

Relief of pain during labor & ECBOLICS

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Pain Pathways

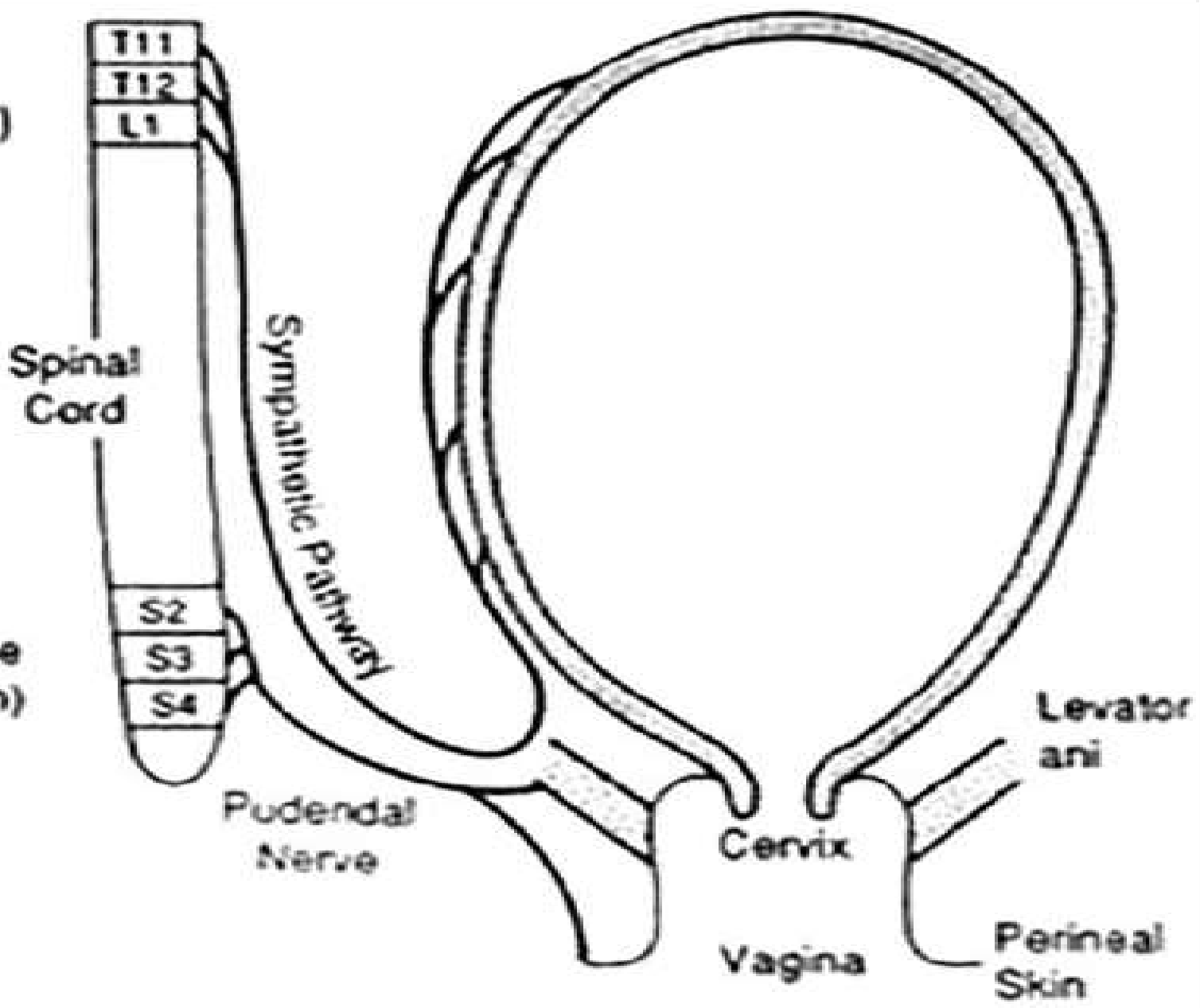
* **During the 1st stage of labor**, pain results from both **cervical dilatation & uterine contractions** → (myometrial ischemia).

The pain travels from the uterus → visceral afferent (sympathetic) nerves → the spinal cord (through the posterior segments of thoracic spinal nerves, T10-T12).

So, pain in the 1st stage is **visceral pain**.

* **Pain during the 2nd stage of labor** results primarily from **distension of the pelvic floor, vagina & perineum by the presenting part of the fetus** → sensory fibers of sacral nerves, S2-S4 (pudendal nerve). So, pain in the 2nd stage is **sacral somatic pain**. The sensation of uterine contractions also contribute, but is probably 2ry.

