Obstetric Analgesia and Anesthesia

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Pain transmission during labor

First stage

uterine contraction
and cervical dilatation

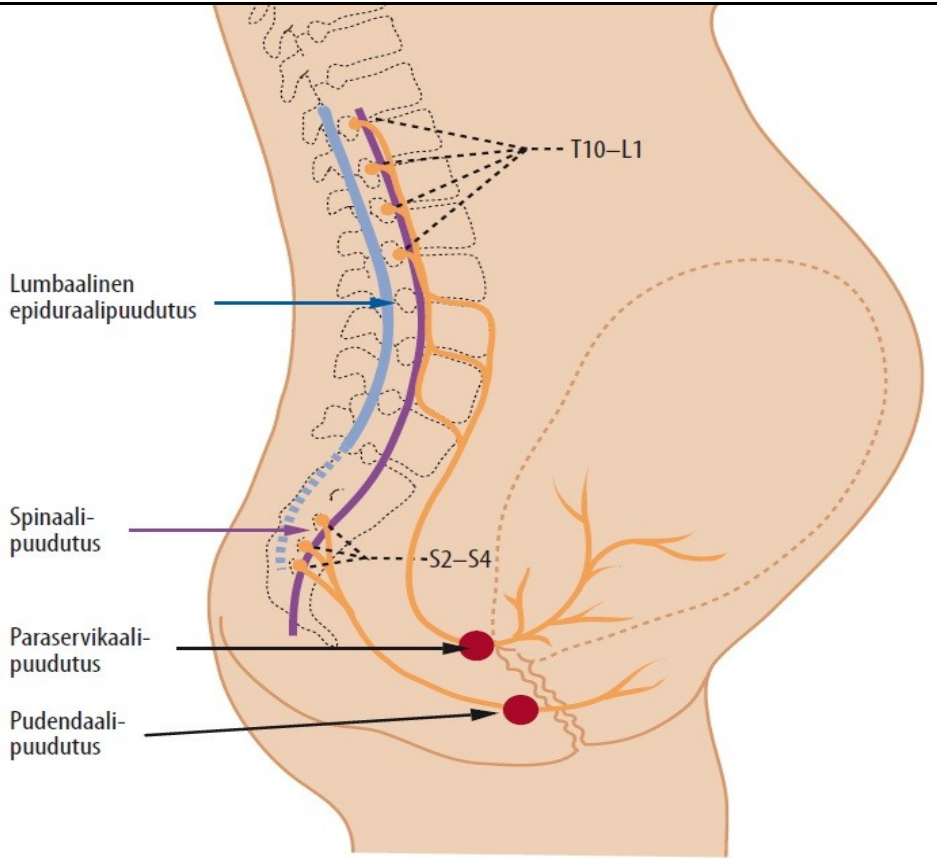
T10-L1

Second stage

Perineal pain **S2-S4**

So, it involves **T10-S4**

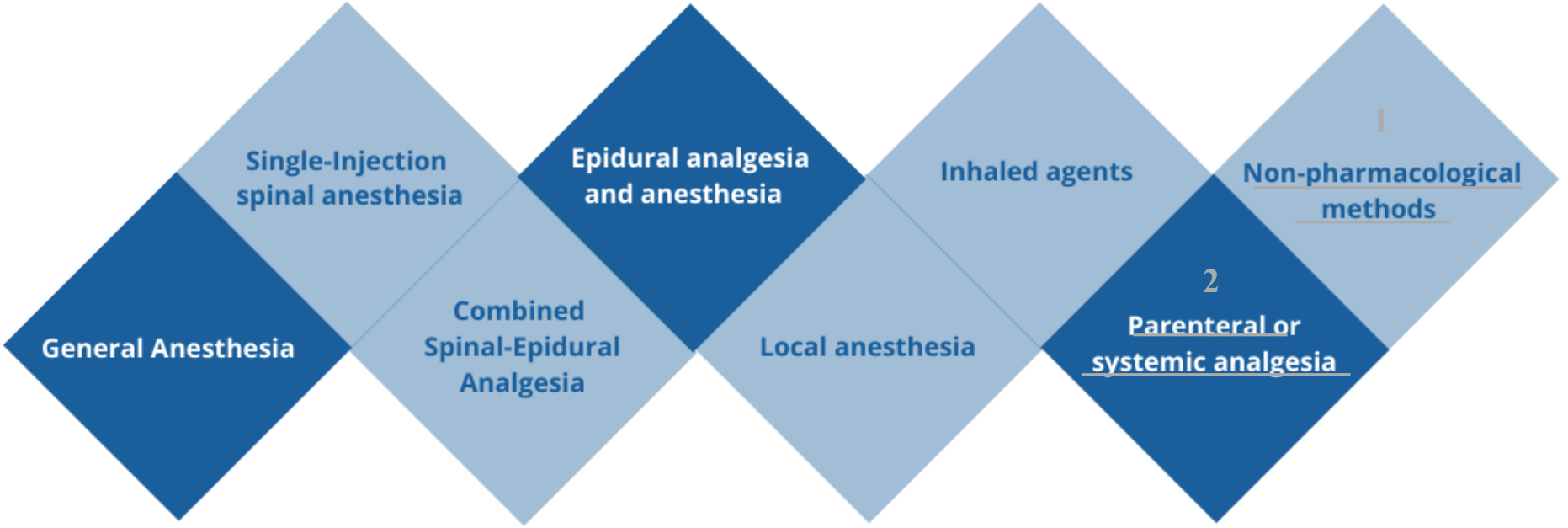
Pain pathway



During 1st stage

During 2nd stage

Available methods of analgesia and anesthesia



Non - pharmacological methods:

Breathing and relaxation exercises:
increases the oxygen supply to the contracting myometium so ischaemia is reduced and pain is minimized.

Sitting on the birthing ball, Hot compresses
(applied to the lower abdomen, groin or perineum).

Beverages:as water and juice.

2 Parenteral or systemic analgesia:

- fentanyl
- morphine
- remifentanil

given
IM/ IV
(Fentanyl also has been given intranasally for labor)

Adverse effects

mostly
nausea,vomiting,drowsiness

Inhalational analgesia Nitrous oxide

Entonox® = 50% nitrous oxide + 50% oxygen mixture, widely used in labor wards

- Quick onset and short duration of pain relief
- More effective than pethidine for labor pain
- Side effects: lightheadedness and nausea
- Not recommended for prolonged use early in labor due to risk of:

  Hyperventilation → hypocapnia, dizziness

  Rarely tetany and fetal hypoxia
- Best used later in labor or while waiting for epidural analgesia

Now a days, nitrous oxide and air are not used because this mixture produce hypoxia.

Local anesthesia

Local anesthesia involves injecting a local anesthetic (usually lidocaine or chloroprocaine) directly into the tissue to block nerve signals in a specific area. Commonly applied for minor obstetric procedures such as episiotomy or repair of perineal tears during vaginal delivery.

Advantages:

- Provides rapid and effective pain relief.
- Minimal systemic effects.
- Useful when neuraxial anesthesia is contraindicated or unavailable.

Technique:

- Aspirate before injection to avoid intravascular administration.
- Proper dosing and injection technique are essential.

Potential Toxicity:

- Central nervous system (CNS) toxicity: dizziness, tinnitus, metallic taste, seizures, or loss of consciousness.
- Cardiovascular toxicity: hypotension, arrhythmias.

Precautions:

Resuscitation equipment and trained personnel should be available during administration.

Pudendal Block

Primarily used to relieve pain during the second stage of labor, especially for episiotomy or assisted vaginal delivery (forceps or vacuum).

Technique:

Injection of a local anesthetic (usually lidocaine) near the pudendal nerve.

