

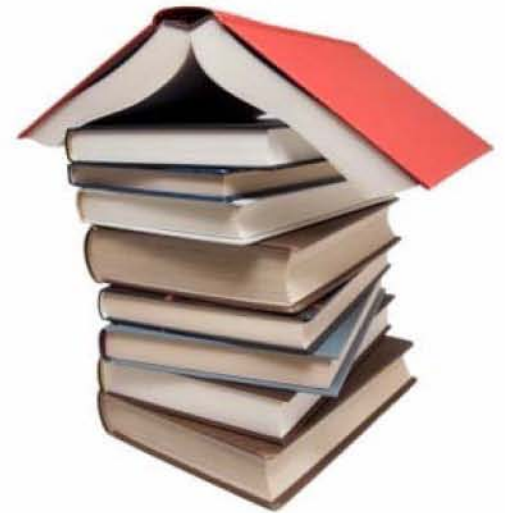


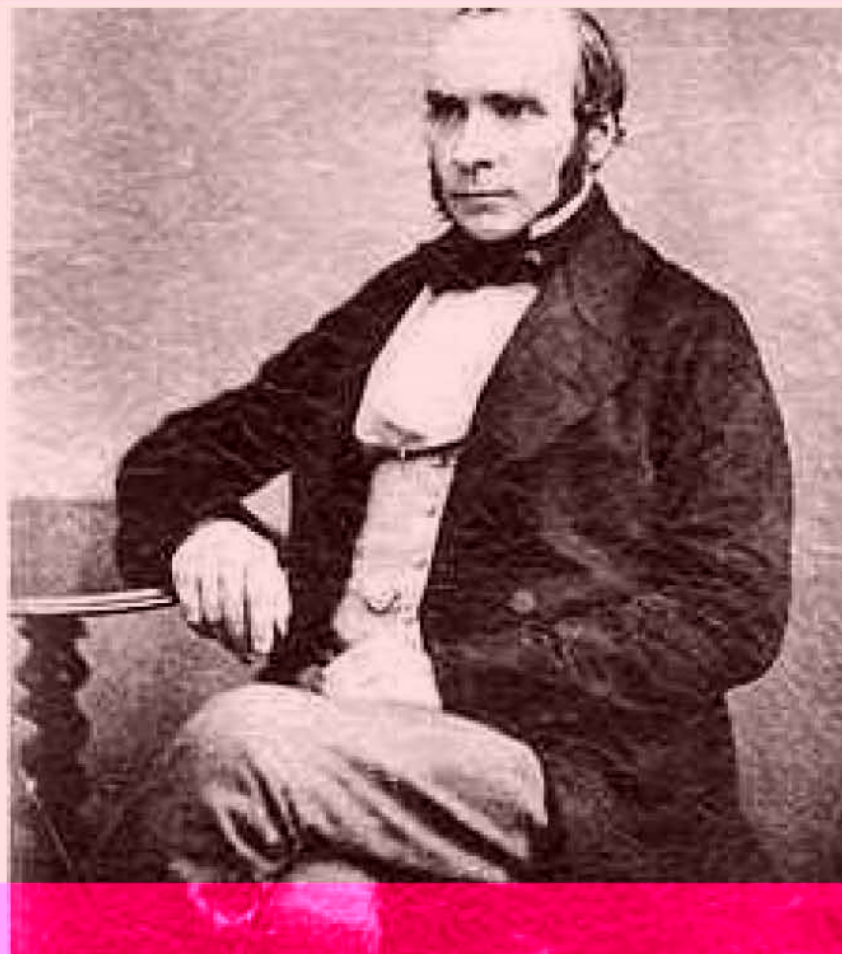
Anesthesia for Labor and Delivery

Objectives

- Describe the pain pathways of labor and delivery
- Describe labor analgesic techniques
- Describe anaesthesia for caesarean delivery
- Describe the complications of regional techniques

INTRODUCTION





Dr. John Snow

born 15 March 1813 in York, England. Queen Victoria was given chloroform by John Snow for the birth of her eighth child and this did much to popularize the use of pain relief in labor.



Regional anesthetic techniques, were introduced to obstetrics in 1900, when **Oskar Kreis** described the use of spinal anesthesia.

° Does Labor Pain Need Analgesia?

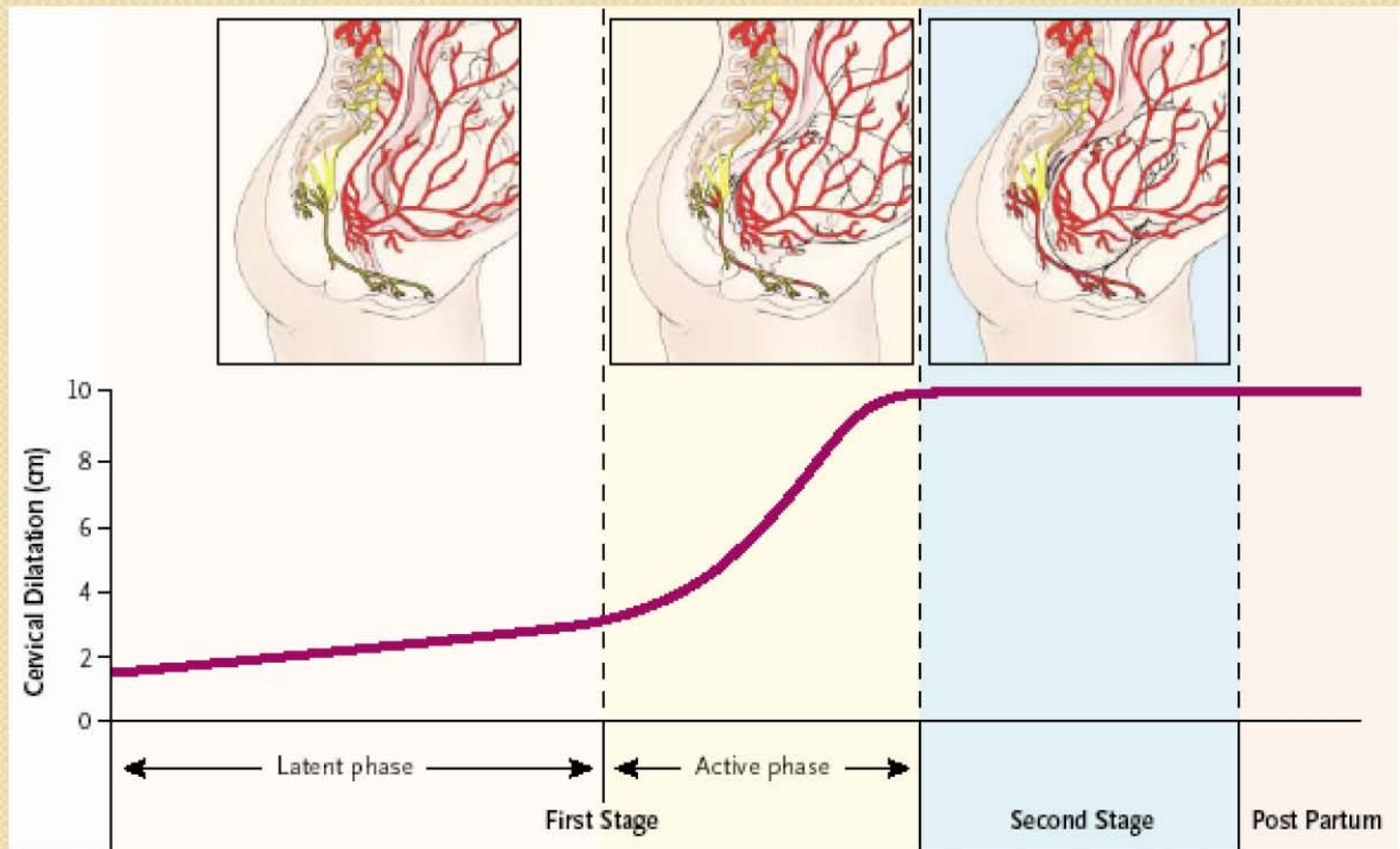


Analgesia for Labor and Delivery

- Always controversial!
- “Birth is a natural process”
- Women should suffer!!
- Concerns for mother’s safety
- Concerns for baby
- Concerns for effects on labor



