

Gynecology and Obstetric Anaesthesia

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Dr : Miaad Adnan

Dr. Bassim Mohammed Jabbar

Specific consideration

- Many patients are **apprehensive**, even for relatively minor surgery.
- **PONV** is a particular problem. With high-risk patients, use appropriate techniques; **avoid N2O**, and give prophylactic **antiemetic**.
- Pelvic surgery is associated with **DVT**—ensures that adequate prophylactic measures have been taken.
- **Prophylactic antibiotics** reduce post-operative wound infection rates for certain operations—check your hospital protocol.

Specific consideration

- **Vagal stimulation** may occur during cervical dilatation, traction on the pelvic organs or the mesentery, or during laparoscopic procedures .
- Take care during patient **positioning**: Patients are often moved up or down the table, when airway devices can be dislodged and disconnections can occur. **Pre-existing back or joint pain** may be worsened in the lithotomy position, and, if the legs are supported in stirrups, there is a potential for **common peroneal nerve injury**.

Specific consideration

- It may be reasonable to ask the gynecologist to administer analgesic drugs rectally during anesthesia—ensure that you have the patient's permission to do so.
- During laparotomies, ensure that patients are kept warm.
- During major gynecological surgery, considerable blood loss may occur, and surgery may be prolonged.
- Many gynecological operations formerly done through an open approach (e.g., hysterectomy, tubal pregnancy repair) are now done primarily using laparoscopic techniques.

Specific gynecological operations

Hysteroscopy :

- Telescopic equipment enables the gynecologist to inspect the uterine cavity and explore it with accuracy for diagnosis and treatment of intrauterine disease. Before hysteroscopy the cervix is dilated, and this carries the risk of **stimulating an autonomic response.**

Specific gynecological operations

Hysteroscopy :

The anesthetic for a hysteroscopy includes induction and maintenance with a selection of drugs relevant today – case surgery (e.g., propofol for the passage of a laryngeal mask airway, and either total intravenous or inhalational anesthesia).

Complications include uterine perforation and bleeding, so facilities to manage these risks should be available. Depending on the type of anesthetic (e.g., opioid) used, prophylactic antiemetic may be indicated.

Laparoscopic surgeries :

Many gynecological operations may be performed laparoscopically, such as; female sterilization, ovarian cystectomy, emergency surgery for ectopic pregnancy, and vaginal hysterectomy.

Most of these procedures require longer operating and anesthetic times than open versions of the same procedures, but are less painful after surgery, require a shorter duration of stay in hospital and lead to earlier return to normal activities. A pneumoperitoneum is created, most commonly by insufflating the peritoneal cavity with carbon dioxide

Laparoscopic surgeries :

Physiological changes due to pneumoperitoneum :

- 1) Increased intra – abdominal pressure, **reduced** both chest wall, lung compliance and functional residual capacity. These effects are more marked for patients undergoing surgery in the lithotomy posture.
- 2) Hypoventilation and increased intrapulmonary shunt.
- 3) Decreased venous return and cardiac output.
- 4) Increased the ventilation/ perfusion ratio and alveolar dead space.
- 5) Bradycardia is a common occurrence after peritoneal insufflations, and occasionally asystole occurs.

Laparoscopic surgeries :

Hysterectomy :

A. Abdominal hysterectomy:

Procedure removal of uterus through abdominal incision (may also include ovaries as bilateral salpingo-oophorectomy)

Time : 1hr, often longer

Pain : +++

Position: supine, head-down

Blood loss : 250–500mL,

Practical techniques : GA, ETT, IPPV.

Laparoscopic surgeries :

Hysterectomy :

B-Vaginal hysterectomy:

Procedure removal of the uterus through the vagina

Time : 50min

Pain : ++

Position : Lithotomy

Blood loss : Variable, usually <500mL

Practical techniques : GA or regional: LMA, SV, caudal. Spinal

Laparoscopic surgeries :

Myomectomy :

A myomectomy is indicated for the removal of symptomatic fibroids and can be associated with major blood loss, bleeding can be also a problem during hysterectomy. Prophylaxis for postoperative nausea and vomiting is considered part of the anesthetic technique.

