

Anesthesia for Gynecology and Obstetrics

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Specific consideration

- Many patients are apprehensive, even for relatively minor surgery.
- PONV is a particular problem.

With high-risk patients,

- i.** use appropriate techniques;
- ii.** avoid N₂O, and
- iii.** give prophylactic antiemetic.



Specific consideration

- 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.
- **Vagal stimulation** may occur during *cervical dilatation, traction on the pelvic organs* or the mesentery, or during *laparoscopic procedures*.

Specific consideration

- Take care during **patient positioning**:

Patients are often moved up or down the table, when *airway devices* can be dislodged and disconnections can occur.

- 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.

Specific consideration

- 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:

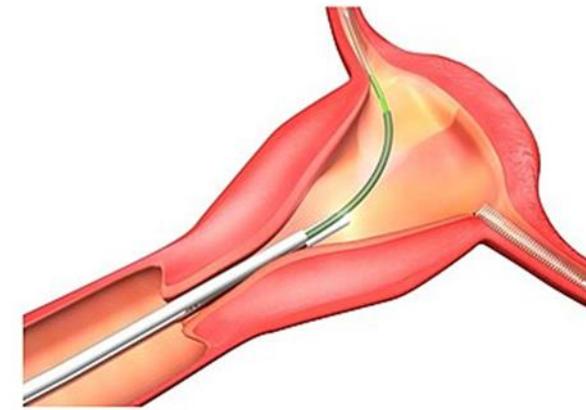
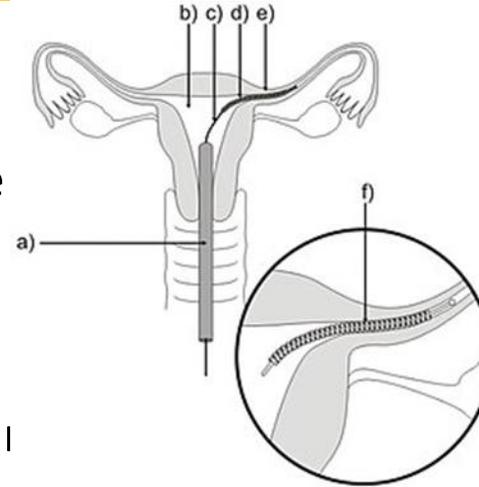
Telescopic equipment enables the gynecologist to inspect the uterine cavity and explore it with accuracy *for diagnosis and treatment of intrauterine disease*.

Before hysteroscopy the cervix is **dilated**, and this carries the *stimulating an autonomic response*.

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.

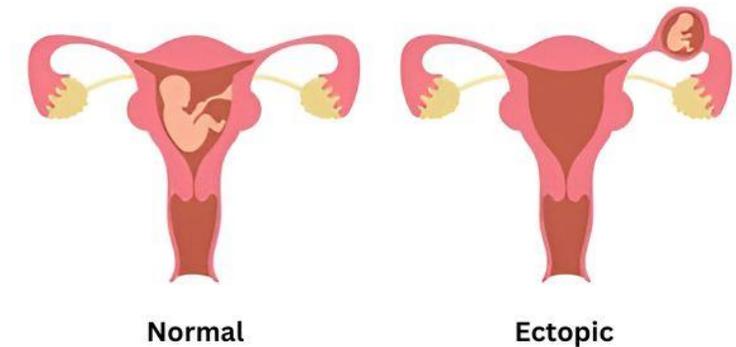
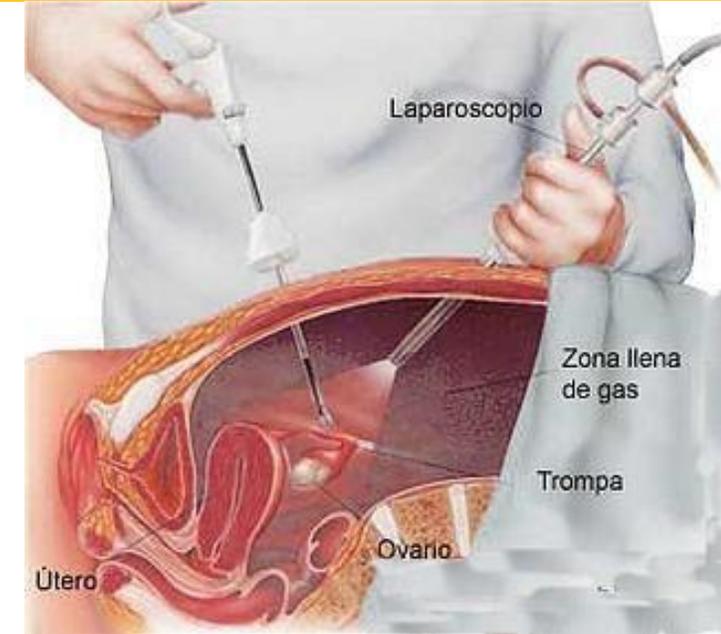
Depending on the type of anesthetic (e.g., *opioid*) used, *prophylactic antiemetic* may be indicated.