Labor Pain at different Stages of Labor

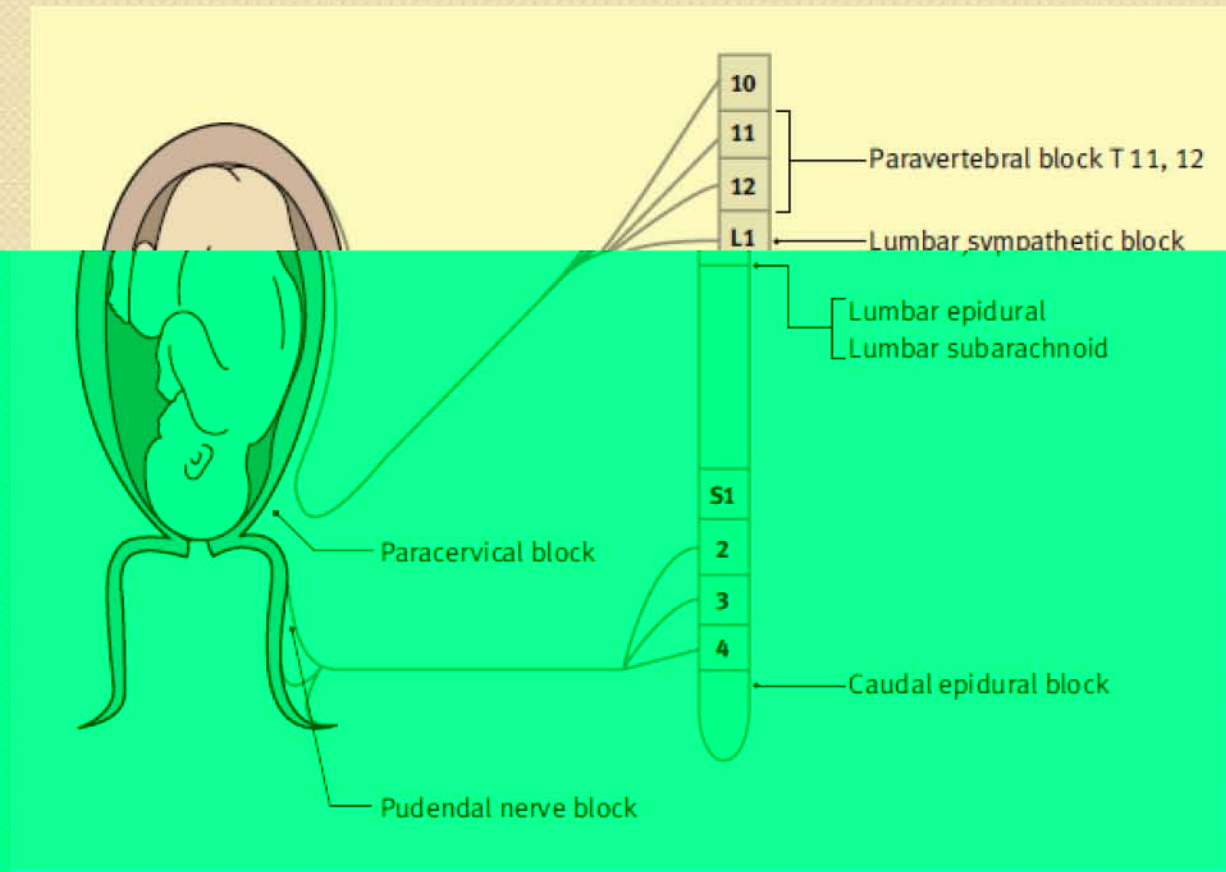


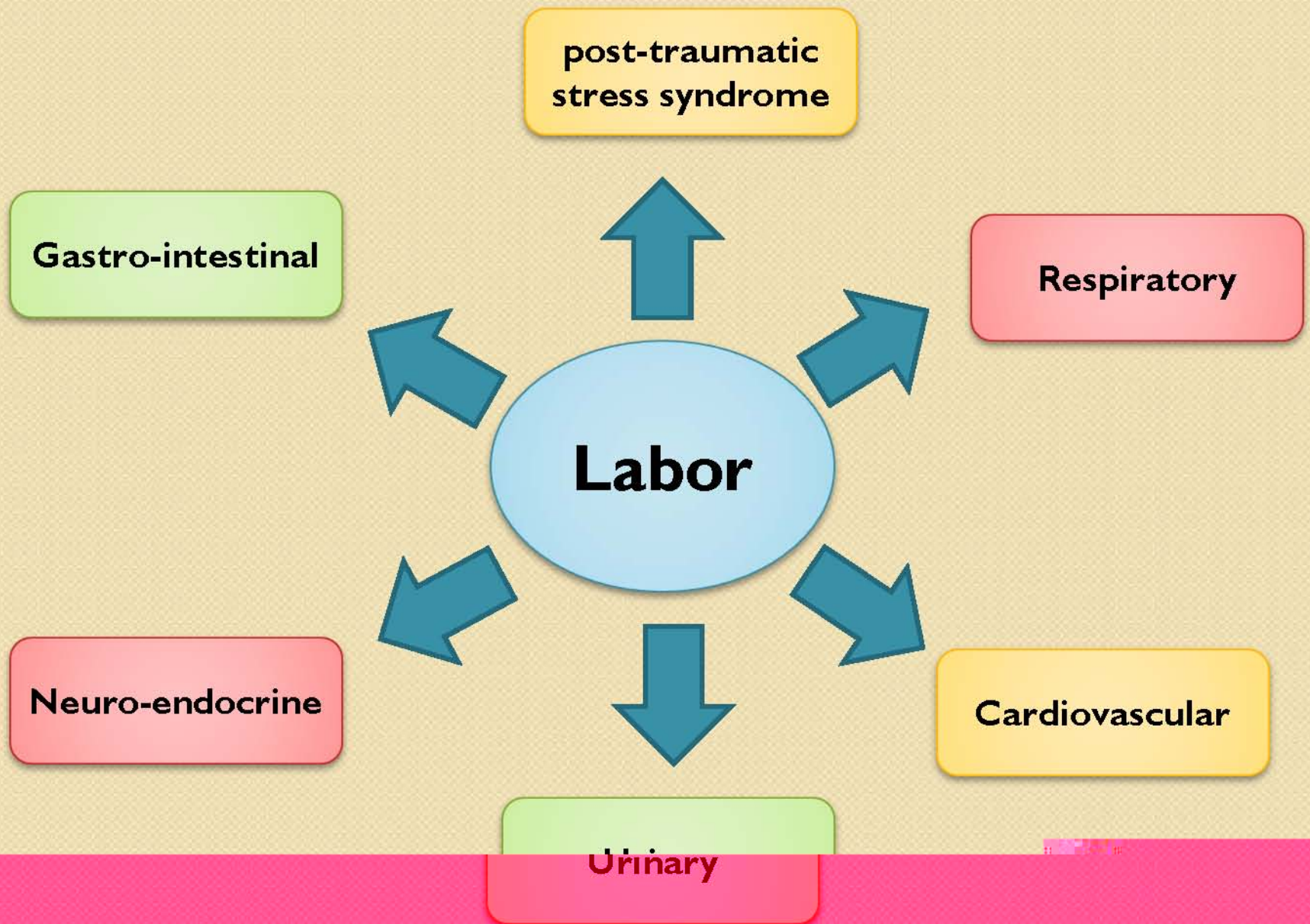
Eltzschig, Leiberman, Camann, NEJM 348; 319:2003