First Phase
(Visceral Pain)



Second Phase
(Somatic Pain)

Labor pain pathways

Relief of pain during labor

SUPPORTIVE (NONPHARMACOLOGIC) TECHNIQUES

There are many effective and helpful ways of reducing the amount of pain felt with contractions. The effect varies from woman to woman and often a combination of techniques are used.

The advantage of these methods includes the avoidance of medications, they are easy to do, and give personal satisfaction. **Some of these techniques are:**

- **Childbirth preparation classes**: learning about childbirth has been proven to decrease anxiety. These courses teach breathing exercises that decrease labor pain.
- **Help from a support person**: either a partner or coach is very valuable to help with the patient comfort and emotional support throughout the labor experience.
- **Touch and massage** including the use of creams and oils, heat and cold, and counter pressure.
- **Being active during labor** rather than staying in bed. Position changes like walking, squatting, sitting, the hands and knees position can all be helpful.
- **Pleasant surroundings** with the use of music, dim lights
- Use of a warm water bath or shower may help reduce labor pain.
- **Hypnosis and acupuncture** may be helpful in some women during labor.

Relief of pain during labor

MEDICATIONS (PHARMACOLOGIC TECHNIQUES)

Narcotics used for labour:

1. **Morphine (natural)** : is given through an intravenous (IV) infusion or it can be injected SC or IM. Pain relief takes effect **within 5 - 30 minutes and lasts 4 - 6 hours**.

2- **Meperidine HCL (Pethidine)** ; a synthetic narcotic analgesic. It should be avoided if delivery is anticipated within 2 hours after administration as it depresses the fetal respiratory center. When given IM, it is effective in **20 minutes & its effect lasts 2-3 hours**. The initial dose is 100-150 mg & can be repeated as needed during the 1st stage

Antidote: Naloxone that should be given to the depressed infant in a dose of 0.1 mg/kg IV , to be repeated as necessary

3. **Fentanyl (synthetic)**: is a shorter acting narcotic, given as a single dose. Pain relief takes effect within **2 - 3 minutes and lasts 30 - 60 minutes**.

Relief of pain during labor

MEDICATIONS (PHARMACOLOGIC TECHNIQUES)

Inhalation analgesia, especially **ENTONOX** (50% oxygen 50% nitrous oxide) is widely used as it is non-irritant, inert, non-toxic, with rapid onset and short duration.

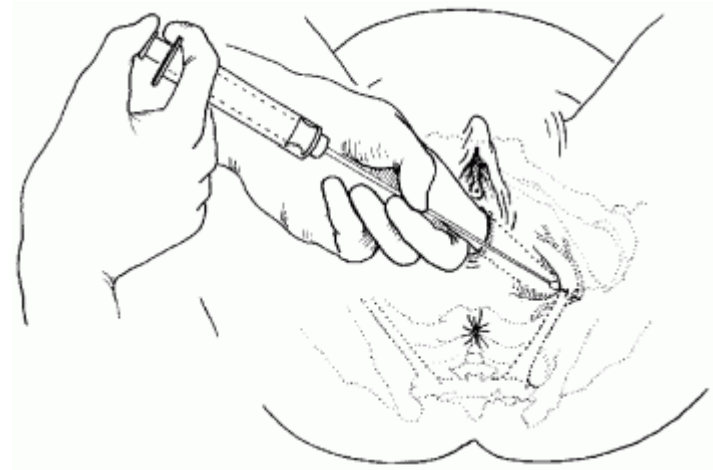




Peripheral nerve block

Pudendal nerve block

This form of analgesia of the perineum can be very useful in **the second stage of labor** and should be considered when other regional analgesia is not available. Local anesthetic, such as lignocaine with epinephrine, allows administration of larger volumes with greater effectiveness and limits systemic levels in the mother and transfer to the fetus. Pudendal block is especially useful for forceps-assisted operative delivery. The block may be administered via the vagina or via the perineum. Both approaches are easily learned.



Perineal infiltration

Generous and widespread infiltration of lignocaine should be used. Use of an agent with epinephrine is helpful. Care should be taken not to inject intravascularly and the toxic dose of the agent being used must be known.

Regional Anesthesia

Regional Anesthesia involves techniques that block pain nerves from the uterus and birth canal with the use of local anesthetics. Options for labour include **epidural, spinal, and combined spinal and epidural (CSE) techniques**. Regional anesthesia is very effective for pain control during labor. These methods can affect mobility and emptying of the bladder. A Foley Catheter is commonly required when an epidural or spinal anesthesia is used in labor.