Specific gynecological operations

Laparoscopic surgeries

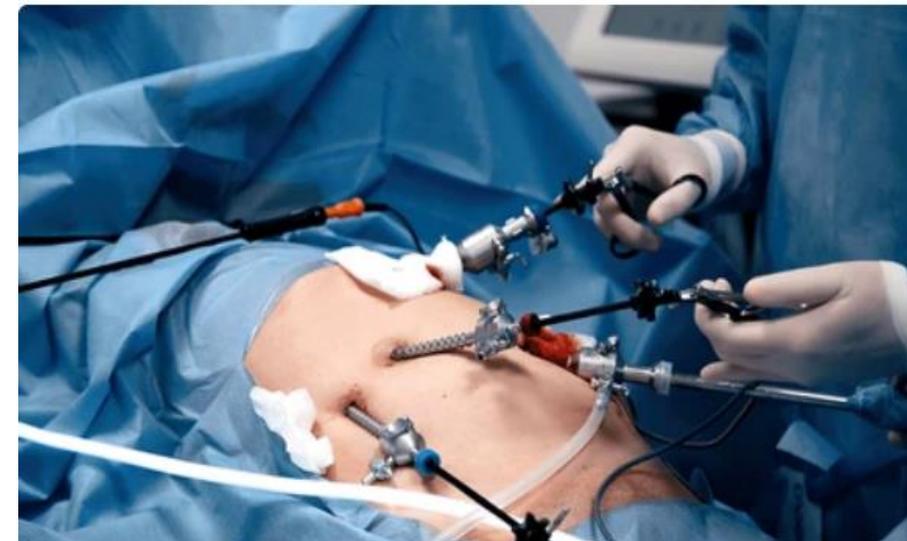
- **Many gynecological operations** may be performed laparoscopically, such as; ***female sterilization, ovarian cystectomy, emergency surgery for ectopic pregnancy,*** and vaginal hysterectomy.
- **Most of these procedures** require longer operating and anesthetic times than open versions of the same procedures, but they are
- **less painful after surgery, earlier return to normal activities, require a shorter duration of stay in hospital.**
- A **pneumoperitoneum** is created, most commonly by **insufflating** the peritoneal cavity with **carbon dioxide**



Specific gynecological operations

Physiological changes due to pneumoperitoneum:

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



Hysterectomy and myomectomy:

Hysterectomy

A. Abdominal hysterectomy:

Procedure removal of uterus through abdominal incision (may also include ovaries)