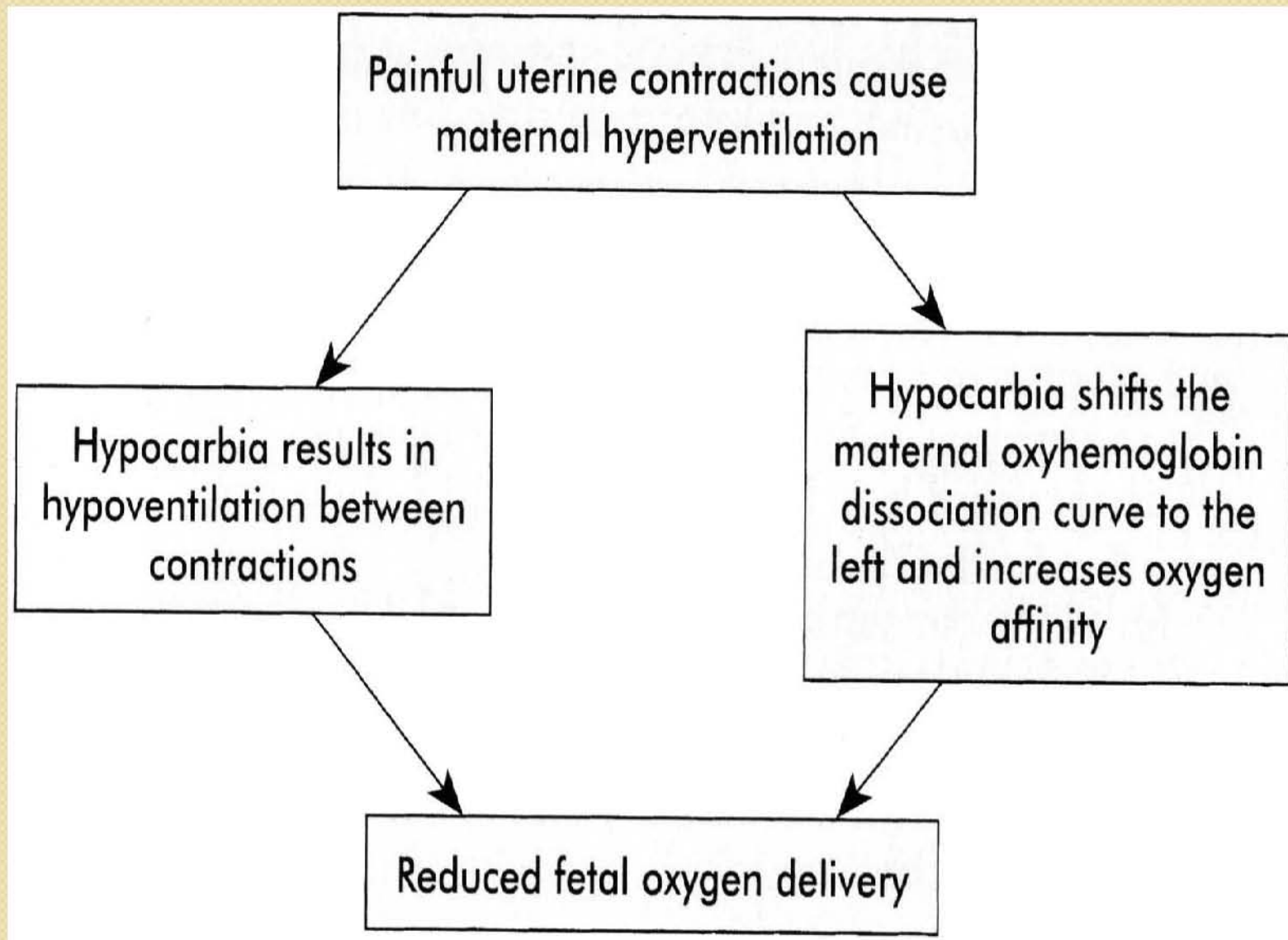
The Physiology of Pain in Labor

- **1st stage of labor** – mostly visceral
 - Dilation of the **cervix** and distention of the **lower uterine segment**
 - Dull, aching and poorly localized
 - Slow conducting, visceral C fibers, enter spinal cord at T10 to L1
- **2nd stage of labor** – mostly somatic
 - Distention of the **pelvic floor, vagina and perineum**
 - Sharp, severe and well localized
 - Rapidly conducting A-delta fibers, enter spinal cord at S2 to S4

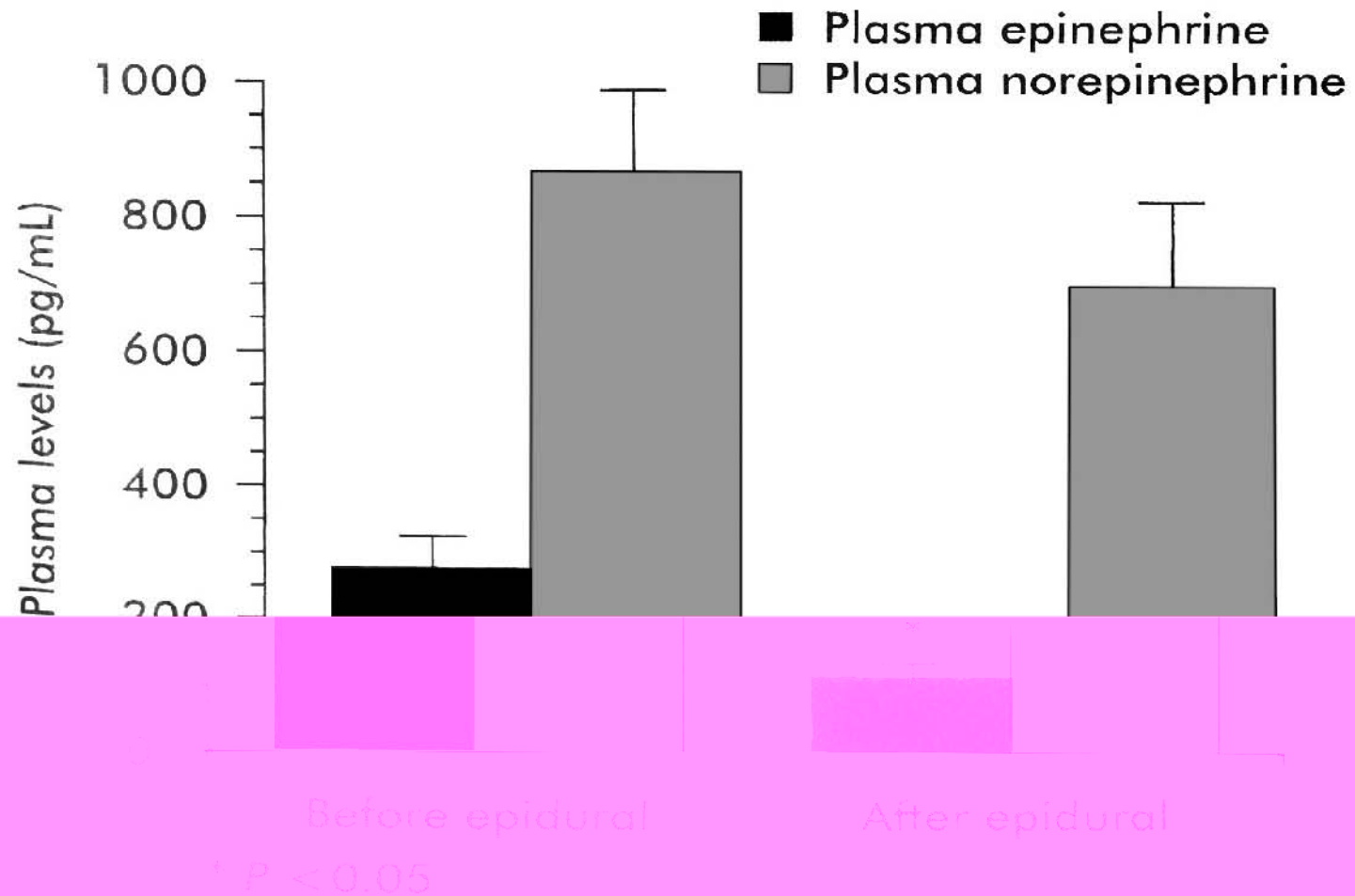
Pain Pathways of Labor







Potential effects of maternal hyperventilation and subsequent hypocarbia on oxygen delivery to the fetus



Influence of epidural analgesia on maternal plasma concentrations of catecholamines during labor. Modified from Shnider SM et al. Maternal catecholamines decrease during labor after lumbar epidural analgesia. Am J Obstet Gynecol 1983;147:13-5.



