Obstetric analgesia and anesthesia

Introduction:
Although the provision of analgesia in childbirth varies between cultures, its provision is the key element of the modern management of labour.

I- Non-pharmacological methods:
This includes the following:

a- One-to-one care in labor from a midwife or effective birth partner has been shown to reduce the need for analgesia.

b- Relaxation and breathing exercise may help the women to manage her pain. Prolonged hyperventilation can make the woman dizzy and can cause alkalosis

c- Acupuncture and hypnosis are sometimes employed, but their use has not been associated with a significant reduction in pain scores or with reduced need for conventional methods of analgesia, and they are probably not widely applicable.

d- Relaxation in the warm water during the first stage of labour often leads to the sense of well-being and allows women to cope much better with pain. The temperature of the water should not exceed 37.5°C. Clearly, women in labor cannot use an opiate nor have an epidural sited while in water.

e- Transcutaneous electrical nerve stimulation (TENS): electrical impulses are applied to the skin via flexible carbon electrodes from a battery-powered stimulator. TENS works on the principle of blocking pain fibers in the posterior ganglia of the spinal cord by stimulation of afferent fibers. Electrodes are placed over T10-L1 in first stage and S2-S4 in second stage of labor.
It has been shown to be ineffective in reducing pain scores or the need for other forms of analgesia. It does not have any adverse effects, but is often disappointing. It may still be of use in the latent phase of labour.

**II- Pharmacological agent:**

**a- Opiates or opioid analgesia:**

Opiate such as pethedine and diamorphine, are still used in most obstetric units and indeed can be administered by midwives without involvement of the medical staff. This may be one reason for their popularity. Its analgesic efficacy is limited, although sedation is almost invariable, pethedine given in dose of 100 mg i.m.

- All opioids can cause decreased Apgar score and neonatal respiratory depression, even when administered many hours before birth.
- Neonatal respiratory depression is readily reversible with nalaxone, a specific opioid antagonist. The neonatal dose is 10 microgram/Kg i.m., repeated if necessary.
- Maternal gastric emptying is inhibited and the incidence of nausea and vomiting increased. An anti-emetic (e.g. cyclizine 50 mg or prochlorperazine 12.5 mg) should be given i.m. with the chosen opioid
- Reduction in baseline cardiotochograph CTG variability can make interpretation difficult.
- Possible interference with breast feeding.

**b- Patient-controlled analgesia:**

Opiates tend to be given as intramuscular injections; however, an alternative is a subcutaneous or intravenous infusion by a patient-controlled analgesic device (PCA). This allows the women, by presenting a dispenser button, to determine the level of analgesia that she requires. If a very short-acting opiate is used, the opiate doses can be timed with contraction.

This method is particularly useful in women with thrombocytopenia or other hematological reasons for avoiding regional analgesia or i.m.
injection. Despite a slower onset of action and less rapid clearance, fentanyl is perhaps the drug of choice, by 20-30 microgram bolus and 5 min. lockout period.

c- **Inhalational analgesia:**
An equal mixture of nitrous oxide and oxygen 50:50 is marketed as Entonox and Equanox, is used on most labour wards. It has quick onset, a short duration of effect, and is most effective than pethidine. It may cause light-headedness and nausea. It’s not suitable for prolonged use from early labour because hyperventilation may result in hypocapnoea, dizziness and ultimately tetany and fetal hypoxia. It is most suitable later on in labour or while awaiting epidural analgesia.

d- **Epidural analgesia:**
Epidural (extradural) analgesia is the most reliable means of providing effective analgesia in labour.
Before an epidural have been sited, the women must be informed about the risks and the benefits. It’s important to warn the woman that she may temporarily lose sensation and movement in her legs, and the intravenous access and a more intensive level of maternal and fetal monitoring will be necessary for example continuous CTG. Epidural analgesia does not increase the Caesarean section rate but it leads to prolongation in the duration of the second stage of labour.

