

Obstetric Analgesia and Anaesthesia

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Obstetric Analgesia and Anesthesia

Labor causes severe pain for many women. There is no other circumstance in which it is considered acceptable for an individual to experience untreated severe pain that is amenable to safe intervention while the individual is under a physician's care. Many women desire pain management during labor and delivery, and there are many medical indications for analgesia and anesthesia during labor and delivery. In the absence of a medical contraindication, maternal request is a sufficient medical indication for pain relief during labor. A woman who requests epidural analgesia during labor should not be deprived of this service based on the status of her health insurance. Third-party payers that provide

Introduction

- Pain is a common labour symptom and physiologic drivers of labour pain include uterine contractions, cervical dilation, and pressure from the fetus.
- Many women, especially nulliparas, rate the pain of labour as very severe or intolerable. The pain of labour varies among women, and each of a woman's labours may be quite different

Pain Pathways

→ pudendal N. Block Not applicable

- **First stage of labour** — Pain is **visceral** or cramping. It originates in the uterus and cervix, and is produced by distention of uterine and cervical mechanoreceptors and by ischemia of uterine and cervical tissues and can be referred to the lumbosacral region, iliac crests, gluteal areas, and thighs.
- The pain signal enters the spinal cord after **traversing the T10, T11, T12, and L1** white rami communicantes.
- **Transition** (7 to 10 cm cervical dilation) is associated with greater pain sensitivity as the labouring woman begins to experience somatic pain from vaginal distention.

- **Second stage of labour** — Pain in the second stage of labour is reported as being **more severe**. As the fetus descends, the *distention* of the vagina, pelvic floor, and perineum elicit stimuli through the pudendal nerve (S2, S3, and S4). → So, we can do pudendal nerve block in
- Second stage pain includes a combination of **visceral pain** from **2nd stage** uterine contractions and cervical stretching, and **somatic pain** (predominantly) from distention of vaginal and perineal tissues.

ADVERSE CONSEQUENCES OF LABOR PAIN

Potential effects of severe labor pain

Increased oxygen consumption

Hyperventilation leading to hypocarbia and respiratory alkalosis

Gastric inhibition

Increased gastric acidity

Lipolysis

Increased peripheral vascular resistance, cardiac output, blood pressure

Decreased placental perfusion

Incoordinate uterine activity

Postpartum psychological effects, such as posttraumatic stress disorder

Analgesia Methods and Classification Of Approaches

- Many women have strong preferences about using pharmacologic versus nonpharmacologic pain relief to cope with pain during labor.
- **Role of antenatal education** – women need information prenatally about the risks and benefits of both pharmacologic and nonpharmacologic methods of pain management.
- **Low-resource interventions** are simple, readily available, inexpensive, and low-risk techniques including distraction, self-help, and comforting strategies or tools.
- **Moderate-resource interventions** require patient motivation, specialized training, professional assistance, specific equipment, financial resources, or a combination.
- **High-resource interventions** require professional training and monitoring, have greater risk of adverse effects on mother, fetus, or labour, require increasingly complex equipment and training by staff and/or patient, and incur significant cost but they are highly effective in reducing labor pain, and include neuraxial analgesia and anesthesia and inhaled anesthesia.

The Non-pharmacologic Methods

- Education and psychoprophylaxis (Lamaze breathing method)
- Emotional support *⇒ the most important/proved method*
- Back massage
- Transcutaneous electrical nerve stimulation (TENS)
- Hydrotherapy (Water Immersion) not more than 2 hours *لأنه نقيس حرارة المي كل ساعة وبتنا مصرفة لكل مريضه*
- Acupuncture: In most studies, acupuncture has been found to decrease pain. *فمش موجود بالأردن*
- Hypnosis (hypnobirthing).
- **Movement** — Labouring women have always walked, moved, and changed positions to make themselves more comfortable. Pelvic dimensions vary with differences in maternal positions; thus, these changes may help to ameliorate labour pain.
- **Yoga** — At least one study has reported that the relaxation, breathing, and posture techniques of yoga appear to reduce maternal anxiety regarding childbirth.
- **Birth ball** — Use of a birth ball (an exercise ball or physical therapy ball) during labour encourages relaxation of the trunk and pelvic floor and also provides some pain relief while allowing women freedom of movement and personal control of the intervention.

⇒ Kegel exercises at the 3rd tri.

These techniques tend to work best early in the first stage of labor, when the pain is least intense, and may decrease pharmacologic usage at that time.



The Pharmacologic Approaches

- 1. Parenteral analgesia** (opioid and non-opioid agents).
- 2. Regional anaesthesia** (epidural, spinal, combined spinal epidural, paracervical, and pudendal nerve blocks).
- 3. Inhalational anaesthesia.**

Parenteral (Systemic) Narcotics

- **Parenteral narcotics have very limited efficacy for the relief of labor pain**. They work best in the **early first stage, when the pain is primarily visceral and less intense**, and have a role in peripartum analgesia.
- They **are inexpensive, and their use requires no specialized expertise**, But they have adverse effects such as nausea, vomiting and drowsiness.
- Fentanyl, morphine, *nalbuphine*, *butorphanol*, and remifentanyl are used commonly.
- Use of a patient controlled analgesia (**PCA**) pump allows the patient to self-administer a programmed dose of IV medication with lockout intervals between doses.



- Remifentanil is an ultrashort-acting opioid and is administered as a patient-controlled intravenous infusion (**Patient controlled analgesia (PCA)**)
- Remifentanil is an ultra-short-acting opioid without active metabolites. Its pharmacokinetics allow for easy titration during labour and for less risk of respiratory depression in the newborn.
- **Remifentanil** is administered intravenously by patient-controlled analgesia, seems to provide **better** pain relief during labour than other opioids (**although less so than epidural analgesia**), and has become increasingly popular as an option during labour.

be aware in pt. with RS problems
asthma//OSA pt. → will trigger seizures in PET pt. (with epilepsy)

- The use of Meperidine (Pethidine) generally is not recommended for peripartum analgesia because its active metabolite, normeperidine, has a prolonged half-life in adults and a half-life of up to 72 hours in the neonate; the normeperidine effect cannot be antagonized by naloxone.

Adverse effects for the fetus or newborn	Adverse effects on the labouring woman
Loss of variability in the fetal heart rate (FHR)	Nausea and Vomiting
Reduction in the FHR baseline	Maternal drowsiness and sedation
Neonatal respiratory depression (usually short-term)	Delayed gastric emptying
Neurobehavioral changes	Respiratory arrest has occurred with use of remifentanil patient-controlled analgesia, and consideration should be given to one-to-one nurse-to-patient ratios, respiratory monitoring, and provision of supplemental oxygen.
Impaired neonatal breastfeeding	-