What Are the Types of Labor Analgesia?

Goals of Labour Analgesia

- Dramatically reduce pain of labor
- Should allow parturient to participate in birthing experience
- Minimal motor block to allow ambulation
- Minimal effects on fetus
- Minimal effects on progress of labor

Types of Labor Analgesia

1. Non-pharmacological analgesia
2. Pharmacological
3. Regional Anesthesia/Analgesia

Non pharmacological analgesia

- Childbirth education
- Relaxation and breathing
- Water immersion
- Acupuncture
- Physical therapy
- Transcutaneous electrical nerve stimulation(TENS)

Pharmacological

- Analgesia and sedation
 - Meperidine, morphine, fentanyl
 - Nalbuphine , butorphanol
 - Nitrous oxide

Regional Anesthesia/Analgesia

- Epidural
- Spinal
- Combined Spinal Epidural (CSE)
- Continuous spinal analgesia
- Paracervical block
- Lumbar sympathetic block
- Pudendal block
- Perineal infiltration

Epidural Analgesia

- Provides excellent pain relief reducing maternal catecholamines
- Ability to extend the duration of block to match the duration of labor
- Blunts hemodynamic effects of uterine contractions: beneficial for patients with preeclampsia.



Indications for LEA

- PAIN EXPERIENCED BY A WOMAN IN LABOR

When medically beneficial to reduce the stress of labor

ACOG and ASA stated

“in the absence of a medical contraindication, maternal request is a sufficient medical indication for pain relief...”

Contraindications for LEA

ABSOLUTE

- Patients refusal
- Inability to cooperate
- Increased intracranial pressure
- Infection
- Severe coagulopathy
- Severe hypovolemia
- Inadequate training

RELATIVE

- Systemic maternal infection
- Preexisting neurological deficiency
- Mild or isolated coagulation abnormalities
- Relative (and correctable) hypovolemia

We are All Ready...Now What? - Last Check

- Obstetrician is consulted and confirmed LEA
- Preanesthetic evaluation is performed/verified
- Pt's (and only patient's) desire to have LEA is reconfirmed
- Pt's understanding of risks of LEA is reconfirmed

We are All Ready...Now What? - Last Check

- Fetal well-being is assessed and reassured



We are All Ready...Now What? - Last Check

- Supporting personal is available and present



We are All Ready...Now What? - Last Check

- Resuscitation equipment and drugs are immediately available in the area where LEA placed



Standard Technique of LEA

1. Pre epidural check list is completed
2. Aspiration prophylaxis

When? How?)

er injection of

duction (e.g.,

3. Intravenous hydration (what? W

4. Monitoring

- BP every 1 to 2 min for 20 min after drugs
- Continuous maternal HR during induction (pulse oximetry)
- Continuous FHR monitoring
- Continual verbal communication

Standard Technique of LEA

4. Maternal position (sitting or lateral?)

Positions for an epidural



Lying on side



Sitting up

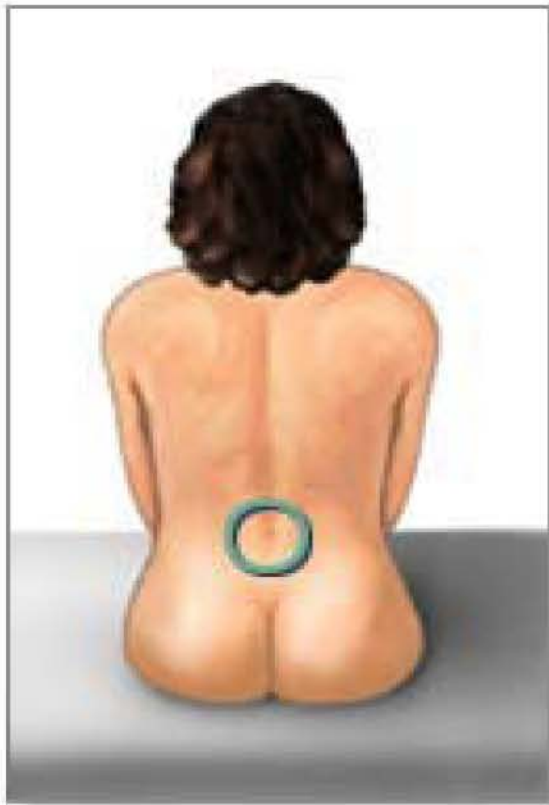
Positi

Comparison of Sitting and Lateral Positions for Performing Spinal or Epidural Procedures

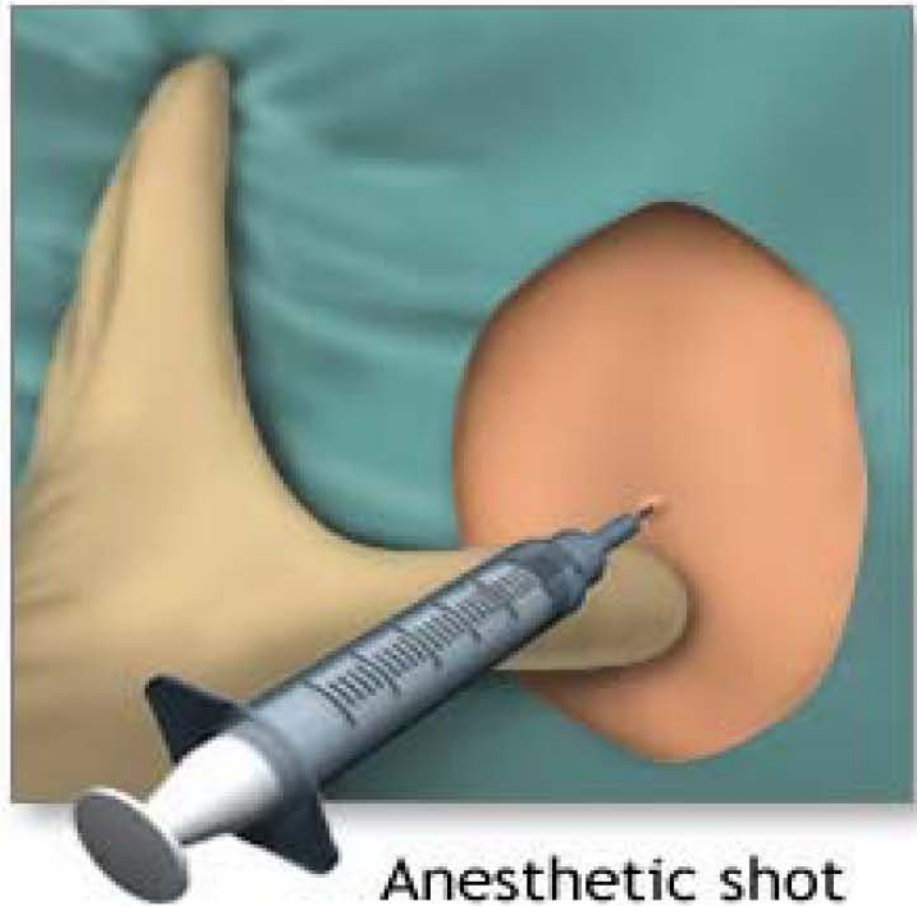
Sitting	Lying (left lateral)
<u>Advantages</u> <ul style="list-style-type: none">• Midline easier to identify in obese women• Obese patients may find this position more comfortable	<ul style="list-style-type: none">• Can be left unattended without risk of fainting.• No orthostatic hypotension• Uteroplacental blood flow not reduced (particularly important in the stressed fetus)
<u>Disadvantages</u> <ul style="list-style-type: none">• Uteroplacental blood flow decreased• Orthostatic hypotension may occur• Increased risk of orthostatic hypotension if Entonox and pethidine have been administered• Assistant (or partner) needed to support patient	<ul style="list-style-type: none">• May be more difficult to find the midline in obese patient