**Indications:**
1- The main indication is for effective pain relief.
2- Prolonged labour.
3- Maternal hypertensive disorder.
4- Multiple gestations.
5- Certain maternal medical condition.
6- A high risk of operative intervention.
Contraindications:
1- Coagulation disorder.
2- Local or systemic sepsis.
3- Hypovolaemia.
4- Insufficient number of trained staffs (both anesthetic and midwifery).
5- Other relative contraindications includes:
   a- Scar tissue from previous vertebral surgery may make identification of spaces difficult, but not precludes the use of epidural.
   b- Subcutaneous LMWH in less than 12 hours is another relative contraindication.

Complications:
1- Accidental Dural puncture: should occur in no more than 1% of cases. If epidural space is accidentally reached with epidural needle, there is a risk that the hole is left afterward in the dura will be large enough to allow the leakage of cerebrospinal fluid. This result in a ‘spinal headache’. This is characteristically experienced on the top of the head and is relieved by lying flat and exacerbated by sitting upright. Treatment is by giving analgesic and taking plenty of fluid like water, tea and coffee. If the head is sever or persistent, a blood patch may be necessary. This involves injecting a small volume of the women’s blood into the epidural space at the level of the accidental Dural puncture. The resulting blood clot is thought to block off the leak of CSF.
2- Accidental total spinal anesthesia (injection of drug into the subarachnoid space), causes severe hypotension, respiratory failure, unconsciousness and death if not recognized and treated immediately. The mother requires intubation and ventilation and circulatory support. Hypotension must be treated with intravenous fluids, vasopressors and left lateral position, although urgent delivery of the baby may be required to overcome aortic-caval compression and so permit maternal resuscitation.
3- Spinal hematoma and neurological complications are rare.
4- Drug toxicity can occur with accidental placement of a catheter within a blood vessel.
5- Bladder dysfunction can occur if the bladder is allowed to overfill because the woman is unaware of the need to micturate. To avoid this catheterization of bladder should be carried out.
6- Hypotension is now an uncommon complication of epidural, but more common with spinal. It can be rectified easily with fluid boluses, but may need vasopressors. Occasionally
7- Short term respiratory depression of the baby is possible because all modern epidural solutions contain opioid which reach the maternal circulation and may cross the placenta.

**Technique:**
1- The woman’s back is cleansed and local anesthetic is used to infiltrate the skin.
2- The woman is positioned in extreme left lateral position or sat up but leaning over, flexion at the hip and upper spine help to open the space between vertebral bodies of the lumbar spin.
3- The catheter is normally inserted at the L2-L3, L3-L4 or L4-L5 interspace and should come to lie in the epidural space, which contains blood vessels, nerve roots and fat.
4- The catheter is aspirated to check for position and if no blood or CSF is obtained a ‘test dose’ is given to confirm the catheter position. This test dose is small volume of dilute local anesthetic that would not be expected to have any clinical effect. If it has no any effect of lower limb sensation the catheter is correctly placed. If, however, there is sensory block the catheter has been inserted too far in subarachnoid (spinal) space.
5- If it’s correctly placed, 5 minutes after test dose injection, a loading dose can be administered. The epidural solution is usually a mixture of low-concentration local anesthetic (e.g. 0.0625-0.1 percent pubivacaine) with an opioid such as fentanyl.
6- The mother should be kept in right or left lateral position and blood pressure checked every 5 minutes until 15 minutes. A fall in blood pressure may result, this hypotension is usually short-lived, but may cause fetal bradychardia, this should be treated by intravenous fluid and sometime vasoconstrictors liker ephedrine.