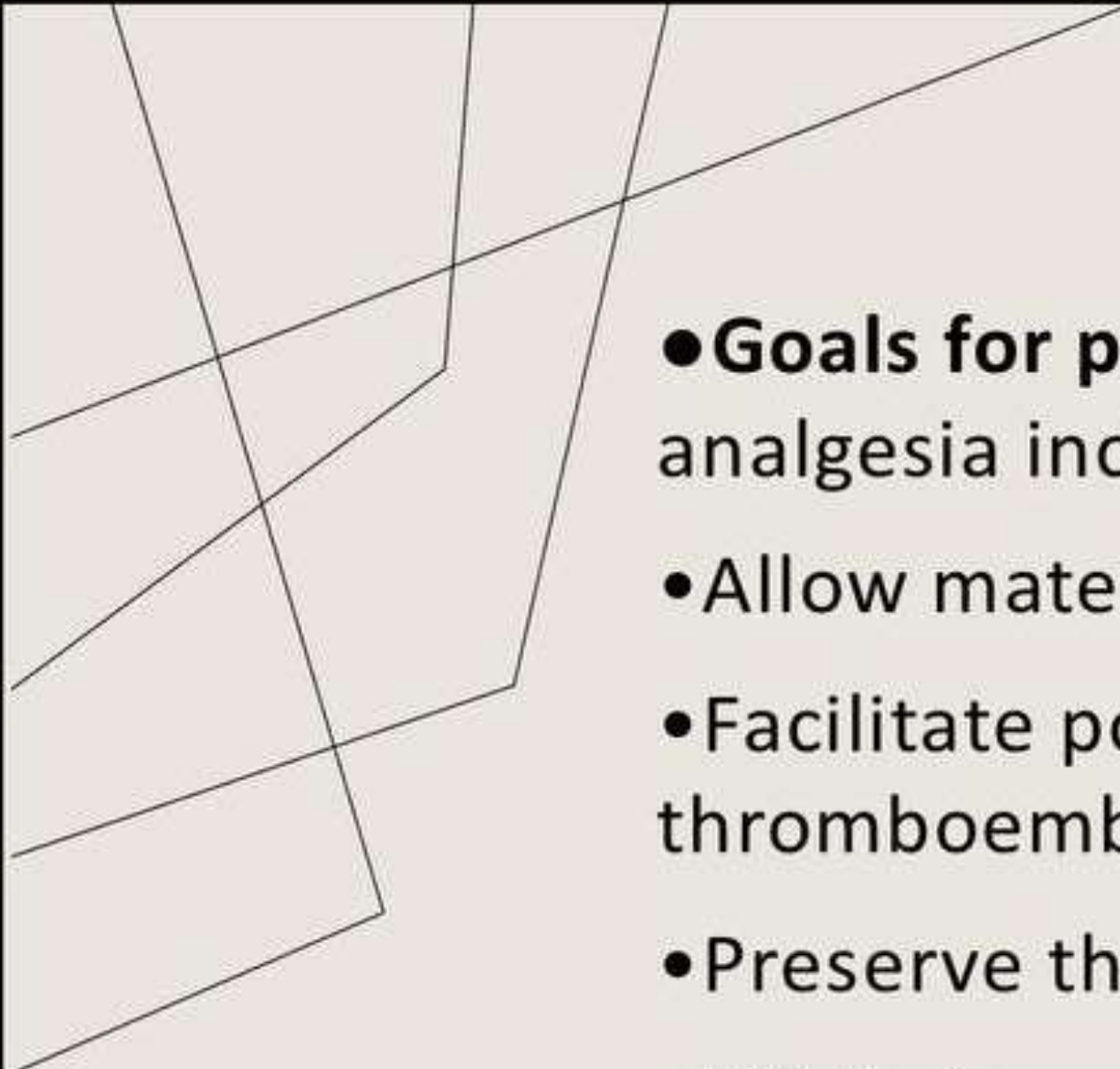
Non-opioid Agents

- A Cochrane review analyzed a variety of agents, including antihistamines, antispasmodics, sedatives, and (NSAIDs) for pain relief during labour.
- NSAIDs and antihistamines were **even less** satisfactory for pain relief during labour than opioids, NSAIDs are avoided during labour because of their potential for precipitating premature closure of the ductus arteriosus.
- We do not offer **acetaminophen** for labour analgesia because of its limited efficacy.
- Various agents have been used to minimize opioid side effects or provide sedation, relief from anxiety, or analgesia during labor. Nonopioid agents (eg, promethazine, a phenothiazine, or hydroxyzine, an antihistamine) are often administered in combination with an opioid to potentiate analgesia and decrease nausea and vomiting.

ما اله اي نوربال Labor →

→ Drug of choice for PET pt. // can be given for pt. with psychological disorders

- **Benzodiazepines** (eg, midazolam and diazepam) are anxiolytics that may be used for sedation during vaginal delivery. **Midazolam** is preferred because it is non-irritating to veins, and has a short duration of action. → Keep in mind the risk of malignant hyperthermia
- **Ketamine** produces a dissociative state and analgesia. It is a potent amnestic, and has a rapid onset of action (less than one minute after intravenous administration).
- Ketamine will induce general anesthesia at doses of 1 mg/kg IV, **but lower doses may be used to provide analgesia** for vaginal delivery or minor operative procedures, such as manual uterine exploration.

- 
- **Goals for post-CD analgesia** – The goals for effective post-CD analgesia include the following, which are interrelated:
 - Allow maternal bonding with her neonate.
 - Facilitate postoperative mobilization to reduce the risk of thromboembolism.
 - Preserve the ability for the mother to care for her infant.
 - Minimize opioid use.
 - Allow safe breastfeeding, with minimal transfer of analgesics to the neonate.

OUR APPROACH

1- Multimodal analgesia for all patients – We use multimodal, opioid-sparing analgesia for all patients. Multimodal analgesia involves the use of two or more drug classes or techniques that employ different mechanisms of action. This strategy improves analgesia through the additive or synergistic effects of the various components, allows the use of lower analgesic doses, and reduces the incidence and severity of side effects.

2- Patients who receive neuraxial anesthesia

3- Patients who receive general anesthesia

Acetaminophen

— Acetaminophen is a key component of multimodal, opioid-sparing post-CD analgesia, due to its favorable side effect profile and apparent effectiveness when administered along with nonsteroidal anti-inflammatory drugs (NSAIDs) and neuraxial opioids . For maximal efficacy, acetaminophen should be administered on a regularly scheduled basis around the clock.

We avoid administration of combined opioid/acetaminophen preparations (eg, oxycodone/acetaminophen), to allow scheduled administration of acetaminophen, and as-needed administration of opioid. Separate dosing reduces the likelihood of exceeding the maximum recommended daily dose of acetaminophen and may reduce the total daily dose of opioid.

- Dose:

- 1 g IV during surgical closure.

- Starting six hours after the intraoperative dose, 650 to 1000 mg orally (or IV for patients who are not able to take oral medication) every six hours for the entire hospital stay and post-discharge until pain is controlled, maximum 3 to 4 g/day.

Note: hydration
Rate for PET
pt. = 100-150 ml/h

→ be aware when using it in PET pt. ⇒ Pre-renal shutdown (↓IV volum due to 3rd spacing)

Non steroidal anti inflammatory drug

overload/shutdown حتى اتجنب hydration for NSAIDs + PET
:: keep your eyes in input/output

We administer NSAIDs on a scheduled round-the-clock basis after CD for all patients without contraindication.

← لا غير ال Mgso4 اللي بيزير ال load على الكلى kidneys خنرهنو بي اتنبه وانا بطيه

We routinely administer NSAIDs for the entire hospital stay and post-discharge until pain is controlled. We administer NSAIDs to patients with preeclampsia and/or hypertension, and avoid NSAIDs for patients with thrombocytopenia or other risk factors for severe bleeding.

● **Efficacy** – When administered as part of multimodal postoperative pain control strategy, NSAIDs have been shown to reduce pain and opioid consumption.

For maximal efficacy, NSAIDs should be administered on a scheduled rather than as-needed basis .

● Adverse effects of NSAIDs

→ In PET pt. mostly No effect on BP ⇒ 3rd spacing + accommodation already occurred

Hypertension – In doses adequate to reduce postoperative pain, NSAIDs can increase blood pressure to a variable degree in both normotensive and hypertensive nonpregnant patients.

• **Effects on platelet function** – Nonselective NSAIDs inhibit platelet function and should be avoided in patients with preexisting qualitative or quantitative platelet defects.

• **Effects on the neonate** – The transfer of NSAIDs to breast milk is low and administration of NSAIDs to women who breastfeed is generally safe, particularly in the first 24 to 72 hours postpartum when low volumes of breast milk are produced . However, NSAIDs (including COX-2 inhibitors) should be considered carefully for breastfeeding mothers of infants with ductal-dependent cardiac lesion .