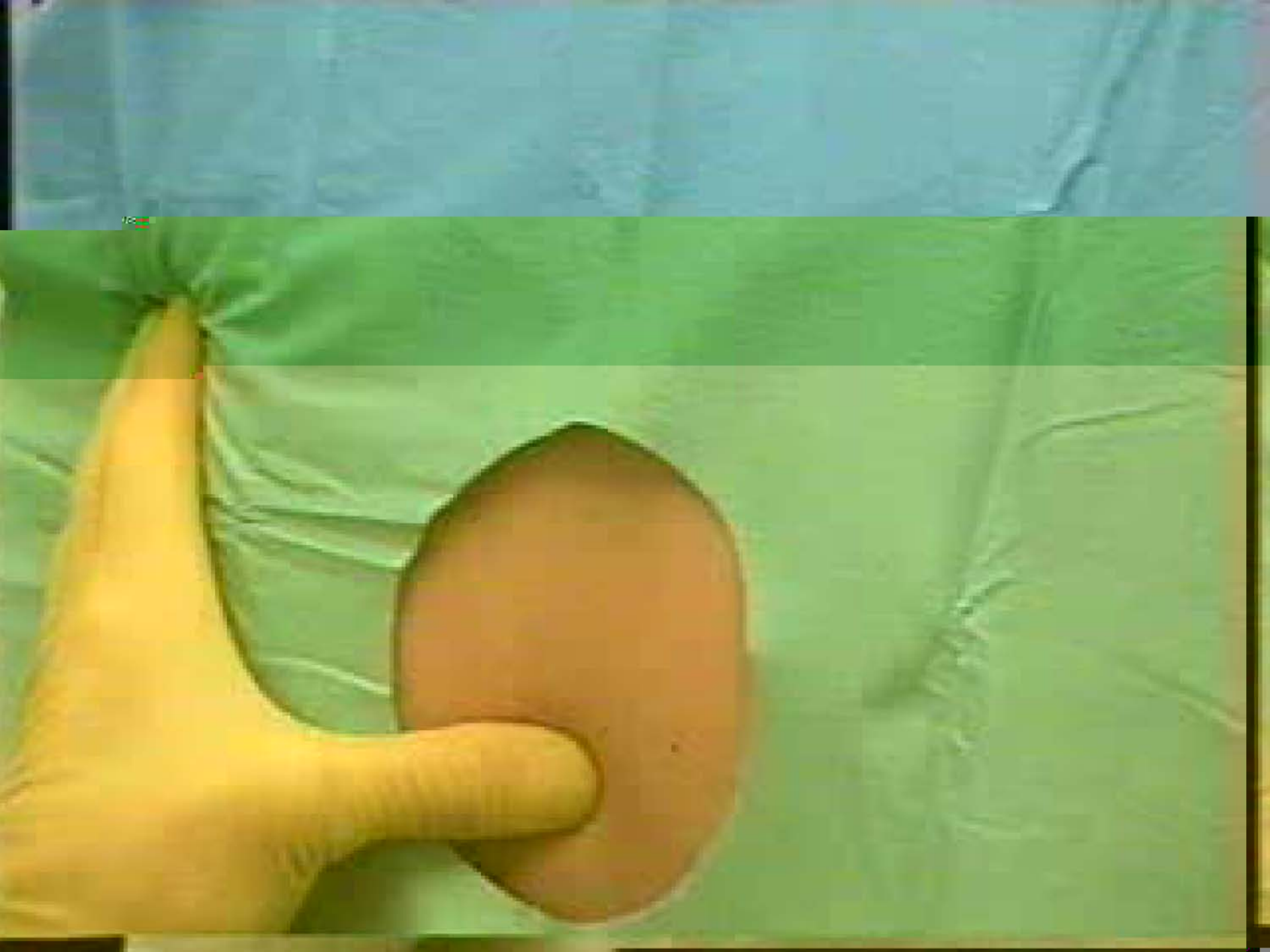
Deposits: Expected Rise of Chronic Diseases in 2010s Expected to Increase 10%



Injection site



Anesthetic shot



Spinal Anesthesia/Analgesia

- Used mainly for very late in labor because

it has limited duration of action

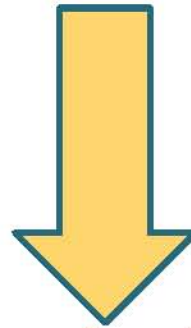
- Faster onset than Epidural
- Amount of local anesthetic used is much smaller



Fig. 64.



Searching For Balanced Labor Analgesia



Ambulatory Labor Analgesia (CSE)

Combined spinal epidural (CSE)

- Initial reports: two interspace technique-epidural followed by spinal
- Later evolution of CSE in the direction of needle through needle technique
- Postdural puncture headache: 1% or less incidence for CSE with small bore atraumatic needles.