7- The mother should never lie supine as aorto- caval compression can reduce maternal cardiac output and compromise placental perfusion

Local analgesia can be maintained throughout labour with either intermittent boluses or continuous infusions. Women should be encouraged to move around and adopt whichever upright position suits them best. Full mobility is unlikely. Regional analgesia should be continued until after completion of the third stage of labour, including repair of any perineal injury.

e- Spinal anesthesia:
A spinal block is considered more effective than that obtained by an epidural, and is of faster onset. A fine gauge a traumatic spinal needle is passed through the dura and into the subarachnoid space, which contain the CSF.
A small volume of local anesthetic is injected after that the spinal needle is withdrawn. This may be used as the anesthetic for Caesarean section, trial of instrumental deliveries (in theater), manual retained placenta and repairs of the difficult perineal and vaginal tears. Spinal are not used for routine analgesia in labour.

f- Combined spinal-epidural analgesia has gained in popularity. This technique has the advantage of producing a rapid onset of pain relief and the provision of prolonged analgesia. CSE analgesia entails an initial subarachnoid injection of fentanyl mixed with small amount of local anesthetic. The spinal injection makes the onset of analgesia considerably faster (5 minutes as opposed to atleast
20 minutes with epidural). The resulting motor block is sufficiently minimal for women to retain sufficient muscle power to walk in labour.

**Anesthesia for Caesarean section:**
The type of anesthesia used is depending on the urgency of CS; however, spinal anesthesia is used in most obstetric unit even in urgent CS.
When fetal compromise is a cause for CS the anesthetist should involve in in-utero resuscitation by:
- Syntocinon off.
- Position: full left lateral.
- Oxygen
- Intravenous fluid: crystalloid.
- Low blood pressure: e.g. i.v. vasopressor.
- Tocolysis: subcutaneous terbutaline 250 microgram.

**Antacid prophylaxis:**
Fasting interval for 6 hours for food and 2 hours for fluids (tea/coffee with semi-skimmed milk, or fruit squash) are appropriate for women scheduled for elective caesarean section. Ranitidine 150mg should be prescribed for 2 hours before an elective operation and administered 8-hourly to all women in labour who are at risk of CS. Administration of a 30 ml of sodium citrate immediately before CS is almost universal practice, as the risk of aspiration of gastric content is not contributed to general anesthesia alone.

1- **Regional anesthesia for CS:** is the most popular technique for anesthesia in CS because here a pencil-point tip needles. This is associated with less leakage of CSF and a lower incidence of headache. Hypotension is best avoided by:
- Strict avoidance of aorto-caval compression.
- Rapid infusion of crystalloid immediately after intrathecal injection.
- Prompt boluses or infusion of vasopressor.

**Level of injection:** Spinal anesthesia should not be inserted higher than the L3–L4 interspinous space—practically, the space at or immediately above a line joining the highest points of the iliac crests.

**Dose of local anesthetic:** in most units 0.5 per cent hyperbaric bupivacaine is used. The obstetrician must clarify with the anesthetist that it is appropriate to start surgery.

**Spinal anesthesia and pre-eclampsia:** pre-eclampsia is no longer a contraindication to spinal. Good control of blood pressure by methyldopa or hydralazine is good in avoiding problematic hypotension.

**Placenta praevia and ante partum hemorrhage:** regional anesthesia has been associated with reduced estimated blood loss and transfusion requirement at CS. However, a women with placenta praevia who are at risk of severe intraoperative bleeding is not a good candidate for spinal. In general any woman who has bled and is pale and tachycardia is not suitable for regional anesthesia regardless of the blood pressure. Regional anesthesia is totally inappropriate for interventional radiological management of bleeding.

2- **General anesthesia for CS:**

GA may be indicated for emergency CS and for other cases for which a regional block is absolutely contraindicated like uncorrected coagulopathy or has failed

GA is associated with the following complications:
- Airway problems (e.g. failed tracheal intubation).
- Aspiration of gastric contents.
- Anaphylaxis (principally to succinylcholine).

In the event of anaphylaxis, adrenaline (epinephrine) is likely to improve rather than reduce uteroplacental blood flow.

GA is reversible for the baby, provided maternal oxygenation and normocarbia are maintained, aorto-caval compression is avoided and a pediatrician is present to support neonatal ventilation.