Approaches: transvaginal or transperineal.

Target site: area adjacent to the ischial spine.

Effect:

Anesthetizes the perineum, lower vagina, and vulva.

Does not affect uterine contractions or upper vaginal sensation.

Indications:

Useful when neuraxial anesthesia is contraindicated or not available.

Precautions:

Requires precise anatomical knowledge to avoid vascular injury or hematoma.

Possible, though rare, complications: infection, bleeding, inadequate analgesia.

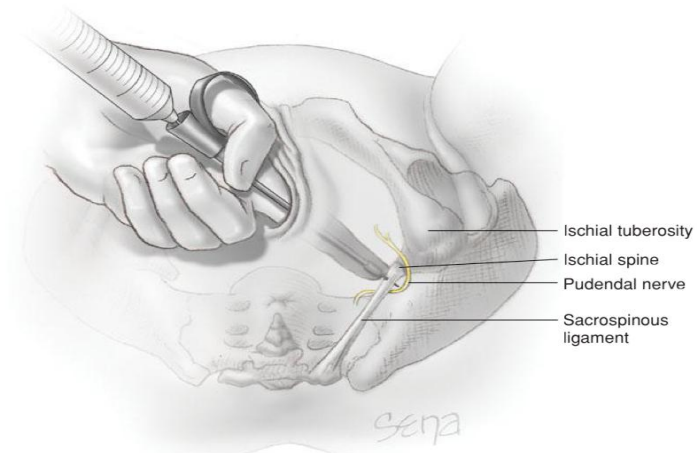


FIGURE 25-2 Local infiltration of the pudendal nerve. Transvaginal technique showing the needle extended beyond the needle guard and passing through the sacrospinous ligament to reach the pudendal nerve.

Paracervical Block

Used to relieve pain during the first stage of labor, specifically cervical dilation.

Technique:

Injection of a local anesthetic into the lateral fornices of the cervix (usually at 4 and 8 o’clock positions).

Effect:

Blocks sensory nerves from the cervix and upper vagina.

Does not affect the perineum or uterine contractions.

Risks:

Use has declined due to risk of fetal bradycardia, possibly from anesthetic diffusion affecting uterine blood flow or sympathetic nerves.

Precautions:

Continuous fetal monitoring after administration is mandatory.

TABLE 25-4. Local Anesthetic Agents Commonly Used in Obstetrics

Anesthetic Agent[a]	Usual Concentration (%)	Usual Volume (mL)	Onset	Average Duration (min)	Maximum Dose (mg)	Clinical Use
Aminoesters[b]						
2-Chloroprocaine	2	10–20	Rapid	30–60	800	Local infiltration or pudendal block
	3	10–20		30–60		Epidural *only* for cesarean
Aminoamides[b]						
Bupivacaine	0.25	5–10	Slow	60–90	175	Epidural for labor
	0.5	10–20		90–150		Epidural for cesarean
	0.75	1.5–2		60–120		Spinal for cesarean
Lidocaine	1–1.5	10–20	Rapid	30–60	300	Local infiltration or pudendal block
	1.5–2	5–20		60–90		Epidural for labor or cesarean
	5	1.5–2		45–60		Spinal for D&C or puerperal tubal
Ropivacaine	0.2–0.5	5–10	Slow	60–90	200	Epidural for labor
	0.5–1	10–30		90–150	250	Epidural for cesarean

[a]Without epinephrine.
[b]Esters are hydrolyzed by plasma cholinesterases and amides by hepatic clearance.
D&C = dilatation and curettage.
Adapted from Liu, 2009. Courtesy of Drs. Shiv Sharma and Erica Grant.