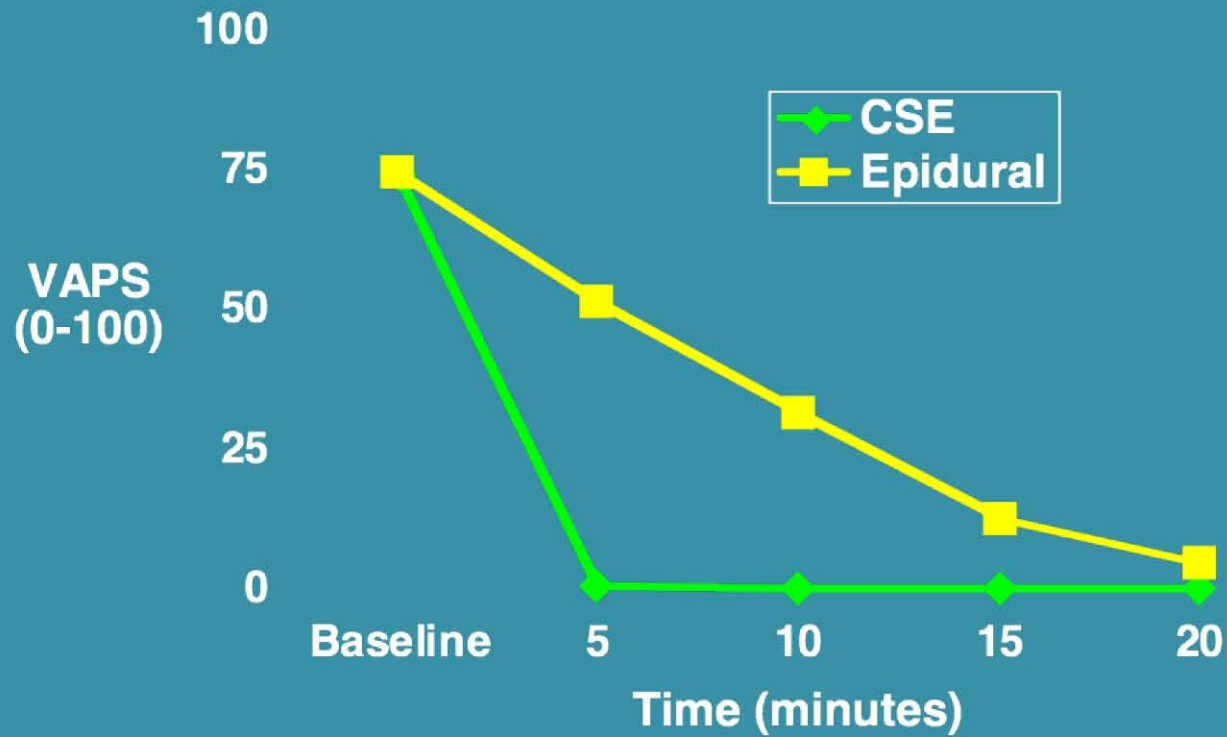


Advantages of CSE for Labor Analgesia

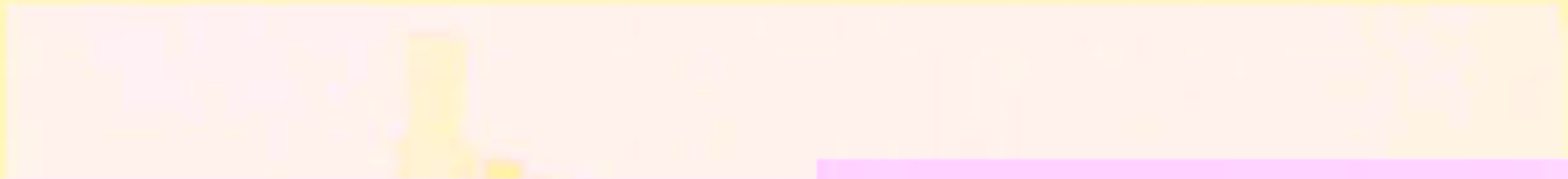
- Rapid onset of intense analgesia (the patient loves you immediately!)
- Ideal in late or rapidly progressing labor
- Very low failure rate
- Less need for supplemental boluses
- Minimal motor block (“walking epidural”)