Regional Analgesia

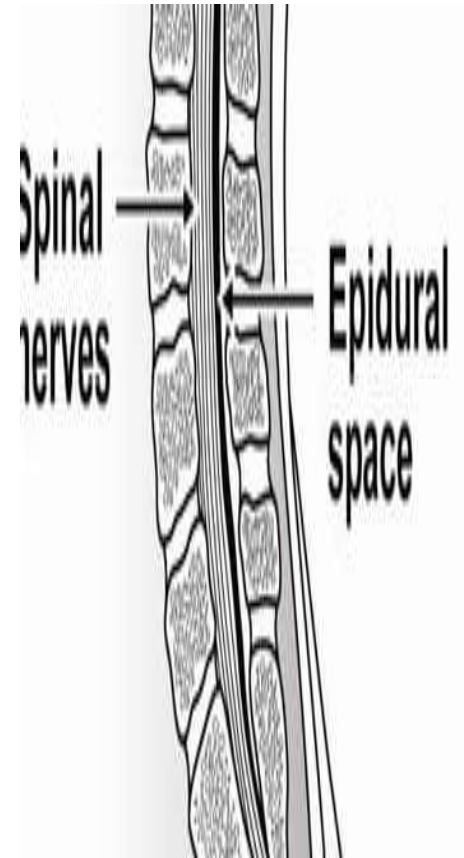
1- Epidural

The local anesthetic is injected into the epidural space by insertion of a canula at L2/3 or L3/4.

Epidurals provide excellent pain relief in labor. If there is a need to deliver the baby with forceps or by cesarean section, the epidural may be used for anesthesia for these procedures.

It should not start until labor is established & the cervix is at least 3 cm dilated.

Side effects may occur, the most important is transient hypotension & respiratory depression.



Epidural analgesia

Indications of epidural analgesia (3Ps):

1- **Hypertensive states of pregnancy without coagulopathy.**

- It decreases sympathetic overactivity.
- corrects vasoconstriction → ↑ placental perfusion.
- prevents convulsions.
- Its use obviates the need for general anesthesia with difficult intubation with laryngeal edema.

2- **Trial of scar** as it does not mask tender scar as it blocks the pain of uterine contractions more than pathological pain.

3- **Preterm labor** as it is less stressful, traumatic or dangerous to the newborn.

It is contraindicated if there is coagulation disorder, local or general sepsis , hypovolemia , or lack of trained staff..