Nonopioid analgesics for all patients

Acetaminophen

- 1 g IV intraoperative
- plus
- 650 mg every 6 hours, or 1 g every 8 hours, orally or IV, postoperative

NSAIDs

- Ketorolac 15 to 30 mg IV intraoperative; for weight < 50 kg, maximum dose 15 mg
- plus
- Ibuprofen 600 mg every 6 hours or 800 mg every 8 hours orally, or ketorolac 15 mg IV every 6 hours for 48 to 72 hours postoperative

• Systemic opioids

The need for opioids after caesarean delivery varies widely among patients, with some patients requiring opioids even within the first 24 hours after surgery, when neuraxial opioids should still be in effect.

- It is suggested to use oral opioids rather than intravenous (IV) opioids in patients who tolerate oral intake .

- **Orally** — A consensus statement from the Society for Obstetric Anesthesia and Perinatology that oral oxycodone or hydrocodone are the preferred rescue opioids for breakthrough pain after caesarean delivery in breastfeeding women.

- Intravenously for PCA use, morphine and hydromorphone provide effective analgesia with high levels of patient satisfaction.

- Hydromorphone does not have active metabolites and may be preferable in breastfeeding women.

→ don't give it in pt. with biliary colic (constrict the sphincter of oddi)

Patients who have neuraxial anesthesia

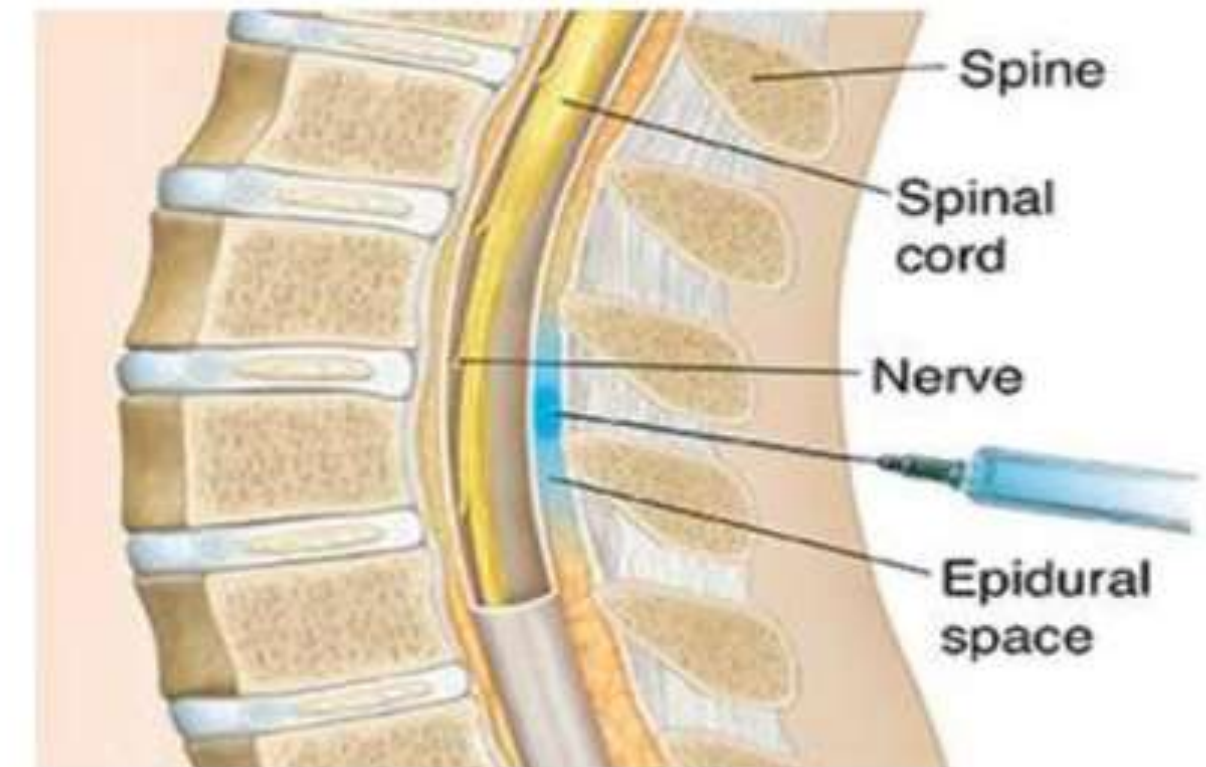
Neuraxial opioid	<p>Preservative-free opioid:</p> <ul style="list-style-type: none">■ Morphine 100 to 150 mcg intrathecal (preferred) or 3 mg epidural after delivery* <p>OR</p> <ul style="list-style-type: none">■ Hydromorphone 50 to 75 mcg intrathecal or 0.4 to 1 mg epidural after delivery*
Oral opioid <i>Interaction with SSRIs</i>	<p>Oxycodone 2.5 to 5 mg orally every 4 hours as needed for breakthrough pain:</p> <ul style="list-style-type: none">■ VNPS 1 to 4/10: 2.5 mg, repeat in 1 hour if needed[¶]■ VNPS > 4/10: 5 mg, repeat in 1 hour if needed[¶]

The best method for PET pt. ⇒ Compind ⇒ Spinal ⇒ General (last choice)

NEURAXIAL ANESTHESIA (REGIONAL ANESTHESIA)

- There are two main types of neuraxial anesthesia : epidural anesthesia and spinal anesthesia.

epidural anesthesia: in this method the anesthetic and/or analgesic agents are injected into the epidural space ,Epidural administration involves an initial bolus of local anesthetic bupivacaine, ropivacaine, or lidocaine as well as narcotics such as fentanyl or sufentanil followed by an infusion of a dilute solution of the same agents until delivery.



Epidural anesthesia:

notice that Epidural administration involves the placement of a catheter into the epidural space.

which may remain in place for the duration of labour also notice that we gave a combination of anesthetic agent + analgesic agent → because Combining the opioid with the local anaesthetic reduces the amount of local anaesthetic required and this reduces the motor blockade and peripheral autonomic effect (hypotension) of the epidural anesthesia

anesthetic agents work by blocking the transmission of signals through nerve fibers:

- first fibers to be affected by anesthesia are **sensory fibers**(responsible of normal sensation and pain so if we block it we block both pain and normal sensation).
- Second fibers to be effected are **autonomic fibers** (if it is blocked this result in hypotension).
- Last fibers to be affected are the **motor fibers** (if blocked the mother will lose ambulation and expulsive fore).
- this order of nerve fiber anesthesia is regulated by the dose(concentration) of the anesthetic agent being administered which mean that at lower concentrations sensory lose occurs and as you increase the dose motor blockade and peripheral autonomic may occur

The effect of epidural anesthesia on labour duration:

Patients who receive epidural anesthesia for labor pain have a similar duration of the first stage of labor, but the second stage may be prolonged by 15 minutes on average the reason why epidural anesthesia may prolong the second stage of labour is due to Impaired ability to push (unlikely as long as motor block is avoided by appropriate adjustment of the epidural infusion) or due to decreased maternal urge to push caused by sensory blockade Reducing the rate of an epidural infusion in the second stage may increase the maternal urge to push, but care should be taken that the analgesic effect is not compromised.

Dilute solutions can be used that permit ambulation, referred to as the “walking epidural.” The goal is to avoid motor block to minimize any adverse effects on maternal expulsive efforts in the second stage of labor.

⇒ The most imp. SE. of regional A. ⇒ *mostly in spinal* Urine retention ⇒ عتاز هيك ال فويز لازم نظل على الأصل ١٢ ساعة
منع تسيلها قبل هيك وبعد ما أتيها ضروري التأكد انهار spontaneous urination

CONTRAINDICATIONS TO REGIONAL ANESTHESIA

Absolute Contraindications :

Patient refusal → Therapeutic dose ⇒ Stop before 24 h
→ Prophylactic dose ⇒ " " 12 h

Coagulopathy (like thrombocytopenia, or systemic anticoagulation)...epidural hematoma!!

Infection at needle insertion site (eg: cellulitis)

Severe hypovolemia with ongoing blood loss

Relative Contraindications (Selected):

Certain cardiac lesions, especially aortic stenosis.