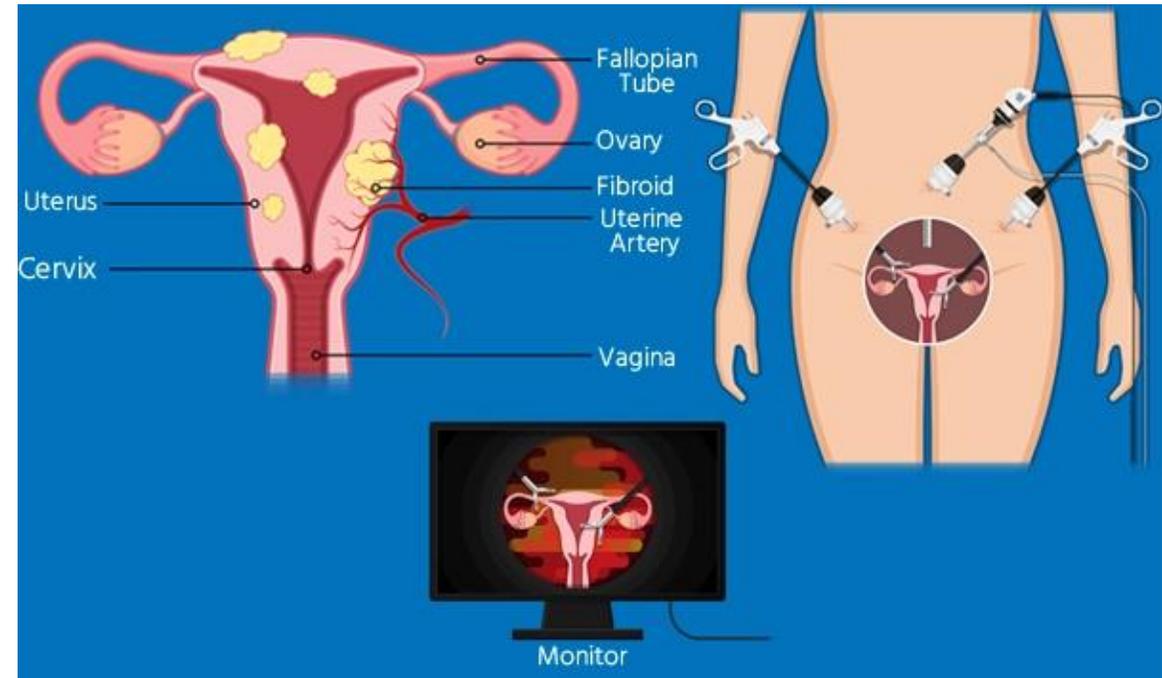
Time 1hr, often longer

Pain ++++

Position: supine, head-down

Blood loss 250–500mL,

Practical techniques GA, ETT, IPPV.



Hysterectomy and myomectomy:

B-Vaginal hysterectomy:

Procedure *removal of the uterus through the vagina*

Time 50min

Pain ++

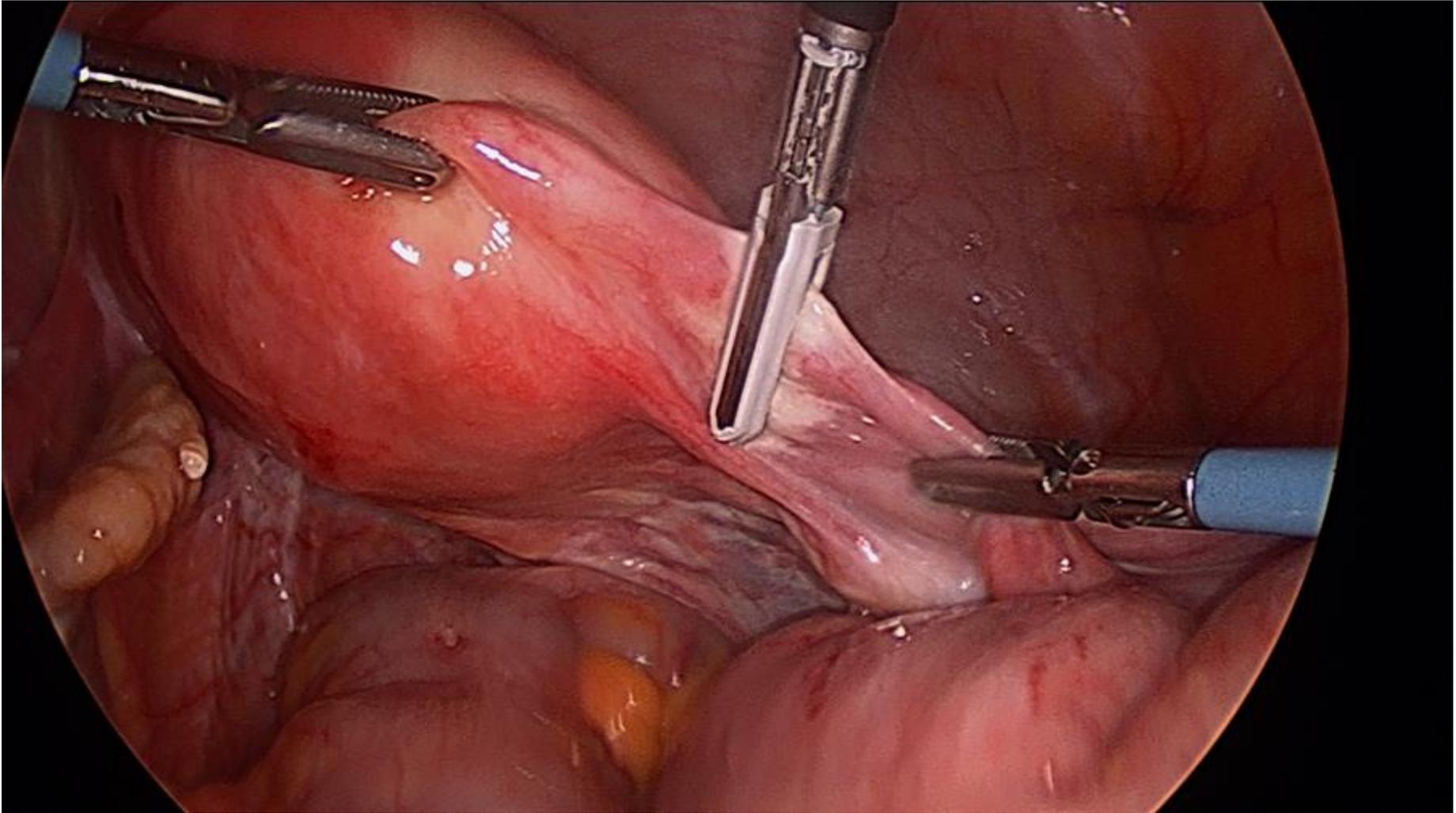
Position: Lithotomy

Blood loss Variable, usually <500mL

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

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.



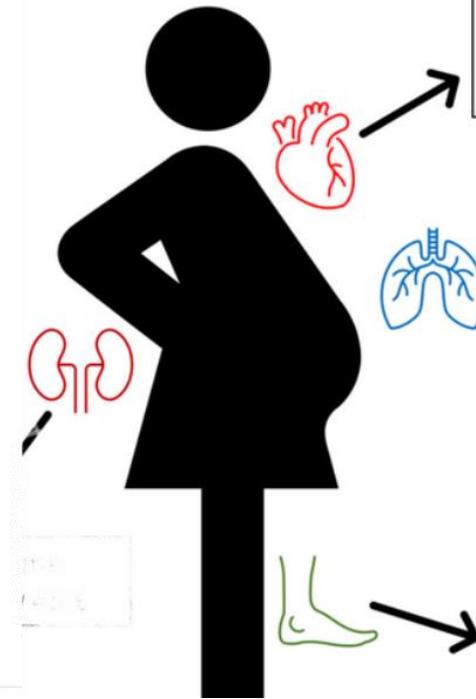
Physiological Changes During Pregnancy

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

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.