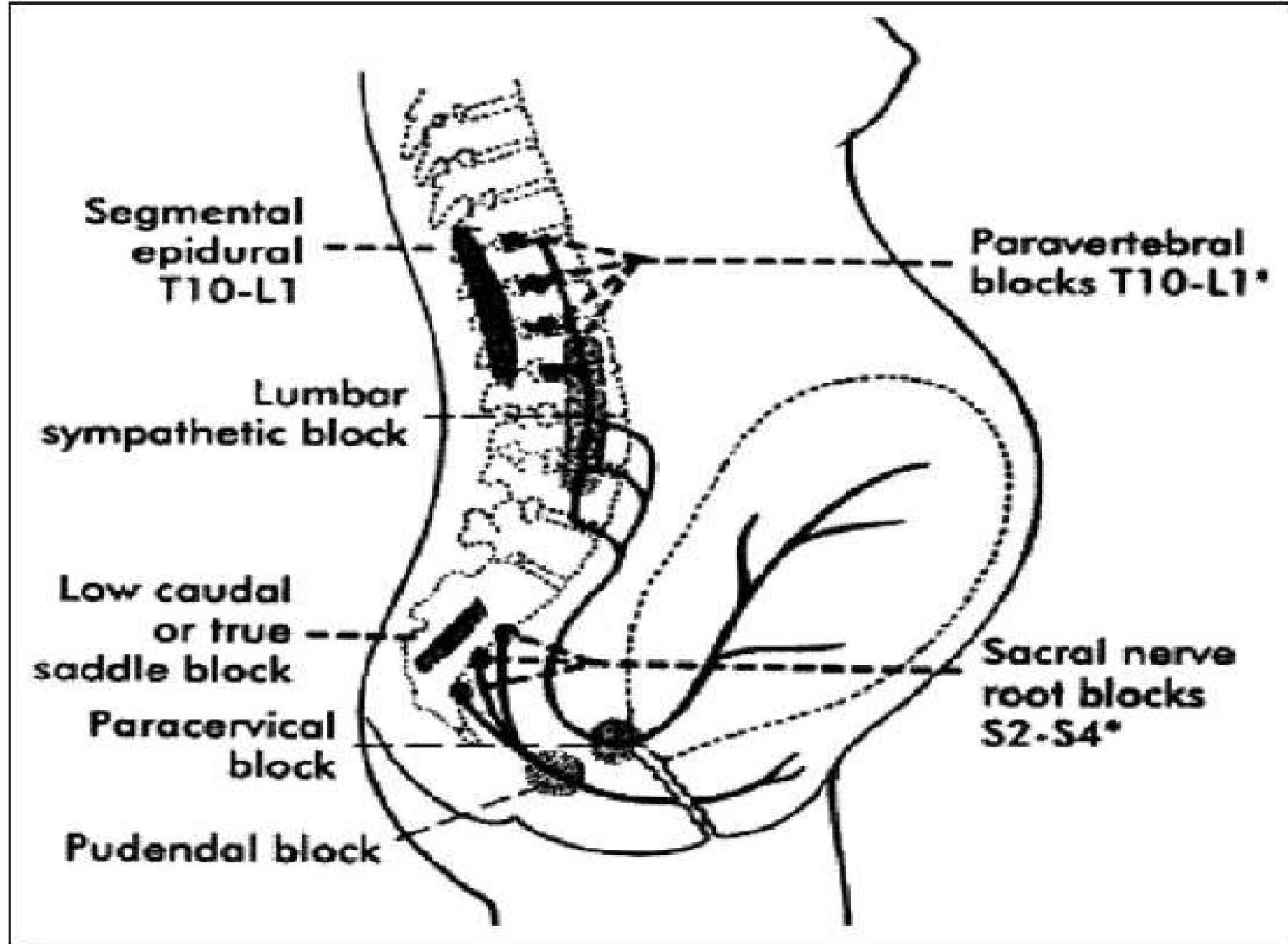
2-Spinal anesthesia

In spinal anesthesia a small amount of local anesthetic and/or narcotic is injected into the fluid surrounding the spinal nerves.

Pain relief is very rapid but only lasts a few hours. As there is no catheter inserted in this technique, a continuous infusion of medication is not possible. Spinal anesthesia is effect is limited ̈ usually reserved for CS as its to 1 - 2 hours.

3-Combined Spinal and Epidural (CSE)

A CSE is similar to an epidural except a spinal injection is given before the epidural catheter is placed.



Regional techniques for labour analgesia

General Anesthesia

This is reserved for emergency situations during vaginal deliveries (instrumental delivery or entrapment of the after-coming head in breech delivery) and for some caesarean sections.

Advantages: rapidly administered, low incidence of hypotension, appropriate for women with **hypovolemia** & women at high risk of **hemorrhage**.

Disadvantages: Higher incidence of aspiration, neonatal depression & PPH (due to uterine relaxation)

Options for anesthesia for CS

1- **General endotracheal anesthesia**; is most often used in emergencies as in severe fetal distress.

2- **Major conduction (spinal or epidural)**: There is less fetal exposure to drugs.

Recently spinal anesthesia has reemerged as the preferred choice for abdominal delivery when a parturient does not have an epidural block in place, because of quicker onset, higher success rate & dense sensory block.

UTERINE STIMULANTS ॐ

(ECBOLICS)

ECBOLICS (UTERINE STIMULANTS)

These are agents that induce and/ or maintain uterine contractions.

The commonest of them in current use are:

*Oxytocics and analouges

-Oxytocin

-Carbetocin

*Ergot alkaloids

Ergometrine(Ergonovine),Methylergometrine•

*Prostaglandins

PGE2, PGF2a, 15-MethylPGF2a, PGE1
analouge(Misoprostol)•

1-OXYTOCIN

Physiology

- Post Pit → Oxytocin and Vasopressin
 - Synth. In hypothalamus → Transported and stored in post. Pitutary
 - Released after distension of the cervix and vagina → birth
 - Stimulation of the nipples → breastfeeding, (Letdown or milk ejection reflex)*

OXYTOCIN

Types

-Posterior pituitary extract: which is composed of; oxytocin or pitocin and vasopressin which has vasopressor and antidiuretic action. It is not used in obstetrics as it may cause **coronary spasm**.

-Synthetic oxytocics:

*Oxytocin (Pitocin): a purified posterior pituitary extract.