Obstetric Anaesthesia

Physiological Changes During Pregnancy

Parturients undergo remarkable changes during pregnancy, labor, and the immediate postpartum period that can directly affect anesthetic techniques.

Introduction of a good anesthetic management depend on understanding of physiological and pharmacological **changes** occurs during pregnancy

Obstetric Anaesthesia/ Physiological Changes During Pregnancy

Respiratory Effects :

- ❖ The combination of decreased FRC and increased oxygen consumption promotes **rapid oxygen desaturation** during periods of apnea.
- ❖ **Preoxygenation** (denitrogenation) prior to induction of general anesthesia is therefore mandatory to avoid hypoxemia in pregnant patients.
- ❖ **Capillary engorgement** of the respiratory mucosa during pregnancy predisposes the upper airways to trauma, bleeding, and obstruction.
- ❖ Gentle laryngoscopy and smaller endotracheal tubes (6–6.5 mm) should be employed during general anesthesia.

Obstetric Anaesthesia/ Physiological Changes During Pregnancy

Respiratory Effects :

| Respiratory | |
|--------------------|------------|
| Oxygen consumption | +20 to 50% |
| FRC | -20% |
| Minute ventilation | +50% |
| Tidal volume | +40% |
| Respiratory rate | +15% |
| P_{aO_2} | +10% |
| P_{aCO_2} | -15% |
| HCO_3^- | -15% |

Obstetric Anaesthesia/ Physiological Changes During Pregnancy

Cardiovascular Effects

- ❖ Cardiac output and **blood volume** increase to meet accelerated maternal and fetal metabolic demands.
- ❖ An increase (**55%**) in **plasma volume** in excess of an increase in **red cell** mass (**45%**) produces dilutional anemia and reduces blood viscosity.
- ❖ At term, **blood volume** has increased by **1000–1500 mL** in most women, allowing them to easily tolerate the blood loss associated with delivery; total blood volume reaches **90 mL/kg**.

Obstetric Anaesthesia/ Physiological Changes During Pregnancy

Cardiovascular Effects

- ❖ Average blood loss during vaginal delivery is 400–500 mL, compared with 800–1000 mL for a cesarean section.
- ❖ Approximately 5% of women at term develop the supine hypotension syndrome (aortocaval compression), which is characterized by hypotension, pallor, sweating, or nausea and vomiting.

Obstetric Anaesthesia/ Physiological Changes During Pregnancy

Cardiovascular Effects

- ❖ This because complete or near-complete occlusion of the inferior vena cava by the gravid uterus. And can readily produce fetal asphyxia. Turning the patient on her side restores venous return from the lower body and corrects the hypotension in such instances. This maneuver doing by placing a wedge ($>15^\circ$) under the right hip.

Obstetric Anaesthesia/ Physiological Changes During Pregnancy

Hematological Effects

- ❖ Pregnancy is associated with a **hypercoagulable state** that may be beneficial in limiting blood loss at delivery.
- ❖ **Fibrinogen** and concentrations of factors **VII, VIII, IX, X,** and **XII** all increase.

Obstetric Anaesthesia/ Physiological Changes During Pregnancy

Gastrointestinal Effects

- ❖ **Gastroesophageal reflux** and esophagitis are common during pregnancy. This factor places the parturient at high risk for **regurgitation and pulmonary aspiration.**

Obstetric Anaesthesia/ Physiological Changes During Pregnancy

Hepatic Effects

- ❖ A 25–30% decrease in serum pseudocholinesterase activity is also present at term but rarely produces significant prolongation of succinylcholine's action

Summary of anatomical and physiological changes of pregnancy:

- 1) Increased basal metabolic rate (hypoxia occurs faster).
- 2) Enlarging abdominal mass and decreased lower esophagus sphincter tone (regurgitation, aspiration).
- 3) Reduced functional residual capacity (reduced oxygen reserve in preoxygenation).
- 4) Altered air way anatomy (failure to intubation).
- 5) Increased blood flow to uterus/placenta (potential for hemorrhage).
- 6) Enlarged uterus (uterine atony and bleeding; aortocaval occlusion/supine hypotension)

Challenges in obstetric procedures:

A) Aortocaval occlusion (supine hypotension) syndrome:

- ❖ It is also called aortocaval compression syndrome, it is the compression of the enlarging uterus on the major vessel in the abdomen when a pregnant woman lies in the supine position.
- ❖ It is characterized by pallor, tachycardia, sweating, nausea, hypotension and dizziness. It is dangerous and may be fatal.

Challenges in obstetric procedures:

B) Aspiration of stomach contents :

- ❖ Regurgitation (passive) and vomiting (active) may result in aspiration of liquids or solids.
- ❖ **Preparation for anesthesia begins with:**
 - 1) A policy of nil by mouth for at least 4 hours, if not longer – prior use of opioids can delay stomach emptying.

Challenges in obstetric procedures:

B) Aspiration of stomach contents :

- 2) Reduction in gastric acid production (e.g. oral ranitidine 150 mg twice daily started the night before anesthesia, or I.V ranitidine 50 mg slowly 2 hours before anesthesia).
- 3) Neutralization of any acid produced (e.g. clear alkaline solution such as 0.3 mmol/ L sodium citrate 30 ml given just before anesthesia).
- 4) Increasing lower esophageal sphincter tone. (E.g. metoclopramide 10mg I.V).

Challenges in obstetric procedures:

C) Failed intubation :

Pregnancy is a contributing factor to failed intubation because it results in an increase in breast size, which impedes laryngoscopy, an increase in soft tissue mass around the airway making it more difficult to visualize the larynx, and an increase in metabolic rate and decrease in the reservoir of oxygen in the functional residual capacity after preoxygenation, thus increasing the risk of hypoxia if the lungs are not ventilated. At caesarean section, if intubation fails the mother is awakened and a regional nerve block is considered

Challenges in obstetric procedures:

Regardless of the time of last oral intake, all patients are considered to have a full stomach and to be at risk for pulmonary aspiration.

The supine position should be avoided unless a left uterine displacement device ($>15^\circ$ wedge) is placed under the right hip.

Anesthesia for Labor & Vaginal Delivery

- ❖ **Meperidine** (Pethidine), a commonly used opioid, can be given in doses of 10–25 mg intravenously or Intravenous fentanyl, 25–100 mcg/h, has also been used for labor.
- ❖ **Morphine** is **not** used because it appears to cause greater respiratory depression in the fetus than meperidine
- ❖ Low-dose intravenous **ketamine** is a powerful analgesic. In doses of 10–15 mg intravenously, good analgesia can be obtained in 2–5 min without loss of consciousness.

Anesthesia for Labor & Vaginal Delivery

Regional Anesthetic Techniques

- ❖ Epidural or intrathecal techniques (spinal), alone or in combination, are currently the most popular methods of pain relief during labor and delivery. They can provide excellent analgesia while allowing the mother to be awake and cooperative during labor.

Anesthesia for Caesarean section

Regional anesthesia :

anesthesia for Caesarean section was initially driven by maternal preference. It was subsequently found that regional anesthesia is also safer than GA.

- **Advantages of regional anesthesia**
- Both mother and partner can be present at the delivery
- Minimal risk of aspiration and lower risk of anaphylaxis.
- The neonate is more alert, which promotes early bonding and breastfeeding.
- Fewer drugs are administered, with less 'hangover' than after GA.
- Better post-operative analgesia and earlier mobilization

Anesthesia for Caesarean section

Spinal anesthesia :

Is the most commonly used technique for elective Caesarean sections.