Increased intracranial pressure.

Neuraxial anesthesia (regional anesthesia)

Spinal anaesthesia:

in this method the anesthetic agents are injected into the subarachnoid space as the needle is passed through the epidural space, through the dura and into the subarachnoid space, which contains the CSF. A small volume of local anaesthetic is injected, after which the spinal needle is withdrawn. This may be used as anesthesia for caesarean sections

1. notice that in this method there is no catheter (no infusion) and the anesthesia is given in a single shot only
so it is only used in cesarean delivery and it is not used to relief the pain during normal vaginal delivery “long period of time”
2. spinal anesthesia is considered more effective and stronger, that patient will lose ambulation(muscular blockade) and have an autonomic effect (hypotension)
3. spinal anesthesia is faster (within 5 minutes) so it is suitable for cs delivery

Neuraxial anesthesia (regional anesthesia)

ما يستحق من شوية CSF

ما يستحق

Comparison between spinal anesthesia and epidural anesthesia:

spinal anesthesia:

- faster onset within 5 minutes
- Lower dose (1.5-3.5ml)
- defined (limited) duration
- higher chance of post-dural puncture headache
- denser block (more effective and stronger), minimal chance for patchy block
- single shot only no catheter no redosing
- lower drug exposure for mother and fetus (because of low dose)

Neuraxial anesthesia (regional anesthesia)

complications: → pt. with ↓ NV ⇒ Good hydration then spinal

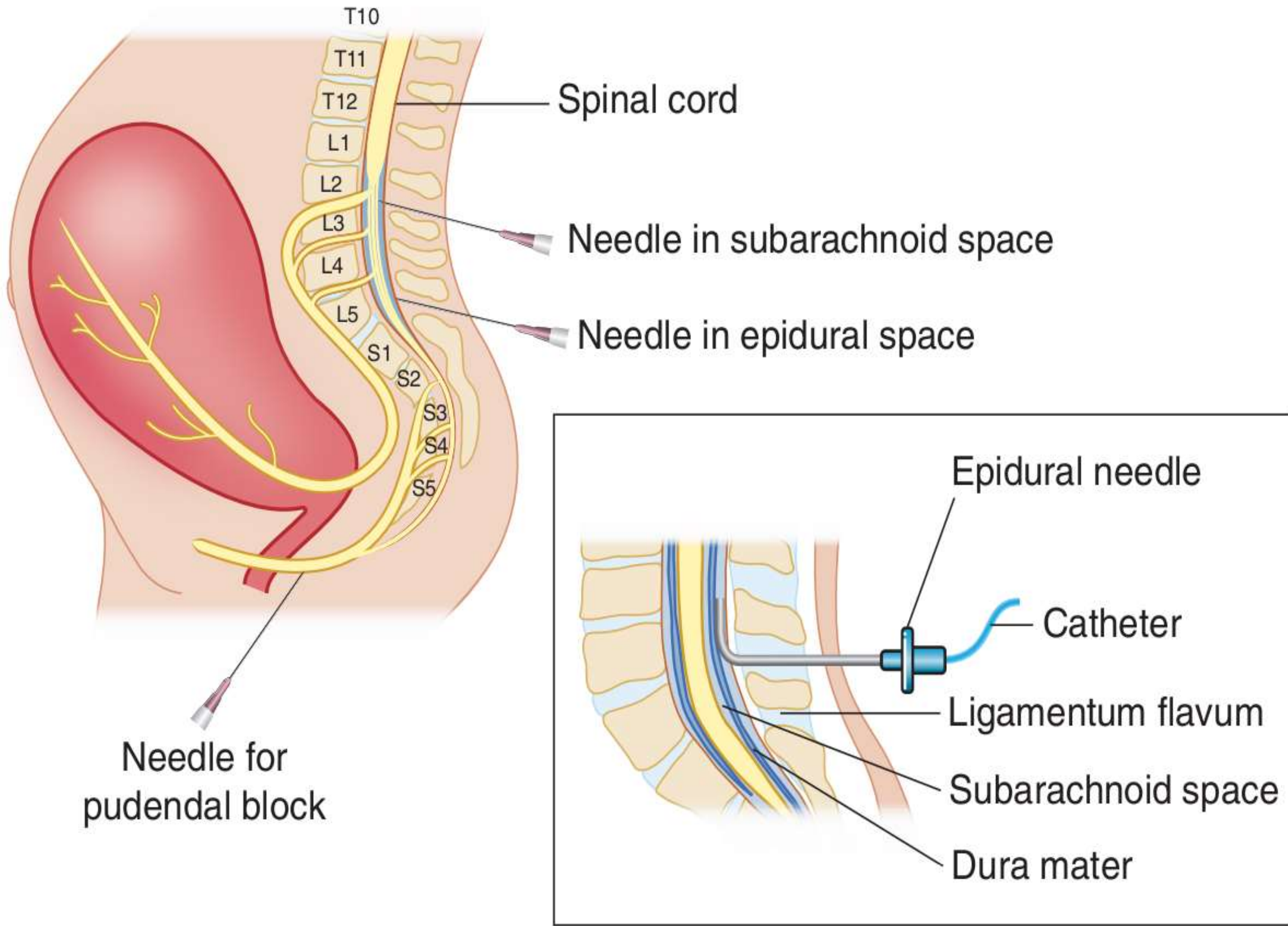
Hypotension most common complication occur due to sympathetic blockage, prophylactic prodring the patient fluid

post-dural puncture headache: → more common
it occurs due to piercing the dura matter (during spinal anesthesia or incidentally during epidural anesthesia) Cerebrospinal fluid leaks through the hole in the dura, resulting in low intracranial pressure. The hallmark is a severe positional headache: little or no headache if supine, but sudden onset of severe headache when sitting upright or standing. The dural hole will heal in about 1 week, or it can be sealed with an epidural blood patch

Accidental total spinal anaesthesia (injection of epidural doses of local anaesthetic into the subarachnoid space) causes severe hypotension, respiratory failure, unconsciousness and death if not recognized and treated immediately ⇒ Cervical block (Tap-UP)

Abscess/meningitis (uncommon complication)
Epidural hematoma (indicate coagulopathy like thrombocytopenia)
Fever (0.5° C increase)