*Syntocinon: synthetic oxytocin.

OXYTOCIN

Mode of Action

*Oxytocics act on the pregnant uterus within 1 minute if injected IV, within 2 minutes if injected IM and **its action lasts for 30 minutes.**

*They cause **initiation** and **increase** in frequency, strength and duration of uterine contractions.

*They are more effective with the advancement of pregnancy.



OXYTOCIN

Routes of Administration

- ***IV drip** is the most common use.
- ***IV pump** using an electronic pump: is the most accurate for calculation of the infused dosage.
- ***IM and IV bolus** may be given postpartum.
- ***Direct intramyometrial:** during caesarean section.
- ***Nasal spray:** to help evacuation of the engorged breasts

Pharmacokinetics

-Not used orally

- Administered by i.v, i.m, rarely nasal route.
- Not bound to plasma proteins- $t_{1/2}$ - 2 -5 hrs
- **Metabolized in liver and kidney**

Pharmacological Actions

Uterus: • Sensitivity increases as pregnancy progresses-9 fold [early&nonpregnant-resistant]

- Receptors increase- 30 times
- Estrogen facilitates, progesterone inhibits
- Lower segment not contracted
- Small doses→Frequency and force of uterine contractions ,but large doses→Sustained contraction

Breast • • Mammary alveoli-myoeperithelial cells→contraction
→ milk ejection

CVS • Hypotension

Kidney • ADH like action

Brain • Neurotransmitter.

Clinical uses of Oxytocin

- Inevitable, incomplete and missed abortions.
- Evacuation of vesicular mole
- Oxytocin challenge test to assess placental insufficiency.

To induce, augment labor in

- 1.Premature rupture of membranes
- 2.Isoimmunization
- 3.Placentalinsufficiency
- 4.Toxemia, post maturity, DM.

Verify fetal lung maturity,

Exclude Position abnormalities, CPD, fetal distress etc.

Monitor fetal HR

Look for fetal, maternal distress, ut.scar

Other uses

- Third stage of labor,
- puerperium:(Postpartum hemorrhage) 5 IU i.m or i.v infusion
- Breast engorgement: Nasal spray before suckling

Contraindications

- 1-Previous uterine scar as C.S, hysterotomy or open uterus metroplasty.
- 2-Grand multipara.
- 3-Some malpresentations as shoulder and brow presentations.
- 4-Contracted pelvis.
- 5-Fetal distress and placental insufficiency
- 6-Incoordinate uterine actions.

Complications

1-Rupture uterus.

2-Foetal distress and asphyxia.

3-Constriction ring and hypertonic inertia.

4-Amniotic fluid embolism.

5-Water intoxication due to its antidiuretic effect and the large amount of IV fluids when given as a drip.

6-Coronary spasm if the crude posterior pituitary extract was used

Carbetocin

*Carbetocin: It is a long acting synthetic analogue of oxytocin with agonist properties.

*It differs from oxytocin in having greater biological effect and 4-10 times longer average half life(40minutes). It is also more heat stable than oxytocin.

Carbetocin (cont.)

- Carbetocin binds to oxytocin receptors in the uterine smooth muscles → rhythmic contractions, ↑ frequency of existing contractions & ↑ uterine tone.

Carbetocin (cont.)

Pharmacokinetics:

-IV→ sustained uterine contractions within 2 min, lasting for about 6 min & followed by rhythmic contractions for 60 min.

-IM→ sustained uterine contractions lasting for about 11 min & rhythmic contractions for about 120 min .



Carbetocin (cont.)

Uses:

Carbetocin is NOT currently recommended for obstetric indications other than **prevention of postpartum hemorrhage**. So, it is not recommended for labor induction, labor augmentation or treatment of postpartum hemorrhage.

It is administered as a single dose of 100 micrograms either as IV bolus or IM

2-Ergometrine and Methyl ergometrine

- Amine ergot alkaloid and methyl derivative.
- Increase force, frequency, duration of ut.contractions
- Moderate increase of dose→Basal tone increased
- Lower segment also contracts.

It induces sustained uterine contraction lasts for 3-4 hours.

- Methyl ergometrine more potent action on uterus and less on CVS, CNS, GIT etc.