Epidural anesthesia

Fundamental method for pain management during labor and delivery

Provides effective and adjustable analgesia

Anesthetic agents administered into the epidural space via catheter

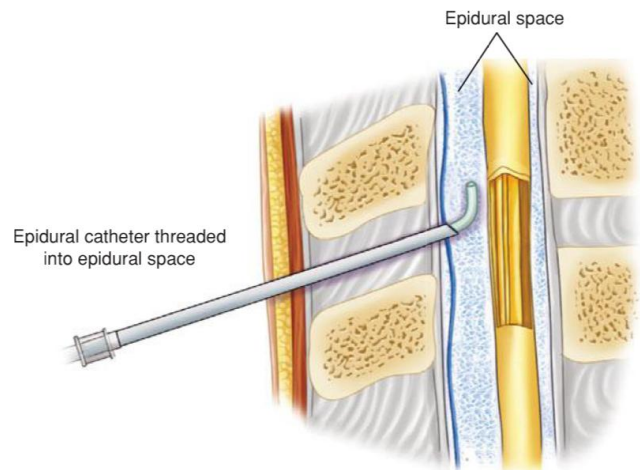
Allows continuous or intermittent dosing based on labor stage and patient needs

Procedure

- Patient positioned in lateral decubitus or sitting
- Epidural space identified using loss-of-resistance technique
- Catheter advanced 3–5 cm into epidural space
- Test dose administered to rule out intrathecal or intravascular placement
- After confirmation, full dose given and analgesia maintained by infusion or boluses

Analgesia Goals

- Labor: sensory block from T10 to S5 dermatomes
- Cesarean delivery: wider block from T4 to S1 dermatomes



analgesia. **A.** Combined spinal-epidural analgesia. **B.** Epidural analgesia.

Epidural Anesthesia: Agent and Benefits

Common local anesthetics: bupivacaine, lidocaine, ropivacaine Often combined with opioids (fentanyl, sufentanil) to enhance analgesia and reduce local anesthetic dose, minimizing motor block

Provides superior pain control

Lowers maternal catecholamine levels, improving uteroplacental blood flow

Allows rapid anesthesia extension if operative delivery is needed

Preferred over general anesthesia for safety

Potential Complications

- Hypotension from sympathetic blockade (managed with IV fluids and vasopressors)
- Postdural puncture headache (treated with caffeine or epidural blood patch)
- Rare total spinal anesthesia (requires urgent care)
- Maternal fever, urinary retention, transient back pain
- Seizures from anesthetic toxicity or cerebrospinal fluid hypotension

TABLE 25-5. Complications of Regional Analgesia

Complication	Incidence (%)
Hypotension (in prehydrated women undergoing cesarean delivery)	
Spinal	25–67
Epidural (in prehydrated women in labor)	28–31
Epidural	8.5–9
Fever > 100.4°F (excess rate over women treated with narcotics)	
Nulliparous women	19
Multiparous women	1
Postdural puncture headache	
Spinal	1.5–3
Epidural	2
Combined spinal epidural	1–2.8
Transient fetal heart decelerations	8
Pruritus (with added opioid only)	
Epidural	1.3–26
Spinal	41–85
Inadequate pain relief: epidural	9–15

Adapted from the American College of Obstetricians and Gynecologists, 2013b.

Contraindications

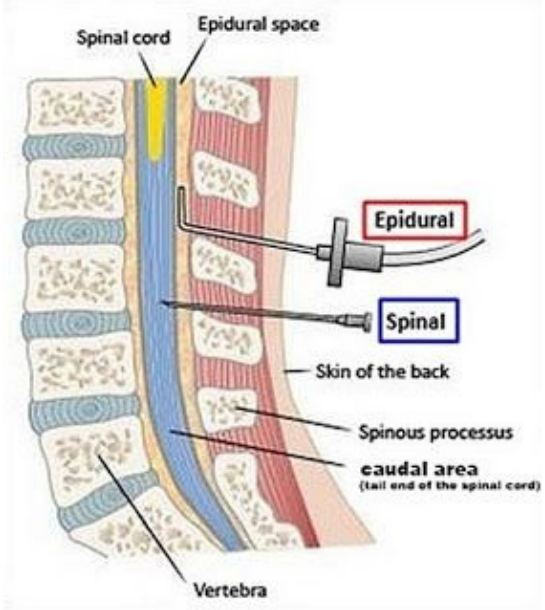
- Severe uncorrected hypotension
- Coagulopathy or thrombocytopenia
- Recent anticoagulant use (e.g., LMWH within 12 hours)
- Local/systemic infection
- Elevated intracranial pressure due to mass lesions