خلال اول 6-8h
تزعج و هي متدرة
تسرب من صفيح
تسرب اشياء فيها
كافيين



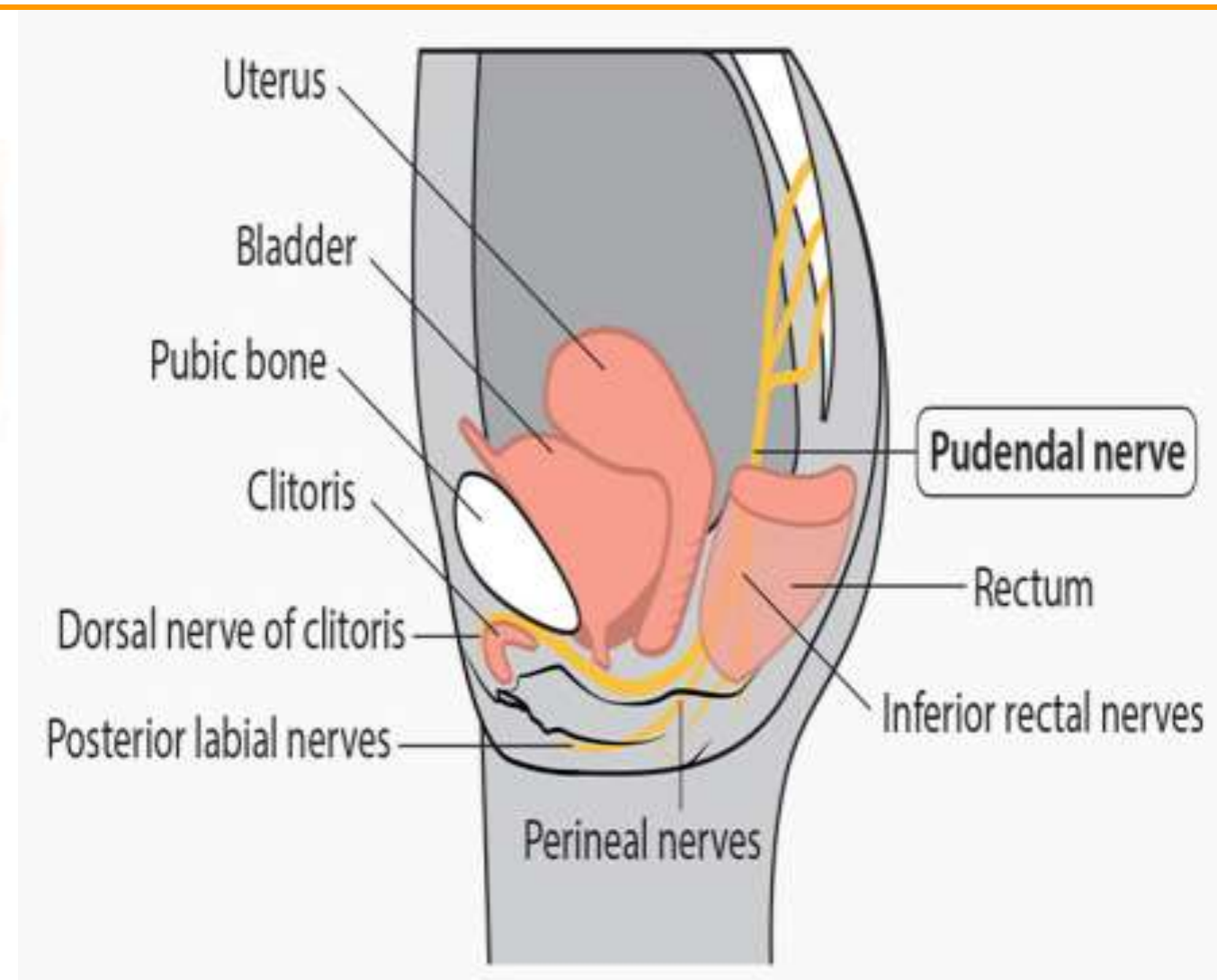
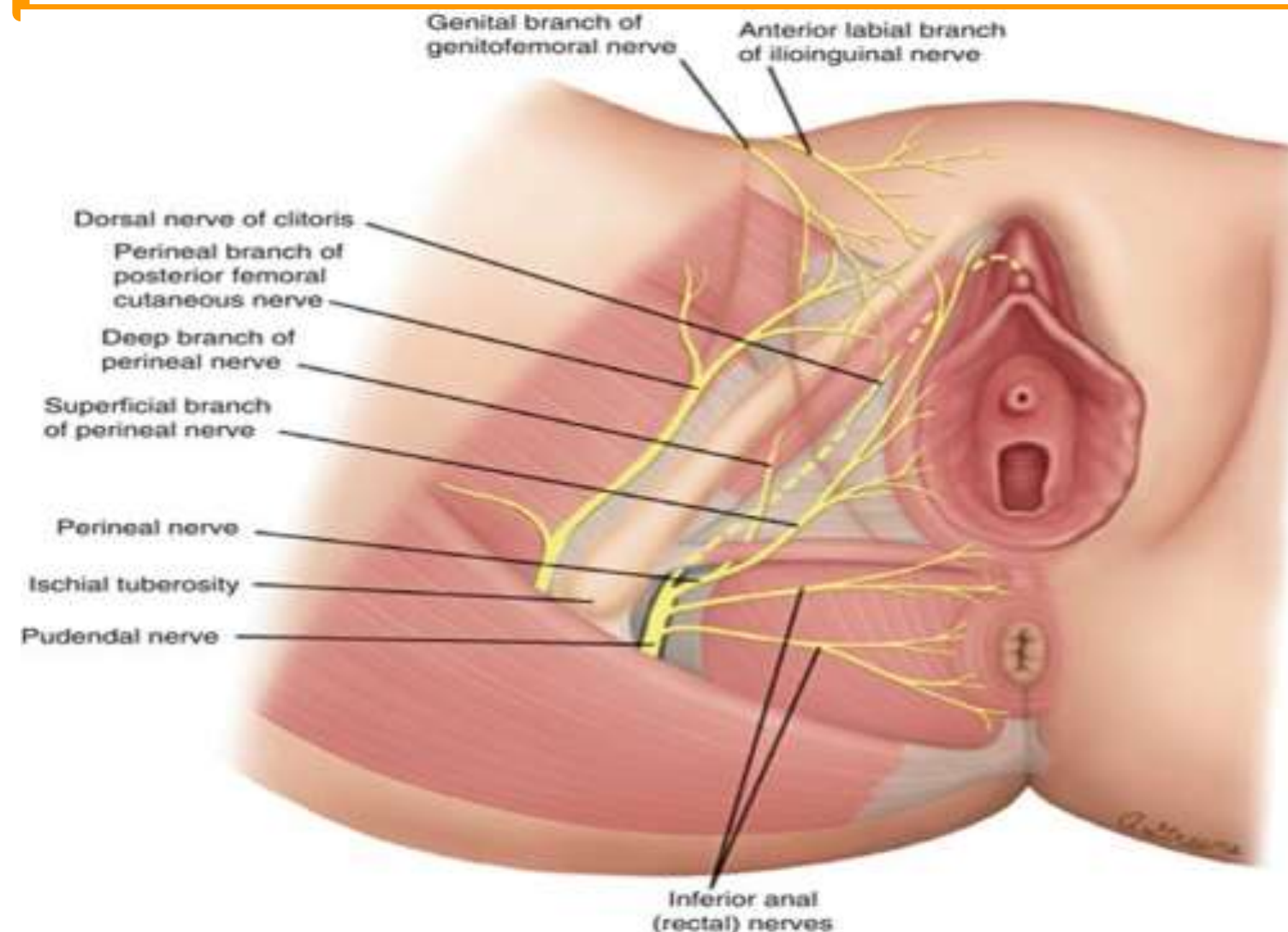
Pudendal Nerve Block

- Pudendal block is typically used to alleviate pain from **minor** surgical procedures involving the perineum and events related to delivery, such as :
 1. Introital distension during the second stage of labor leading to perineal pain.
 2. Operative vaginal delivery (provides analgesia for low forceps delivery).
 3. Repair of perineal lacerations (e.g. episiotomy and episiotomy repair).
- Of note, pudendal nerve block does not decrease the pain associated with uterine contractions and cervical dilatation in the first stage of labor.
- It is still sometimes used when there are contraindications to neuraxial anesthesia and an anesthetic is needed for a low vaginal and/or posterior perineal procedure.
- Additionally, at least one study has reported successful use of pudendal nerve block for the placement of McDonald cerclage.

↑ General/
Regional
with top up
⊙ Umbilicus
↓ Regional A.

