selection of appropriate drugs of anesthesia should be guided by maternal indications for surgery and the location of the surgery. Anesthetic and perioperative surgical care performing in pregnancy have a risk for both mother and fetus due to changes

in anatomy, physiological, and hormonal of pregnant women. Principle of anesthetic management in pregnancy patient is optimize and maintain normal maternal physiological function, optimize, and maintain uteroplacental perfusion and oxygen delivery, avoid teratogen drug, avoid contraction of myometrium, avoid awareness during anesthesia, and if possible, use of regional anesthesia.[5] A combination of general anesthesia with epidural analgesia was the technique of choice for this patient.

In non-obstetric surgery on pregnancy, general and regional anesthetic techniques have been successfully used. There is no research that has shown which technique is more superior, but regional anesthetic can reduce potential teratogen drug exposure to the fetus. The advantages of epidural technique include slower onset of sympathetic block than spinal technique, this may allow compensatory mechanism to attenuate the severity of hypotension.[6] Epidural catheter technique allow to titration of the level, density and duration of anesthesia and postoperative analgesia can be provided through epidural catheter.[5] Combination of general anesthetic with Epidural also can reduce risk of Venous Thromboembolism (VTE). VTE risk significantly increased in pregnancy and puerperium. It is caused by venous stasis of lower extremities, endothelial damage, and hypercoagulable state in pregnancy. An increase in circulating coagulation factor reduced anticoagulant protein and reduce fibrinolysis activity result in a relatively hypercoagulable state.[2,3]

For pregnancy in first trimester, teratogenicity of common anesthetic drugs was a concern one. General anesthetic drugs inhibit synaptic transmission and may lead to abnormal synaptic connections and inappropriate apoptosis. Many anesthetic agents have effects on neuronal receptors which are necessary for neuronal differentiation, synaptogenesis, and survival during development but there is no definite evidence to show the teratogenicity of any volatile anesthetic so in this patient we still had sevoflurane as a maintenance agent. However, it is prudent to use the lowest effective concentrations for the shortest possible time, especially because many of these drugs do cause significant maternal hypotension.[6]

Benzodiazepine use in pregnancy has been associated with cleft palate and cardiac anomalies. However, many recent controlled studies have countered this association. It is usually recommended to avoid benzodiazepine use throughout gestation and most especially during the first trimester. Most other anesthetic medications, including barbiturates, propofol, opioids, muscle relaxants, and local anesthetics have been widely used during pregnancy with a good safety record.[6,7]

In pregnant women, cardiac output can increase up to 20% at 8 weeks and increase up to 50% at 32 weeks of gestational age. It is caused by the increase of preload due to a rise in blood volume, a decrease in afterload due to the systemic vascular resistance and an increase in maternal heart rate. This change aims to increase the perfusion to uteroplacental.[3] Maternal hypotension from any cause can jeopardize uteroplacental perfusion and cause fetal asphyxia. The most common cause of hypotension in pregnant patients undergoing surgery include deep levels of anesthesia, sympathectomy with high sensory level of spinal or epidural blockade, aortocaval compression, hemorrhage, and hypovolemia.[5] Gravid patients beyond the first trimester should be placed in the left lateral decubitus position or partial left lateral decubitus position to minimize compression of the vena cava.[2]

Providing adequate analgesia is also important in the postoperative period, as pain has been shown to increase the risk of preterm labor. Regional nerve or plexus blockade or epidural analgesia can provide excellent postoperative analgesia and reduce the risk of opioid-induced hypoventilation when compared to intravenous opioids, so we used epidural analgesia in this case. Opioids can be used, as needed, to control postoperative pain. Paracetamol is the analgesic of choice for the treatment of mild to moderate pain during any stage of pregnancy. NSAIDs should be avoided, especially after 32 weeks of gestation, as they can cause premature closure of the fetal ductus arteriosus (if given for more than 48 hours). They are also associated with oligohydramnios with decreased fetal renal function. NSAIDs may also inhibit uterine contractions.[6]

CONCLUSION

Symptomatic cholelithiasis in pregnancy increase risk preterm labor, spontaneous abortion, and fetal loss due to complication including acute cholecystitis, cholangitis, and gallstone pancreatitis. Laparoscopy cholecystectomy is the safest procedure at any trimester in pregnancy, despite there are some complications like increase intra-abdominal pressure, decrease maternal cardiac output, or decrease uteroplacental perfusion. General anesthetic combined with epidural analgesia have some benefit include the effect vasodilatation of low dose volatile agent, and regional anesthesia due to maintaining uteroplacental perfusion, decreasing dose of iv anesthetic agent, it is potent analgesic effect can reduce catecholamine surge with resulting impaired uteroplacental perfusion, reduce risk of VTE and reduce postoperative drug requirements.

CONFLICT OF INTEREST

The author's have no conflict of interest to declare.

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