Respiratory	
Oxygen consumption	+20 to 50%
FRC	-20%
Minute ventilation	+50%
Tidal volume	+40%
Respiratory rate	+15%
Pao ₂	+10%
Paco ₂	-15%
HCO ₃	-15%

Physiological Changes During Pregnancy

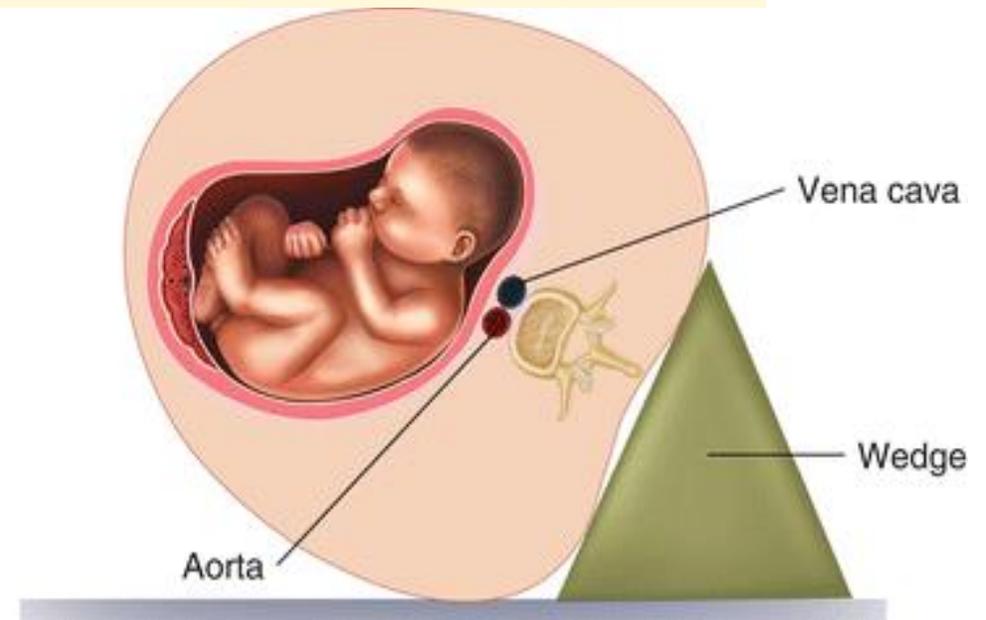
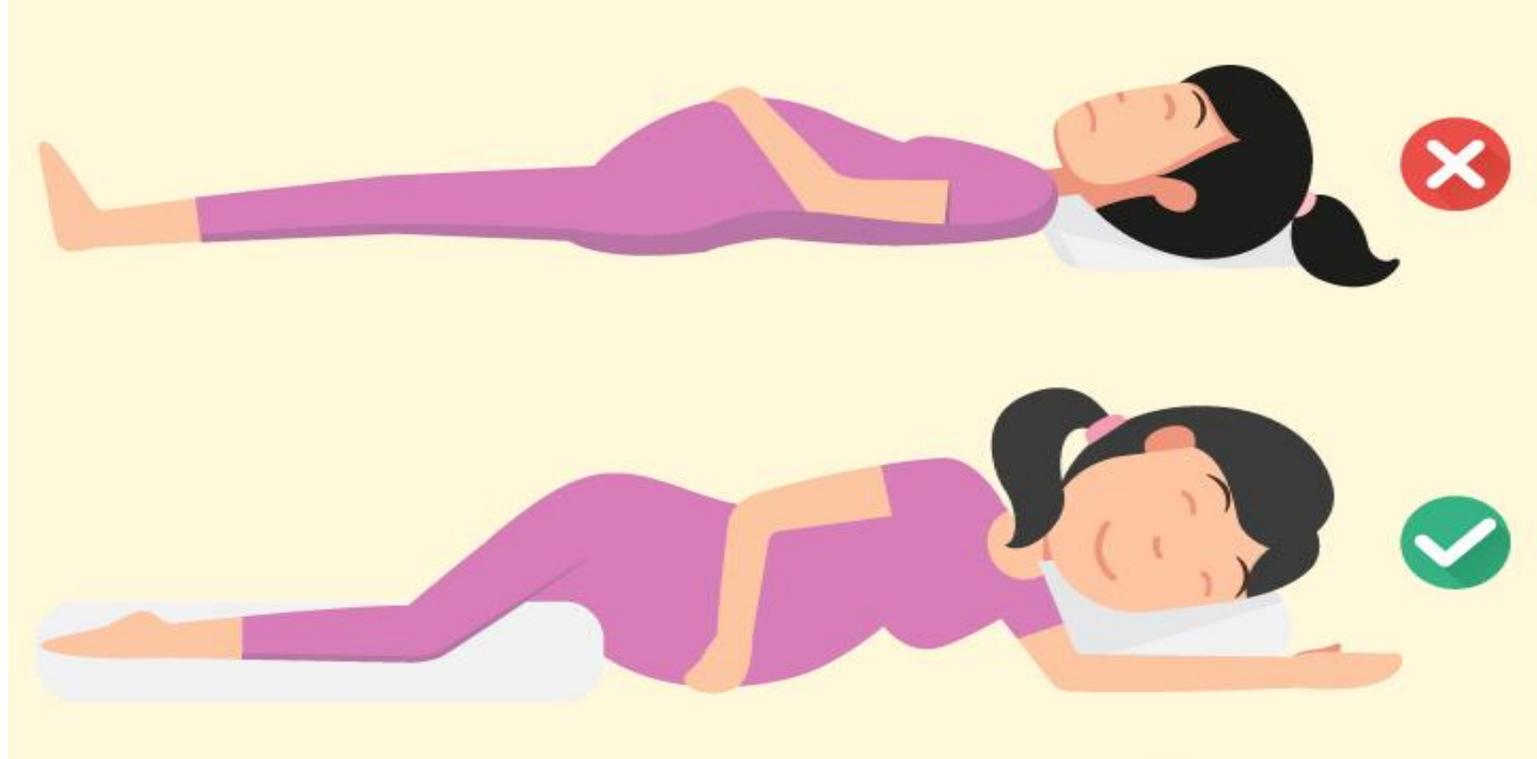
Cardiovascular Effects