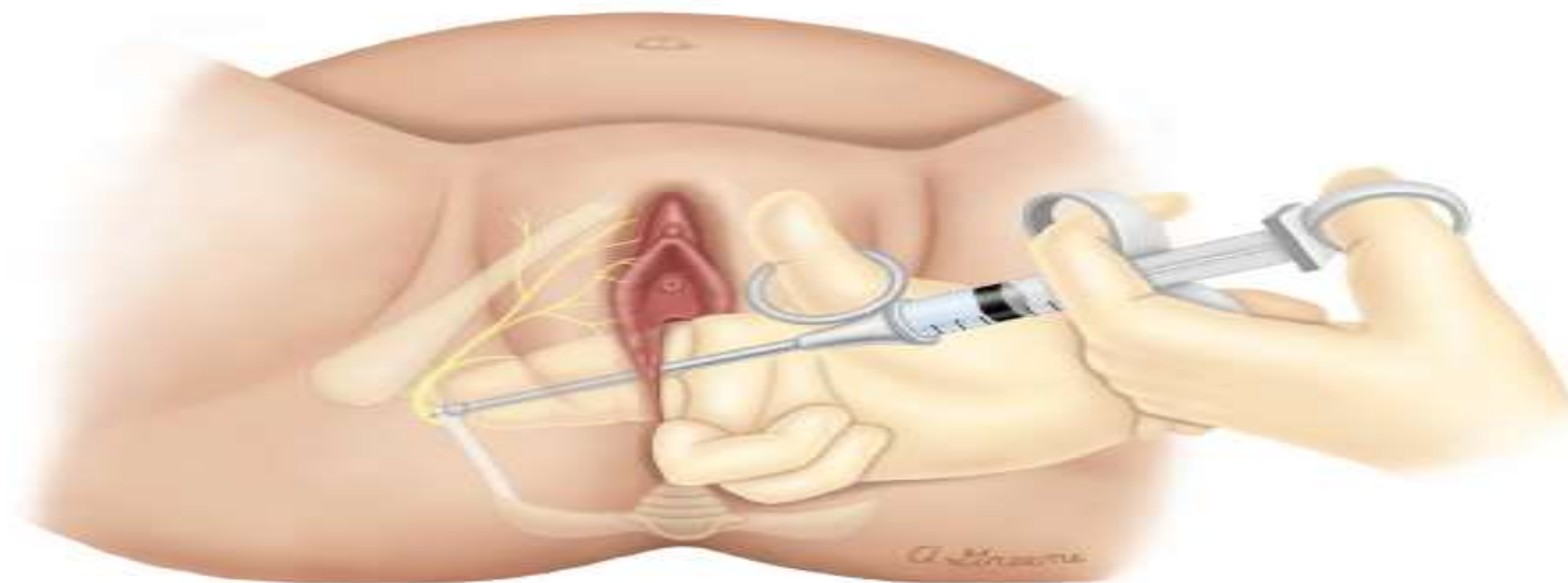
⇒ Office Procedure

- Infiltration of a local anesthetic around the trunk of the pudendal nerve at the level of the ischial spine results in analgesia of these areas (lower vagina, posterior perineum and vulva).
- Of note, pudendal nerve block does not abolish sensation to the anterior part of the perineum because this region is supplied by branches of the ilioinguinal and genitofemoral nerves



- While either a transvaginal or transperineal approach to the ischial spine can be used, **the transvaginal approach is almost always employed, except** for laboring women in whom the fetal head has descended so far that the clinician cannot access the ischial spines.

Pudendal block



Complications

- **Hematoma**
- **Infection** – Infection can occur at the site of injection.
- **Nerve injury** – Ischial region paresthesias or sacral neuropathy can result from nerve injury incurred during block placement.
- **Systemic toxicity** – Local anesthetic systemic toxicity (LAST) can occur with intravascular administration of a local anesthetic.
- **Allergic reaction and toxicity** – mostly with chloroprocaine and tetracaine.
- **Neonatal anesthetic toxicity** –

Paracervical Block

- Paracervical block is most commonly used to provide analgesia during gynecologic procedures involving cervical dilation or manipulation.
- Typical applications include:
 - 1. Relief from the pain of uterine contractions and cervical dilation during the active phase of labor.**
 2. Pregnancy termination.
 3. Hysteroscopy.

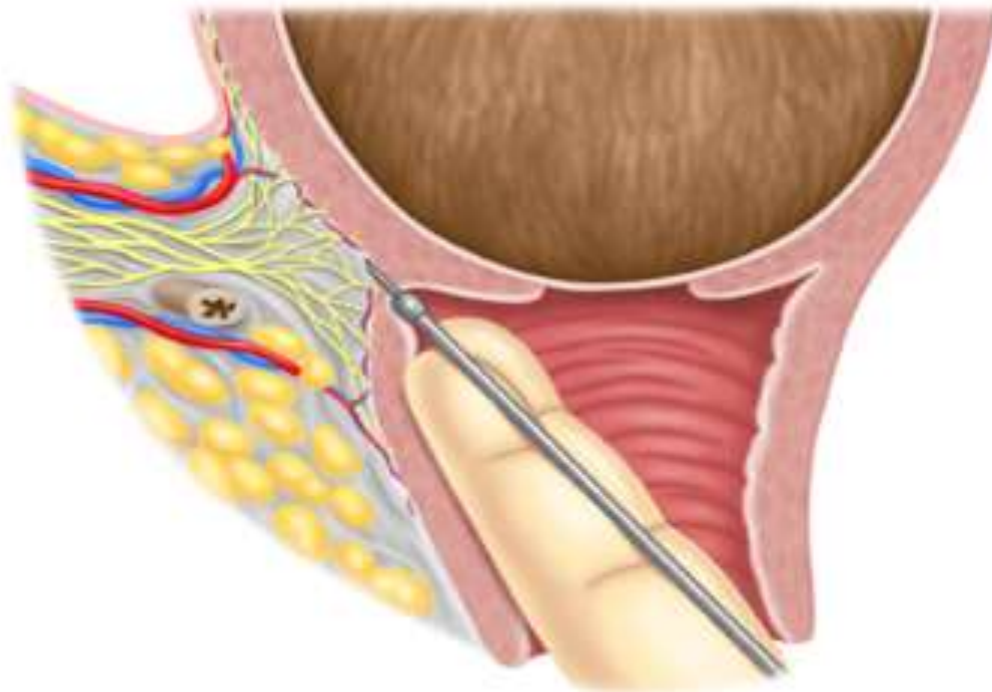
If alternative pain management options are not available, a paracervical block can be used to reduce the pain associated with cervical dilation during the active phase of labor. The procedure is not effective for pain relief during the second stage because sensory nerves from the perineum are not blocked.

Warning

It is no longer used in the United States, in part because of concerns about post-block fetal bradycardia.