It is rapid in onset, produces a dense block, and, with intrathecal opioids, can produce long-acting post-operative analgesia. However, hypotension is much commoner than with epidural anesthesia

Anesthesia for Caesarean section

Spinal anesthesia / Technique

- ✓ History/examination/explanation and consent.
- ✓ Ensure that antacid prophylaxis has been given.
- ✓ Establish 16G or larger IV access.
- ✓ Start crystalloid co-load.
- ✓ Position the patient: A sitting position usually makes finding the midline easier, which may be helpful with obese patients, and may be associated with a faster onset, although the height of block is less predictable. A lateral position is associated with a slower onset of block, particularly if a full lateral position is maintained until the block has fully developed.

Anesthesia for Caesarean section

Spinal anesthesia / Technique

✓ Perform **spinal anesthetic at L3/4 interspace**, using a **25G** or **smaller pencilpoint needle**. After injection of the solution, move the woman to a supine position with a left lateral tilt or wedge. If supine hypotension occurs, increase the tilt, or, if severe, temporarily move the woman to a full lateral position.

Anesthesia for Caesarean section

General anesthesia :

Elective GA is now uncommon, limiting opportunities for training. The majority of complications relate to the airway. **Failed intubation is much more frequent in obstetric than non-obstetric anesthesia.** All obstetric theatres should have equipment to help with the difficult airway, and all obstetric anesthesiologists should be familiar with a failed intubation drill.

Anesthesia for Caesarean section

General anesthesia / Indications for GA include:

- Maternal request.
- Urgent surgery (in experienced hands and with a team that is familiar with rapid regional anesthesia, a spinal or epidural top-up can be performed almost as rapidly as a GA).
- Regional anesthesia contraindicated (e.g. coagulopathy, maternal hypovolemia).
- Failed regional anesthesia.
- Additional surgery planned at the same time as a Caesarean section.

Anesthesia for Caesarean section

General anesthesia / Technique :

History and examination. In particular, assess the maternal airway—
mouth opening,

Mallampati score, thyromental distance, neck mobility

- Antacid prophylaxis
- Start appropriate monitoring.
- Position supine with a left lateral tilt or wedge.
- **Preoxygenate for 3–5min or, in an emergency, with 4–8 VC breaths with a high flow through the circuit. Ensure a seal with the face mask**

Anesthesia for Caesarean section

General anesthesia / Technique :

- Perform RSI with an adequate dose of induction agent (e.g. 5–7mg/kg of thiopental)
- A 7.0mm ETT is adequate for ventilation and may make intubation easier.
- Propofol has also been used for Caesarean section, without any major reported complications, although, at present, thiopental is still the most commonly used agent in the UK.
- Ventilate with 50% O₂ in N₂O. If severe fetal distress is suspected, then 75% O₂ or higher may be appropriate. Maintain ETCO₂ at 4.0–4.5kPa (30–34 mmHg).

Anesthesia for Caesarean section

General anesthesia / Technique :

- Use 'overpressure' of the inhalational agent to rapidly increase the end-tidal concentration of the anesthetic agent to at least 0.75 MAC (e.g. 2% isoflurane for 5min, then reduce to 1.5% for a further 5min).
- At delivery: Give 2–5IU of oxytocin IV bolus. If tachycardia must be avoided, then an IV infusion of 30–50IU of oxytocin in 500mL of crystalloid, infused over 4hr, is effective

Administer opioid (e.g. 10–15mg of morphine \pm 100 micrograms of fentanyl), IV paracetamol, and IV diclofenac (unless contraindicated)

Anesthesia for Caesarean section

General anesthesia / Technique :

- If a woman has eaten shortly before surgery, consider passing a large-bore orogastric tube to empty the stomach before extubation.
- Extubate awake. Be aware that extubation is a high-risk time.
- Give additional IV analgesia, as required

Anesthesia for Caesarean section

General anesthesia / Recovery :

Be aware that recovery units are potentially dangerous places for mothers after GAs, particularly if the recovery is staffed by midwives who may be less familiar with airway care. The same standard of recovery staff should be available to women on labour wards as in a normal theatre recovery unit.