Onset of Analgesia: CSE vs. Epidural

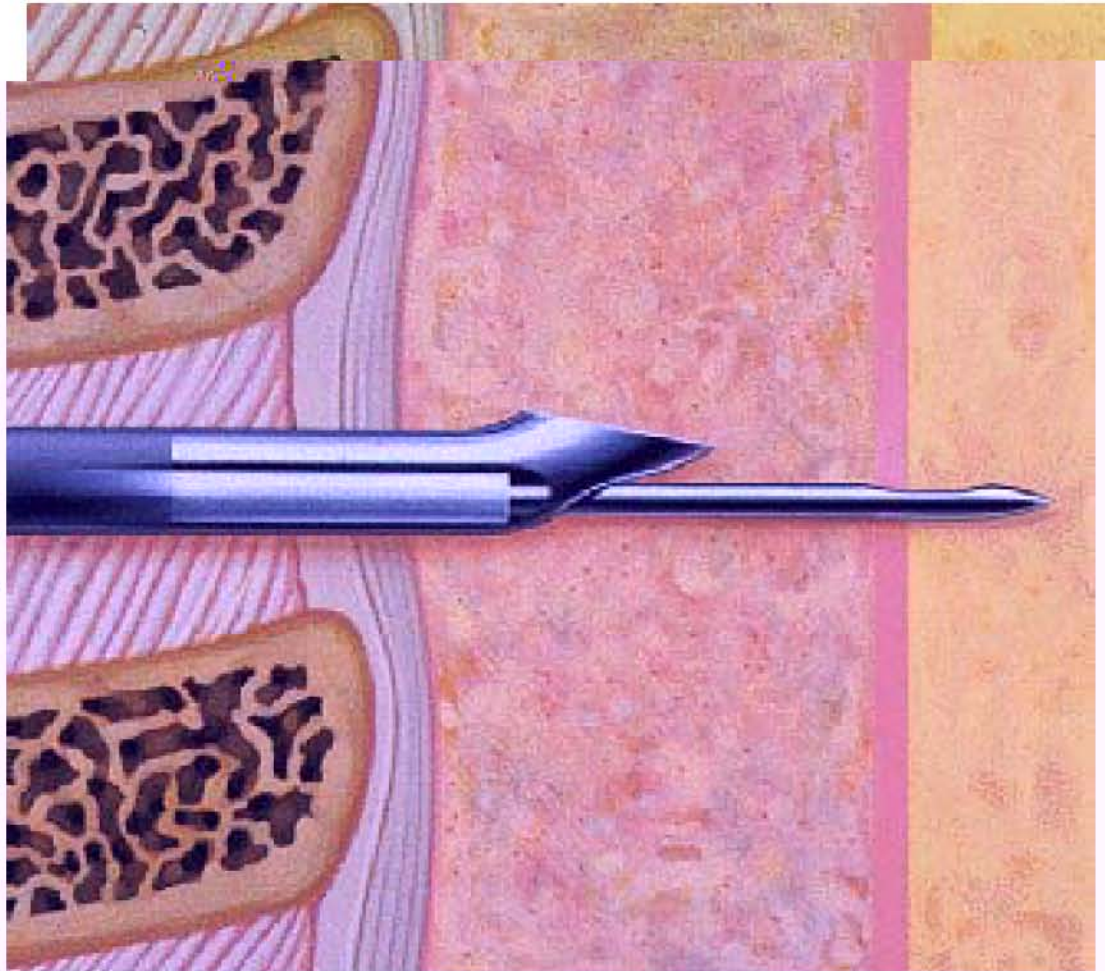
Collis et al. Lancet 1995;345:1413



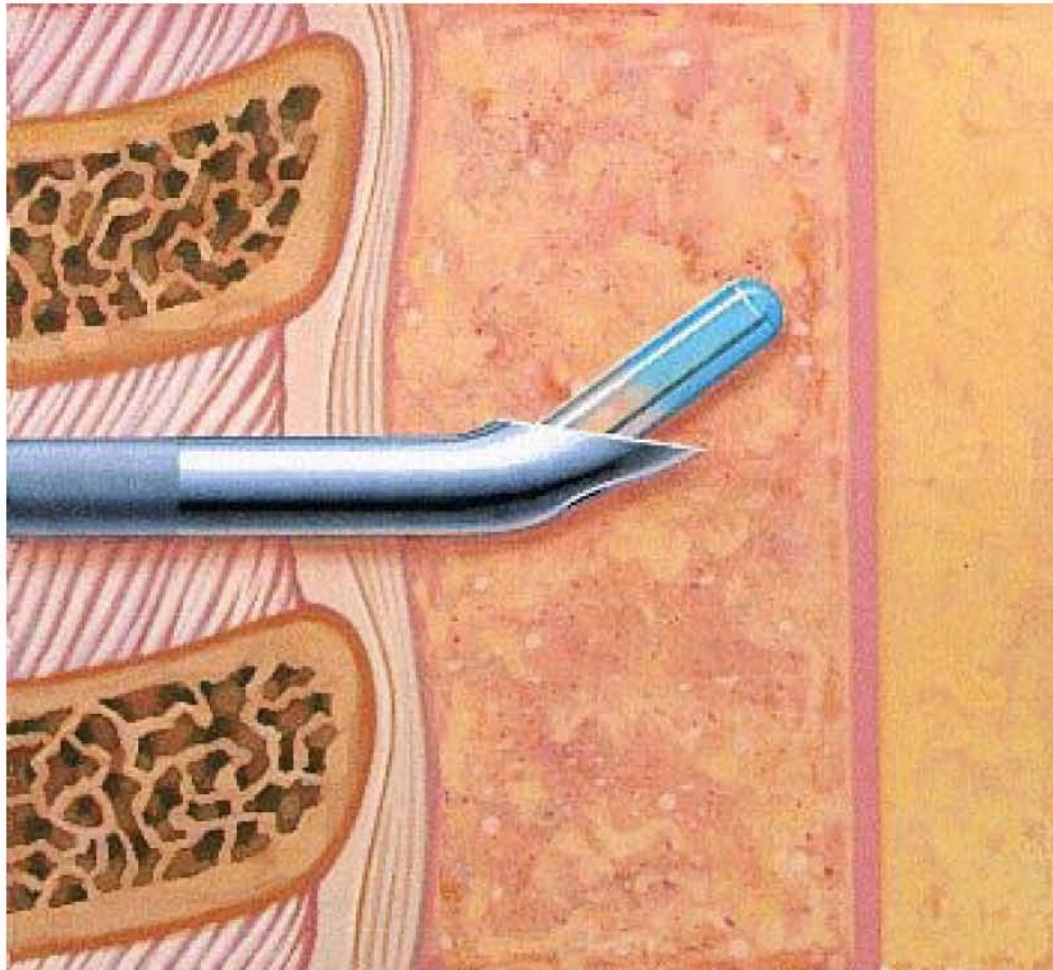
COMBINED SPINAL EPIDURAL



Espocan CSE Needle (B. Braun)

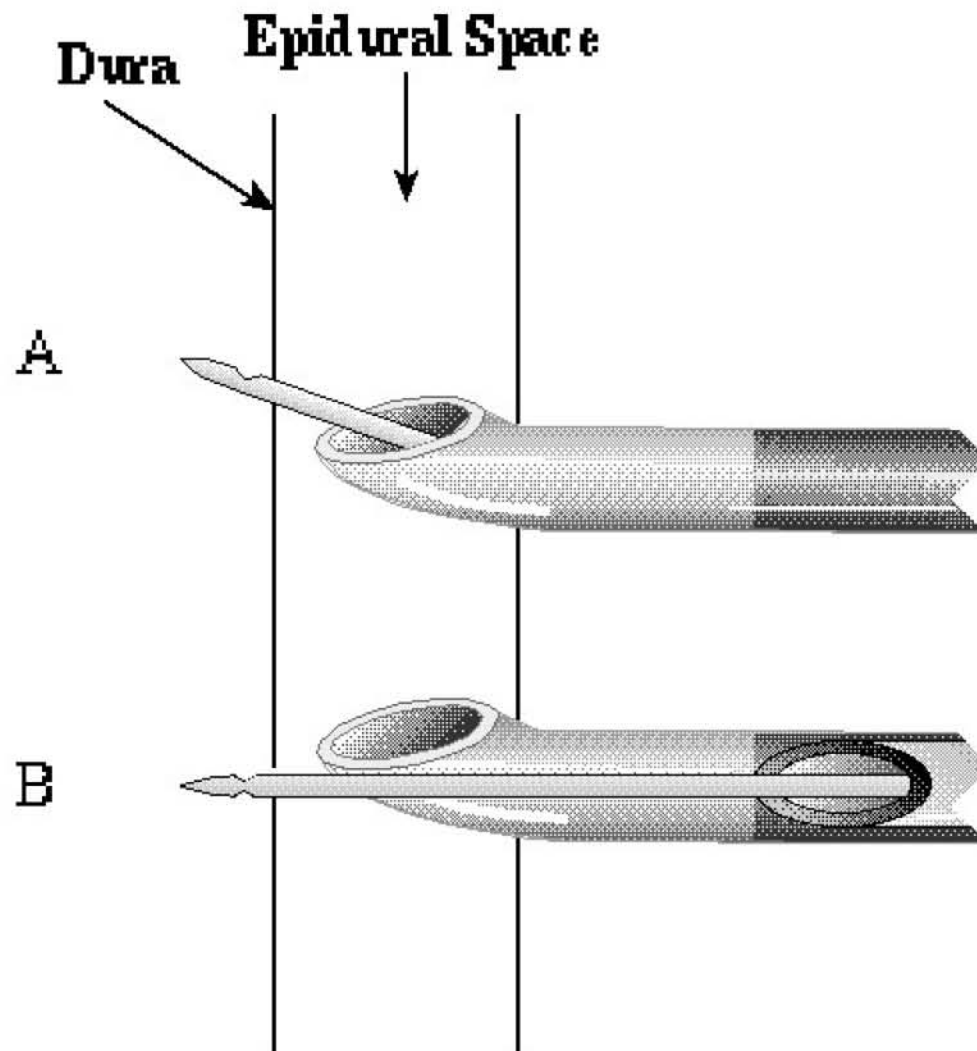


Espocan CSE Needle (B. Braun)



Eldor needle

etric.Anesthesia.fly





Maintenance of epidural analgesia can be achieved by:

- regular top-ups
- an epidural infusion
- patient-controlled epidural analgesia (PCEA).

Intermittent bolus injections:

- Bupivacaine: 0.125%-0.375%, 5-10 ml, duration: 1-2 hr
- Ropivacaine: 0.125%-0.25%, 5-10 ml, duration: 1-2 hr
- Lidocaine: 0.75%-1.5%, 5-10 ml, duration: 1-1.5 hr

Continuous Infusion of Dilute Local Anesthetic Plus Opioid

- Better pain relief while producing less motor block.
- Maternal and neonatal drug concentrations safe.

e with 2-3
without
2 ml/hour

Regimen

0.0625% - 0.08% bupivacaine
mcg /ml fentanyl, with or
epinephrine, infusing at 10-1

Patient Controlled Epidural Analgesia (PCEA)

Advantages:

- Flexibility and benefit of self administration
- Ability to minimize drug dosage
- Reduced demand on professional time



Disadvantages:

- May provide uneven block

Addition of a basal infusion provides:

- More even block producing greater patient satisfaction

Continuous Spinal Analgesia

- Use of spinal microcatheters restricted by FDA in 1992 due to reports of Cauda Equina Syndrome
- 28 or 32-G catheters for 22 or 26-G spinal needles
- Ongoing multi-institutional study with FDA approval for evaluating the safety and efficacy of delivering sufentanil and/or bupivacaine via 28-G catheters

Continuous Spinal Analgesia

- Results still preliminary but it appears safe for labor analgesia and may offer some advantages
- Some routinely use spinal macrocatheters through standard epidural needles for obese parturients or parturients with kyphoscoliosis



NEURAXIAL LABOR TECHNIQUES

Technique	Advantages	Disadvantages
Epidural anaesthesia	<ul style="list-style-type: none"> • Controlled onset reduces hypotension • Unlimited duration 	<ul style="list-style-type: none"> • Slow onset • Failure due to poor density of block and missed segments • Risk of postdural puncture headache (PDPH)
Single shot spinal anaesthesia	<ul style="list-style-type: none"> • Rapid and reliable • Good postoperative analgesia 	<ul style="list-style-type: none"> • Limited duration • Hypotension common
Spinal after epidural analgesia	<ul style="list-style-type: none"> • Improved reliability of anaesthesia compared to epidural 	<ul style="list-style-type: none"> • Incidence of high block
Combined spinal-epidural	<ul style="list-style-type: none"> • Combines advantages of spinal and epidural • Allows titration • Potential to reduce dose of anaesthetic 	<ul style="list-style-type: none"> • Increased technical time • Risk of PDPH
Spinal catheter	<ul style="list-style-type: none"> • Similar advantages to CSE • Rapid onset increments 	<ul style="list-style-type: none"> • Technically difficult • Unknown risk of PDPH cf. CSE

Neuraxial Opioids

- The following opioids have been used:
- Morphine, fentanyl, sufentanil, meperidine, diamorphine.