- ❖ **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**.
- ❖ Average blood loss during vaginal delivery is 400–500 mL, compared with 800–1000 mL for a cesarean section.

Physiological Changes During Pregnancy

Cardiovascular Effects

- ❖ Approximately **5%** of women at term develop the *supine hypotension syndrome* (**aortocaval compression**), which is characterized by hypotension, pallor, sweating, or nausea and vomiting.
- ❖ 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**.



Physiological Changes During Pregnancy

Cardiovascular

Blood volume	+35%
Plasma volume	+55%
Cardiac output	+40%
Stroke volume	+30%
Heart rate	+20%
Systolic blood pressure	-5%
Diastolic blood pressure	-15%

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.

Hematologic	
Hemoglobin	-20%
Platelets	-10%
Clotting factors ²	+30 to 250%

Gastrointestinal Effects

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

Hepatic Effects

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

Anatomical and physiological changes of pregnancy:

- 1) **Increased** basal metabolic rate (hypoxia occurs faster).
- 2) **Enlarging** abdominal mass and **decreased** sphincter tone (regurgitation, aspiration).
- 3) **Reduced** functional residual capacity (**FRC**) (reduced oxygen reserve on 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*.

B) Aspiration of stomach contents:

Regurgitation (**passive**) and vomiting (**active**) may result in aspiration of liquids or solids.

Challenges in obstetric procedures

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.
- 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.

- **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° 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.