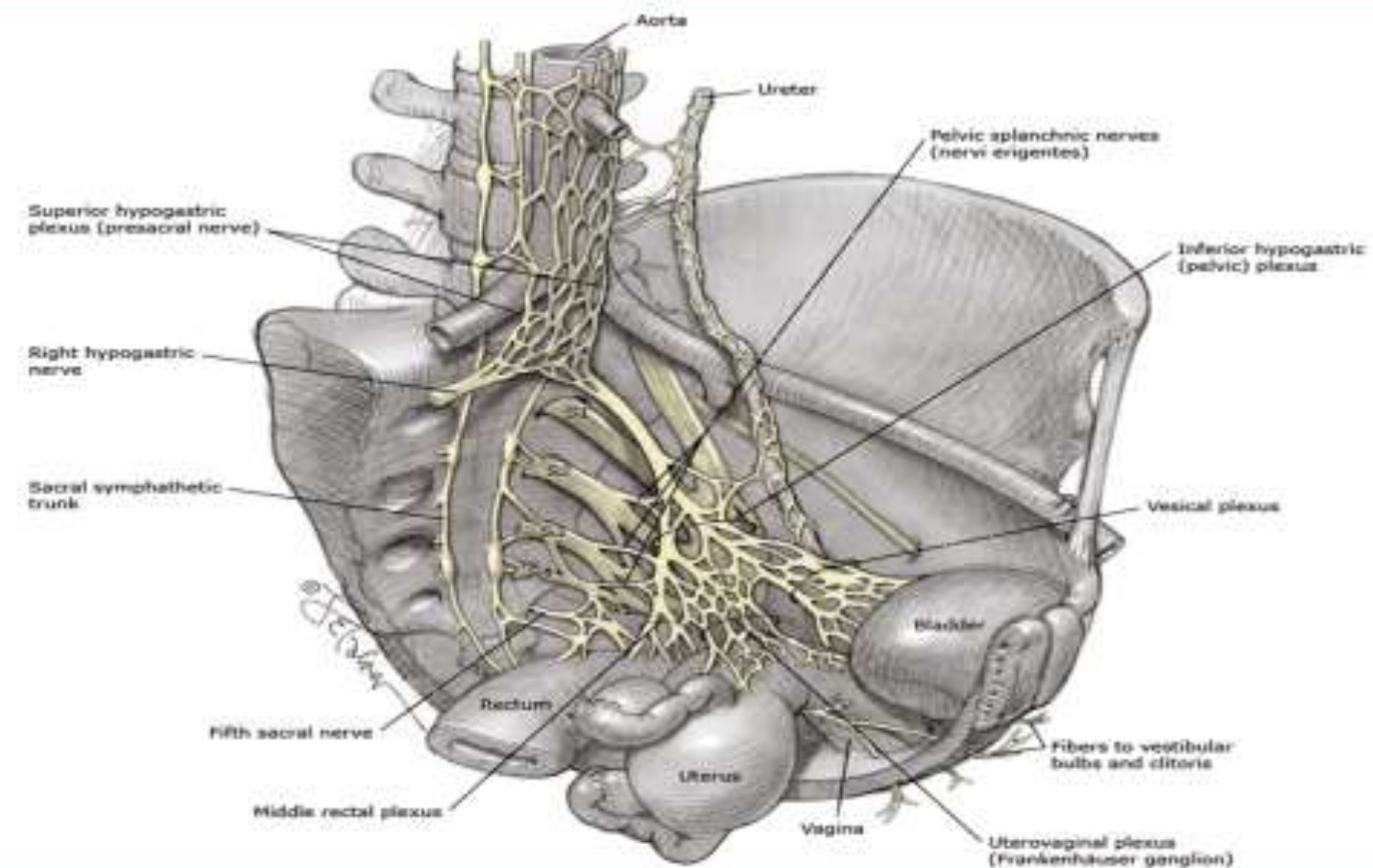
- Paracervical anesthetics block transmission of pain through sympathetic, parasympathetic, and visceral sensory fibers before they enter the uterus at the level of the internal os.
- The anatomic basis for the paracervical block is that the upper vagina, cervix, and lower uterus are innervated by the uterovaginal (or Frankenhäuser) plexus, which contains fibers derived from the inferior hypogastric (pelvic) plexus (T10-L1) and sacral nerve roots (S1-S4).
- Paracervical block **does not affect the motor pathways or provide pain relief to the perineum.**

Paracervical block



UpToDate®

Pelvic autonomic nerves



Complications

- **Post-block fetal bradycardia** – typically occurs 2 to 10 minutes after infiltration. It is usually transient, but can last as long as 40 minutes.
- **Maternal systemic toxicity after intravascular administration** – Intravascular injection of the local anesthetic may cause excessive sedation, generalized convulsions, and cardiovascular collapse.
- **Other** – Lower extremity paresthesias have been reported in up to 7 percent of cases, and vaginal/broad ligament hematoma or infection in 0.4 percent of cases. Allergic reactions are rare with local anesthetics

General Anesthesia

An altered physiological state Characterized by:

- reversible loss of consciousness and sensation
- Analgesia of entire body
 - Amnesia and sleep

Advantages of general anesthesia:

- It can be given very quickly.
- blood pressure is more easily controlled.
- breathing is more easily controlled once the ability to breathe for the patient is obtained.
- On patients with bleeding and clotting abnormalities, patients with neurological problems, patients with infections that might be spread to the spinal area if regional anesthesia is done, etc.

Disadvantages of general anesthesia

1. Possibility of maternal aspiration
2. Narcotization of the newborn
3. Problems of airway management
4. Maternal awareness during light general anesthesia

1. Possibility of maternal aspiration

Factors increase risk of aspiration include:

- Diminished tone in the lower oesophageal sphincter
- In later pregnancy the raised intra-abdominal pressure
- Altered gastro-oesophageal angle make gastric reflux more likely
- In labour the administration of opioids markedly slows gastric emptying
- During induction of anaesthesia passive regurgitation of stomach contents into the pharynx may occur, and lead to aspiration pneumonia.
- This is likely if the pH of the stomach contents is less than 3 (very acidic) and more than 30 mls of fluid is aspirated.

2. Narcotization of the newborn

- Many drugs used in anaesthesia cross the placental barrier, Thus may affect the fetus, particularly opioids such as morphine and sedatives such as diazepam.
- During anaesthesia these drugs should be avoided until the umbilical cord has been clamped.
-

3. Problems of airway management

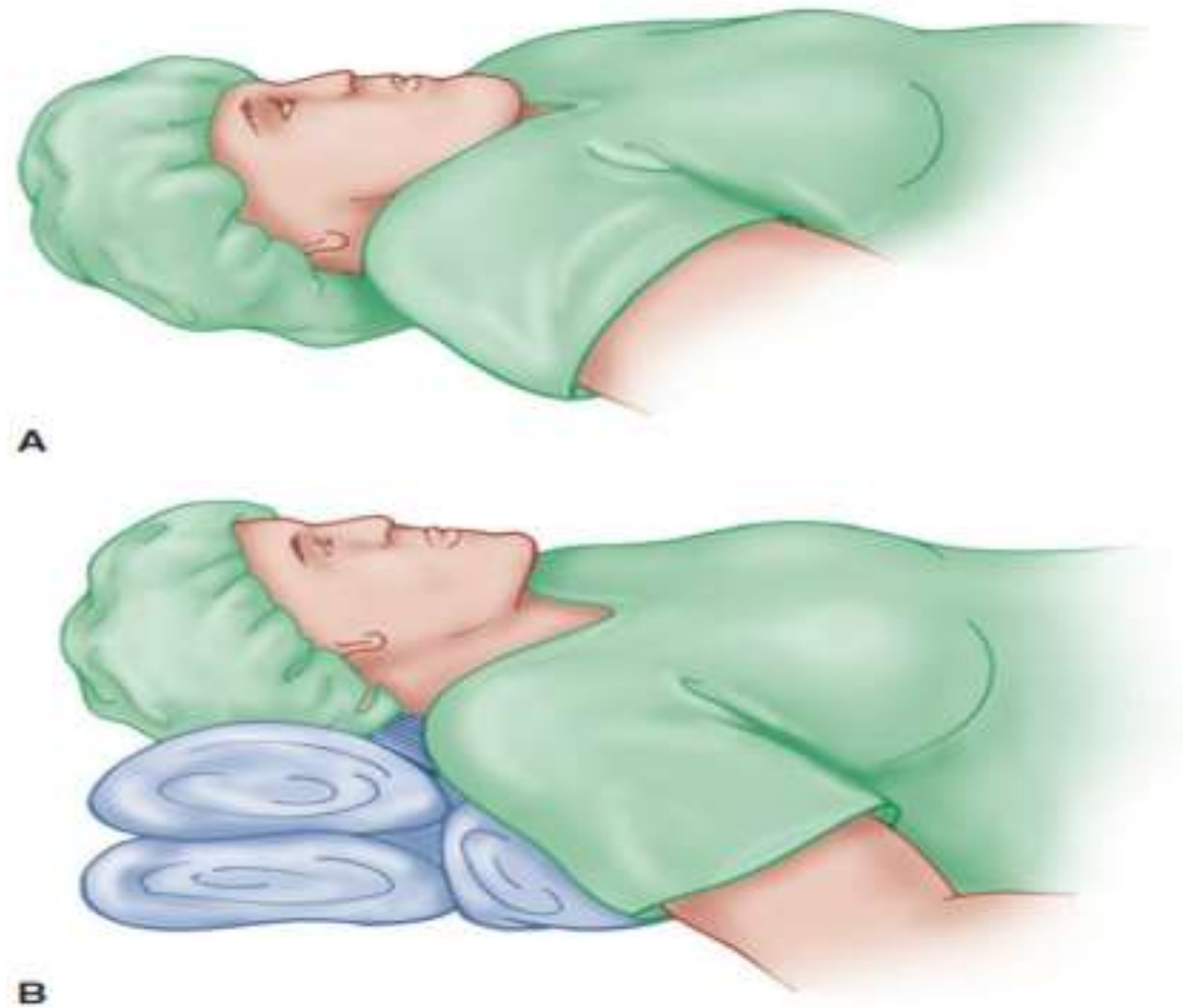


FIGURE 41-2 Optimal positioning for obese patients with a short neck. **A:** The normal supine position often prevents extension of the head and makes endotracheal intubation difficult. **B:** Elevation of the shoulder allows some neck flexion with more optimal extension of the head at the atlantooccipital joint, facilitating intubation.