Special Populations and Labor Impact

- Safe and beneficial in severe preeclampsia with careful fluid management
- Technical challenges and increased monitoring needed for obese patients
- May slightly prolonged second stage of labor
- May increase oxytocin use and operative vaginal delivery
- Does not significantly increase cesarean delivery rates
- Neonatal outcomes generally favorable with improved acid-base status vs systemic opioids

single-injection spinal anesthesia

Single-Shot Spinal Anesthesia is a neuraxial block ,technique in which a single dose of local anesthetic with or without additives such as opioids, is injected directly into the cerebrospinal fluid (CSF) via the subarachnoid space, without leaving an indwelling catheter



this technique is seldom chosen for vaginal delivery except for patients for whom delivery is predicted to occur within an hour or so. However , it is commonly employed for cesarean delivery.

General Steps

1. **Patient preparation** – preoperative assessment, monitoring vital signs, preload with IV fluids if indicated.
2. **Positioning** – usually sitting or lateral decubitus with spinal flexion.
3. **Aseptic technique** – thorough skin cleaning and draping.
4. **Needle insertion** – a fine spinal needle (e.g., Quincke, Whitacre) is introduced, typically at the L3–L4 or L4–L5 interspace.
5. **Drug injection** – administer local anesthetic (e.g., bupivacaine) ± opioid (e.g., fentanyl, morphine).
6. **Needle removal** – after injection, no catheter is left in place

-Many local anesthetics are used with different onset, duration, uptake, elimination properties.

. -They target the spinal nerve roots and dorsal root ganglia, and the spinal cord (superficial and deep portions)

local anethetic includes:

lidocaine , bupivacaine , ropivacaine

The addition of opioids to local anesthetics produces several beneficial effects. Opioids exert a direct analgesic effect, which enhances pain relief. They prolong the duration of both sensory and motor blockade and increase the mean spread of the blockade. Their use allows for a reduction in the required dose of the local anesthetic, which can help minimize potential toxicity. Furthermore, opioids can promote motor block sparing and enable faster recovery while still providing the same degree of analgesia.

Advantages:

- **Very rapid onset (2-5 minutes).**
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- **Small dose required.**
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- **Well-suited for relatively short procedures such as routine cesarean delivery.**

Disadvantages / Risks:

- **Hypotension is very common after injection due to sympathetic blockade.**
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- **Limited duration — if the surgery is prolonged, additional anesthesia may be needed.**

In cesarean delivery: Often preferred when there are no contraindications (e.g., bleeding disorders, patient refusal).

Contraindications

- Patient refusal.
- Unstable patients (sepsis, hypovolemia)
- Anatomical deformities, spine surgeries
- Raised intracranial pressure.
- Severe aortic stenosis.
- Clotting disorde
- Neurological disease

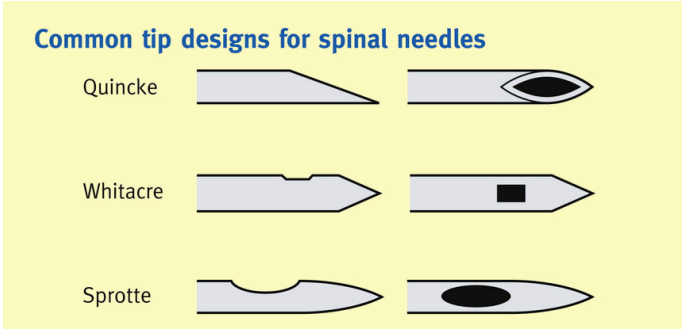
Experts strongly recommend neuraxial (regional) anesthesia in preference to GA for most cesarean deliveries when feasible.