Routes of Administration

Route	Dose	Onset of action
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Oral	1 mg	7 min
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Oral	1 mg	7 min
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Oral	1 mg	7 min
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IM	0.5 mg	4 min
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IM	0.5 mg	4 min
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IM	0.5 mg	4 min
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IV	0.25 mg	1 min
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IV	0.25 mg	1 min
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IV	0.25 mg	1 min
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Syntometrine

Syntometrine

Is a combination of 5U syntocinone and 0.25 mg methergin given only IM

Uses

- Inevitable and incomplete abortions
- PPH→
 - ☐Prevention→0.2-0.3 mg i.m after anterior shoulder delivery or immediately after delivery of the fetus (Active management of the 3rd stage of labor)
 - ☐Treatment→0.5 mg i.v
 - ..Prevent uterine atony [CS, instrument]
- To promote involution of the uterus in multipara→ 0.125mg TDS -7days

Contraindications

- Before delivery of the foetus as it will cause foetal asphyxia and rupture uterus.
- Cardiac disease.
- Hypertension

Adverse Effects

- Methyl ergometrine less toxic

☐ Nausea, vomiting, rise in BP.

☐ Decreases milk secretion

Complications: In abuse only;

- Rupture uterus.
- Constriction ring.
- Foetal asphyxia.
- Hypertension.
- Retained placenta

Why oxytocin? Why not ergometrine?

1. Short t $\frac{1}{2}$
2. Normal relaxation of uterus allowed-Good fetal oxygenation
3. Lower segment not affected-descent free
4. Consistent augmentation in ut.inertia

3-PROSTAGLANDINS

Nature

PGs are naturally occurring unsaturated fatty acids present in different body fluids and tissues as the seminal fluid, endometrium, amniotic fluid, lungs and brain.

PGs result from the action of PG synthetase enzyme on arachidonic acid.

Prostaglandins

Preperations

- Misoprostol; PGE1 analouge
- • PGE2(Dinoprostone) → Vaginal application
→ Induce II trimester abortion, missed abortion,
ripening of cervix in near term
- 15-Methyl-PGF2 α (Carboprost)

PROSTAGLANDINS

Obstetric Actions

- *Ripening of the cervix: Natural and synthetic PGs can ripen the cervix at any stage in pregnancy by inducing collagen breakdown and tissue hydration.
- *Initiation and/or stimulation of uterine contractions: at any stage of pregnancy

Obstetric Indications Of Prostaglandins

- Induction of abortion.
- Induction of labor.
- Treatment of postpartum haemorrhage

Routes of Administration Of Prostaglandins

Intramuscular: PGF₂α 15-methyl (Prostin 15 M) 250m g/2 hours.

Intravenous: PGF₂α 0.25m g / minute.

Oral: PGF₂α (Prostin tablets 0.5 mg) 0.5-1 mg/ hour & Misoprostol

Vaginal tablets: PGE₂ 3 mg & misoprostol.

Vaginal gel: PGE₂ 1-2 mg.

Endocervical gel: PGE₂ 0.5 mg.

Extra-amniotic gel: PGE₂ 400-500m g.

Intramyometrial: PGF₂α 1 mg.

Intra-amniotic and extra-amniotic PGF₂a: see induction of abortion

Sublingual &rectal : Misoprostol

Misoprostol

Usual Adult Dose for Labor Induction

25 mcg vaginally every 4 to 6 hours.

Usual Adult Dose for Postpartum Bleeding

Prophylaxis: 400 to 600 mcg orally or rectally after delivery of the baby, but before delivery of the placenta.

Usual Adult Dose for Cervical Ripening

Before surgical abortion: 400 mcg vaginally, 3 to 4 hours before suction curettage.

Usual Adult Dose for Abortion

First Trimester of Pregnancy: 400 mcg orally once as a single dose 48 hours after mifepristone administration. Alternatively, 800 mcg vaginally 48 hours after mifepristone administration. When used with methotrexate, 5 to 7 days later give 800 mcg vaginally (misoprostol dose may be repeated 24 hours later if needed).

Misoprostol (Cont.)

In Failed Pregnancy or Fetal Death: 800 mcg vaginally once or twice (doses given 24 hours apart).

Second Trimester of Pregnancy: 600 mcg vaginally, 36 to 48 hours after mifepristone administration, followed by 400 mcg orally or vaginally every 3 hours to a maximum of 5 doses in the first 24 hours.

Third Trimester of Pregnancy - Fetal Death: 100 mcg vaginally every 12 hours.

Usual Adult Dose for Gynecologic Surgery

Study (n=204) - Operative hysteroscopy: 400 mcg orally 12 to 24 hours before surgery.

Complications

- Nausea.
- Vomiting.
- Diarrhoea.
- Flushing.
- Tachycardia.
- Pyrexia.