BOX 8-2

FACTORS SUGGESTING DIFFICULT INTUBATION

- Obesity and/or short neck
- Neck flexion and/or extension limitations at atlantooccipital joint
- Short chin–hyoid distance (receding chin)
- Limited mouth opening
- Poor dentition and/or buck teeth
- Excess oropharyngeal tissues (see the uvula and tonsillar pillars)
- Large tongue

Women in labor have a higher risk of airway complications than nonpregnant patients because they have:

1. a twofold higher chance of failed intubation
2. a 60% increased oxygen consumption
3. a decreased functional residual capacity, resulting in a lower oxygen store
4. a potentially increased risk of aspiration.

4. Maternal awareness during light general anesthesia

- Awareness with recall is relatively common during GA for CD. The rate of awareness under anesthesia for obstetric patients may be as high as 1:212, compared with 1:19,600 for all types of surgery . The 5 National Audit Project from the United Kingdom reported that many of these cases of awareness were preventable
- To minimize the possibility of awareness, we administer a high concentration of volatile anesthetic after induction of anesthesia leading up to delivery, and routinely administer midazolam and opioids after delivery.

General anesthesia during cesarean delivery is administered differently than other surgeries due to fetal concerns and maternal physiology; some of the changes in anesthetic technique may contribute to the high incidence of awareness in obstetric patients.

Suggested mechanisms for awareness in these patients include the following:

1. Underdosing or omission of sedative premedication, induction agents, and opioids to avoid placental transfer to the fetus

2. Underdosing of inhalation anesthetics to avoid uterine relaxation and bleeding Changes in drug distribution related to physiologic changes of pregnancy (eg, increase in cardiac output)

3. Increase in difficulty with airway management, which is associated with awareness in all patients

4. High percentage of emergencies among patients who have general anesthesia for cesarean delivery

General anesthesia is employed for cesarean delivery in three situations:

- (1) There is extreme urgency and no preexisting epidural catheter.
- (2) There is a contraindication to regional anesthesia.
- (3) Regional anesthesia has failed (1.7% incidence).

(1) There is extreme urgency and no preexisting epidural catheter .

Emergency CD, with insufficient time to perform neuraxial anesthesia or to achieve a surgical level of anesthesia via labor epidural catheter.

For urgent or emergency CD, spinal anesthesia may be appropriate, particularly for patients who have increased risks associated with general anesthesia (ie, known difficult airway, recent oral intake of food, or malignant hyperthermia susceptibility). A single shot spinal anesthetic by an experienced provider does not take much longer than general anesthesia induction. The anesthesia and obstetric providers should collaborate to determine the degree of urgency so the appropriate anesthetic plan can be formulated.

(2) There is a contraindication to regional anesthesia

BOX 8-1

CONTRAINDICATIONS TO REGIONAL ANESTHESIA

Absolute Contraindications

Patient refusal

Coagulopathy

Infection at needle insertion site

Severe hypovolemia with ongoing blood loss

Relative Contraindications (Selected)

Prior back surgery (including Harrington rod placement)

Certain cardiac lesions, especially aortic stenosis

Increased intracranial pressure

(3) Regional anesthesia has failed (1.7% incidence).

A neuraxial block inadequate for surgery may occur if there is no block, a low spinal level, or a patchy block.

Management of inadequate block depends on the degree of urgency and patient factors. In urgent situations, general anesthesia should be induced rather than making further attempts at neuraxial anesthesia.

PREPARATION FOR ANESTHESIA

1 . Aspiration prophylaxis :

Because worse outcome may be associated with aspiration of particulate matter, acidic material, and of large volumes, goals for aspiration prophylaxis are to eliminate particulate gastric contents and to decrease the volume and acidity of stomach contents at the time of induction of anesthesia.

Aspiration prophylaxis is done by preoperative fasting and pharmacological prophylaxis

A. Preoperative fasting:

Gastric emptying is not changed by pregnancy ,and preoperative fasting guidelines are the same for elective cesarean delivery as for other surgical procedures (ie, two hour fast for clear liquids, six hours for solids, eight hours for fatty meals).

B. Pharmacological prophylaxis:

American Society of Anesthesiologists Practice Guidelines for Obstetric Anesthesia, which state that the timely administration of **nonparticulate antacids, H2 receptor antagonists** and/or **metoclopramide** should be considered , they also listed proton pump inhibitors in consideration

2. Premedications :Unlike many other surgical procedures, sedatives are not generally administered as premedication prior to cesarean delivery, as these medications cross the placenta and also may result in some degree of amnesia for the baby's birth. Reassurance and verbal support by the anesthesia clinician provide sufficient anxiolysis for most patients.

3. IV access : one 16- to 18-gauge intravenous (IV) catheter , additional IV catheters as indicated by the risk of hemorrhage.

4. Monitoring : pulse rate, blood pressure measurement, electrocardiography, oxygen saturation via pulse oximetry, and temperature monitoring when significant changes in body temperature are expected.

5. The fetal heart rate should be documented prior to cesarean delivery. If possible, laboring patients who were monitored in the labor room should continue to be monitored after transfer to the operating room when surgery is significantly delayed or when clinically indicated.

6. Preoperative antibiotics – A single intravenous dose of a narrow spectrum antibiotic should be administered preoperatively within 60 minutes of incision to all women undergoing planned cesarean delivery

- Cesarean delivery (intact membranes, not in labor) : Cefazolin <⁹⁰~~120~~ kg: 2 g IV ≥⁹⁰~~120~~ kg: 3 g IV OR Clindamycin 900 mg IV + Gentamicin 5 mg/kg IV (if overweight or obese, based on adjusted body weight)
- Cesarean delivery (in labor, ruptured membrane) : Cefazolin <120 kg: 2 g IV ≥120 kg: 3 g IV + Azithromycin 500 mg IV OR Clindamycin 900 mg IV + Gentamicin 5 mg/kg IV (if overweight or obese, based on adjusted body weight) + Azithromycin 500 mg IV

⇒ CS ⇒ Clean Contaminated

Induction of anesthesia

Rapid sequence induction and intubation (RSII) is the standard induction technique for cesarean delivery.

Induction agents of choice :

1-Propofol (2 to 2.5 mg/kg IV)

Side effects: 1. Maternal hypersensitivity

2. It crosses the placenta and maybe associated with neonatal respiratory depression and neurotoxicity

2-Etomidate (0.3 to 0.5 mg/kg IV)

Used when cardiovascular stability is particularly desirable

3- Ketamine

used for patients with hypovolemia or asthma

4-Thiopental

→ Also given in cases of status epilepticus with PET if MgSO₄ failed
→ If failed ⇒ intubation

- Neuromuscular blocking agents : muscle relaxant used to facilitate intubation is succinylcholine (unless contraindicated), because of its rapid onset and brief duration of action. If contraindicated, vecuronium or rocuronium may be used.

Maintenance of general anesthesia

- Nitrous oxide may be added. After induction, a potent inhalational agent is administered at a modest level (0.5 minimum alveolar concentration) to minimize myometrial relaxation .
- Oxygen delivery is maintained at 50-100% until delivery if the baby is stressed.
- Narcotics may be administered after the delivery of the baby to reduce the need for inhalational anesthesia and provide postoperative pain relief.
- The patient must be extubated only when fully awake to minimize the risk of aspiration.