Opioid	Epidural Dose	Spinal Dose	Duration (h)
Morphine	2.5–5 mg	0.1–0.2 mg	18–24
Fentanyl	50–100 µg	10–20 µg	3–4
Sufentanil	10–20 µg	5–10 µg	3–4
Meperidine	25 mg		2–3

ANESTHESIA FOR CESAREAN SECTION



Anesthetic consideration

(Mendelson syndrome)

Prevention by premedication:

- 0.3M Sodium citrate 30 ml.
- H2 antagonist Oral/IV
 - Metoclopramide IV

Anesthesia for Cesarean Section

The choice of anesthesia depend on:

- The indication for the CS
- The urgency of the procedure
- The medical condition of the mother and the fetus
- The desire of the mother

Anesthesia for Cesarean Section

- GA associated with higher risk of airway problems .
- Incidence of failed tracheal intubation in pregnant women is 1 in 200 to 1 in 300 cases

Anesthesia 2000;55:690-4

- Maternal death due to anesthesia is the sixth leading cause of pregnancy related death in USA

Obstet Gynecol 1996;88:161-7

Anesthesia for Cesarean Section

- The risk of maternal death from complications of GA is 17 times as high as that associated with Regional anesthesia
- In USA the shift from GA to RA for CS resulted in decrease in anesthesia related maternal mortality from 4.3 to 1.7 per 1 million live birth

Anesthesiology 1997;94:277-94

Epidural anesthesia

- Advantage

- Titration (volume dependent, not gravity dependent), decreased likelihood of hypotension
- Incremental dose (for longer operation)

- Disadvantage

- Dural puncture : 1/200-1/500 in experienced hands, higher in training institution
- If unintentional dural puncture, PDPH incidence is 50-85%
- Slower onset

Spinal anaesthesia

- Hyperbaric bupivacaine 0.5% is the drug most commonly used for spinal anaesthesia for Caesarean section.
- Pregnant patients require a smaller dose than the nonpregnant population (why?)
- The dose used via a standard lumbar approach is typically 2.0–2.75 ml.

no significant correlation between age, height, weight, body mass index and length of vertebral column and the final block height achieved

Anesthesiology 1990; 72: 478–482.

Combined spinal epidural(CSE)

Combines the rapid onset and efficacy of the spinal technique with the ability to:

- Extend anaesthesia if surgery is prolonged
- Provide excellent postoperative epidural analgesia.

- [Combined Spinal Epidural](#)



Optimal Neuraxial Medication Combinations for Cesarean Delivery

Medication	Spinal	Epidural
Local anesthetic	Bupivacaine 12 mg (range 9–15)	Lidocaine 2%;
Fentanyl	15–35 ug	50–100 ug
Morphine	0.2mg	3.0 mg

General Anesthesia

- Used when
 - Patient refuses regional technique
 - Regional technique is contraindicated
 - Emergency C/S when there is inadequate/absent regional analgesia and to delay will cause undue risk to the fetus / mother

General Anesthesia

• Benefits

- Rapidly for emergency

• No hypotension

- For abnormal coagulogram

Adversed effects

- Aspiration
- Difficult ventilation & intubation
- Bleeding
- High mortality rate

Suggested Contents for Difficult Airway Management

1. Rigid laryngoscope blades and handles of alternate design and size
2. Endotracheal tubes of assorted size
3. Laryngeal mask airways of assorted sizes
4. At least one device suitable for emergency nonsurgical airway ventilation. Examples include retrograde intubation equipment, jet ventilation stylet or cricothyrotomy, the esophagealtracheal combitube.
5. Endotracheal tube guides. Examples include semirigid stylets, light wands.
6. Equipment suitable for emergency surgical airway
7. Topical anesthetics and vasoconstrictors

Difficult airway in obstetrics

Can you oxygenate the mother?: (mask, LMA)?

Yes

No

Can you ventilate the mother?

Yes

No

Is there severe fetal concern?

Yes

No

Continue

Awaken mother
Alternative anesthetic

Oxygenate the mother
Awaken the mother
Alternative anesthetic

Anesthesia: Effects on the fetus

- Avoid hypotension, hypoxia, acidosis, hyperventilation
- Limit time between uterine incision and delivery to less than 3 minutes
- Infants exposed to GA have lower Apgar at one minute but no difference at 5 mins
- No significant alteration in neurobehavioral scores with regional techniques

Complications



Complications of regional anesthesia

Post Dural Puncture Headache (PDPH)

- severe, disabling fronto-occipital headache with radiation to the neck and shoulders.
- present 12 hours or more after the dural puncture
- worsens on sitting and standing
- relieved by lying down and abdominal compression.

Complications of regional anesthesia

PDPH syndrome

1. Photophobia
2. Nausea
3. Vomiting
4. Neck stiffness
5. Tinnitus
6. Diplopia
7. Dizziness



Complications of regional anesthesia

Differential diagnosis of post-dural puncture headache in the obstetric patient:

1. Non-specific headache
2. Caffeine-withdrawal headache
3. Migraine
4. Meningitis
5. Sinus headache
6. Pre-eclampsia
7. Drugs (amphetamine, cocaine)
8. Pneumocephalus-related headache
9. Intracranial pathology (hemorrhage, venous thrombosis)

Complications of regional anesthesia

Management of PDPH

Conservative:

- Bed rest
- Encourage oral fluids and/or intravenous hydration
- Caffeine - either i.v. (e.g. 500mg caffeine in 1 litre of saline) or orally
- Regular Analgesia
- Reassurance

Complications of regional anesthesia

Management of PDPH

Others

1. Theophylline
3. Sumatriptan
4. Epidural saline
5. Epidural dextran
6. Subarachnoid catheter
7. Epidural blood patch

Complications of regional anesthesia

Cardiovascular complications

- Hypotension
- Bradycardia

Effects on the course of labour and on the fetus

Complications of regional anesthesia

Neurological complications

- Needle damage to spinal cord, cauda equina or nerve roots.
- Spinal haematoma
- Spinal abscess
- Meningitis and Arachnoiditis
- Neurotoxicity

Complications of regional anesthesia

Miscellaneous

- Venous puncture e.g. of dural veins
- Catheter breakage
- Extensive block (including unplanned blocks)
- Shivering
- Backache - Long-term backache is not a complication of neuraxial techniques although there will always be some local bruising.

Complications of regional anesthesia

Drug side effects

- Nausea and vomiting (opiates)
- Respiratory depression (opiates)
- Anaphylaxis
- Toxicity (including intravascular injection of local anaesthetics)

Toxicity of local anaesthetics:

Causes:

- An overdose of local anaesthetic is given,
- Large dose of local anaesthetic is inadvertently given intravenously.

The recommended protocol is

- Take a 500 ml bag of intralipid 20% and immediately give a 100 ml bolus over 1 minute

Toxicity of local anaesthetics

- Infuse at a rate of 400 ml over 20 minutes
- Give two further boluses of 100 ml at 5-minute intervals if Circulation is not restored
- Continue infusion at a rate of 400 ml over 10 minutes until stable circulation is restored.

Airway, ventilatory and cardiovascular support should be maintained via standard protocols. It may be >1 hour before recovery

Complication

- Failed intubation
- Pulmonary aspiration
 - Hypoxia bronchospasm
- Amniotic fluid embolism

Conclusion

“The delivery of the infant into the arms of a conscious and pain-free mother is one of the most exciting and rewarding moments in medicine.”

Moir DD. Extradural analgesia for caesarean section. Br J Anaesth 1979; 51: 1093.



Thank you