Regional Anesthetic Techniques

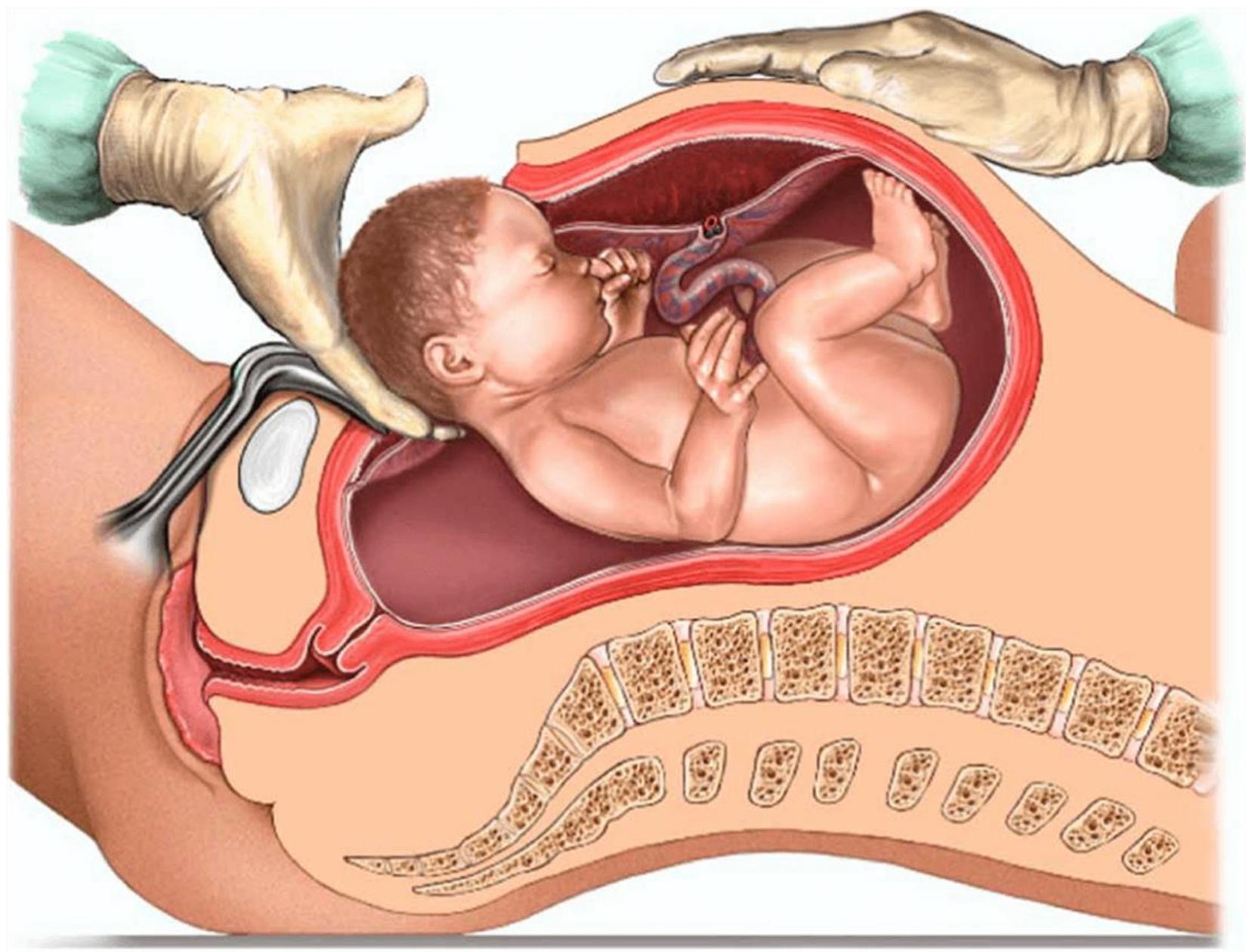
- ❖ **Epidural** or intrathecal techniques (**spinal**), alone or in combination, are **currently the most popular methods of pain relief during labor and delivery**. They can provide excellent analgesia while allowing the mother to be awake and cooperative during labor.

Anesthesia for Cesarean Section

Regional 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 Cesarean 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

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.

- ✓ 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 Cesarean 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 anesthetists should be familiar with a failed intubation drill.

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 Cesarean Section

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.

Anesthesia for Cesarean Section

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
- **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.



Anesthesia for Cesarean Section

- **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)**.
- **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 2–5 IU of oxytocin IV bolus. If tachycardia must be avoided, then an IV infusion of 30–50 IU of oxytocin in 500mL of crystalloid, infused over 4hr, is effective

Anesthesia for Cesarean Section

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

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.



Thank you