If spinal is chosen, experts strongly prefer pencil-point spinal needles (reduced postdural puncture headache

Recommendations / practical points

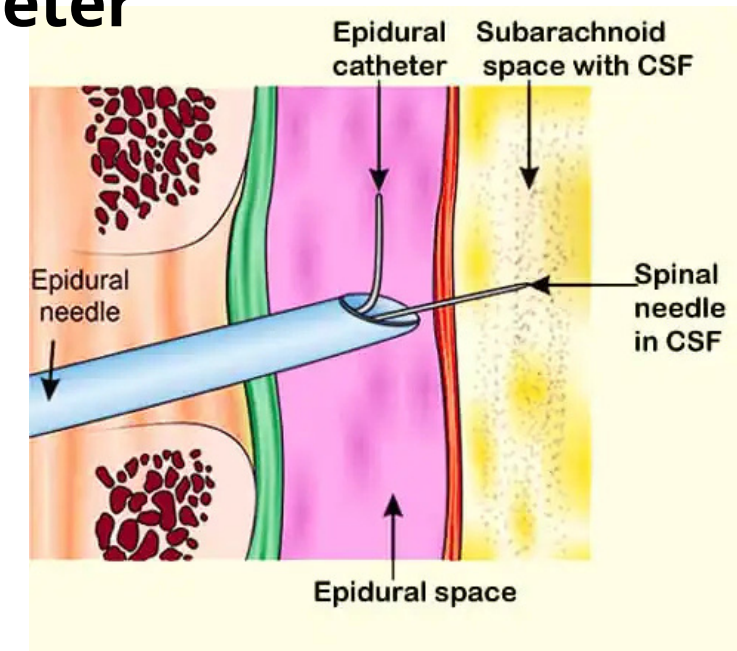
Use spinal anesthesia for elective or most urgent cesareans when there are no contraindications (.coagulopathy, severe hypovolemia, patient refusal)

Expect and prepare for hypotension: institutional protocols should include vasopressors (ephedrine or phenylephrine) and IV fluid strategies



Combined Spinal–Epidural (CSE) Anesthesia

Combines a single-shot spinal injection with placement of an epidural catheter



Advantages:

- Rapid onset of anesthesia due to spinal injection .
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- Ability to prolong or adjust anesthesia via the epidural catheter if surgery lasts longer or for postoperative pain control.

General anesthesia

Although regional anesthesia is preferred for cesarean delivery due to better maternal safety and neonatal outcomes, general anesthesia may be indicated in certain situations

indications :

Maternal indications:

- **Refusal of regional anesthesia.**
- **Contraindications to regional block (e.g., coagulopathy, infection at injection site).**
- **Severe maternal bleeding / hypovolemic shock.**
- **Fetal indications:**
- **Immediate threat to fetal life (e.g., severe bradycardia) when there’s no time for regional.**

Preparation

- Preoperative assessment (airway evaluation, allergies, fasting status).
- Preoxygenation (important because pregnant women desaturate quickly).
- Equipment check (especially airway and suction).

Drugs and Technique

- Induction agents (e.g., propofol, thiopental — thiopental historically preferred for rapid onset).
- Muscle relaxants (succinylcholine for rapid sequence induction).
- Opioids (fentanyl — often given after cord clamping to avoid neonatal depression).
- Maintenance (volatile anesthetics like sevoflurane, isoflurane, with oxygen/nitrous oxide)

Complications

- **Failed intubation (more common in obstetric patients).**
- **Aspiration pneumonitis (Mendelson’s syndrome).**

- **Neonatal respiratory depression (if opioids given before cord clamping).**