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Anaesthesia and Analgesia for Labour and Vaginal Delivery for safe Obstetric Practice.

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Abstract

Background: Labour pain is one of the most intense pains that a woman can experience in her life, worse than the pain of deep cut, caused by the distension and stretching of fibres from lower uterine segment, and tearing of tissues in the vagina and perineum in an effort to expelled the foetus. There are various non pharmacological and pharmacological (conventional) methods to alleviate the pain. Recently antispasmodic the buscopan (hyoscine) and drotavarine used liberally in obstetric practice to overcome the spasm at cervico-uterine plexus to promote cervical dilatation; hence mild to moderate reduction in pain and duration of labour. Neuraxial techniques are the gold standard for labour analgesia but cannot be performed on primary health centre (PHC)/ community health centre (CHC) due to non availability of qualified anaesthesiologist.

Key words: Safe labour analgesia, hyoscine and

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Introduction

Labour is the process by which the foetus and placenta are expelled from the maternal body. The forceful uterine contractions are involuntary and under intrinsic nervous control. It is one of the most intense pains that a woman can experience in her life, worse than the pain of deep cut. The 60% of primiparous women described the pain of uterine contractions as being "unbearable, intolerable, extremely severe, or excruciating." This high intensity, painful contractions initially occurs at every 15-30 minutes interval and shortens as 2-3 minutes as labour progress. Labour is classically divided into three separate stages and has two components the visceral and a somatic. The first stage is cervical dilatation, the second stage is expulsion of foetus and third stage is expulsion of placenta. Pain during the 1st stage of labour is due to dilatation of the cervix and distention of the lower uterine segment. It is mostly dull, aching, poorly localized, visceral in nature and conducted by the slow conducting, C fibers. Pathway of this pain is usually confined to T11-12 dermatomes during the initial phase, but eventually involved the T10-L4 dermatomes during the active labour phase.

Pain in the 2nd stage of labor is conveyed by pudendal nerve (S2- S4) – mostly somatic, due to distention of the pelvic floor and tearing of tissues in the vagina and perineum, it is sharp, severe, well localized and conducted by the rapidly conducting, A-delta fibers. Obstetrical anaesthesia is different from other type of anesthesia in that we have to take two individuals into account -the mother and baby when considering the anaesthesia choices. Another factor to be considered is that labour is unpredictable. It can range from relatively quick and easy to painful and exhausting and every women experiences pain differently. During labour, painful uterine contractions may result in myometrial ischemia resulting in the release of potassium, bradykinin, histamine, and serotonin.[1] In addition, mechanoreceptors are also stimulated by the stretching and distention of the lower segments of the uterus and the cervix. Furthermore, maternal hyperventilation due to painful uterine contraction, lead to hypocarbia and uteroplacental vasoconstriction, shift of oxyhaemoglobin dissociation curve (ODC) to towards left, which causes increase in O2 consumption, cardiac output, blood pressure and increase in maternal plasma catecholamines and reduced foetal oxygen delivery; finally lead to fetal acidosis and hypoxia. Furthermore, it can leads to mental disturbances in the form of postpartum depression and post traumatic stress disorder.

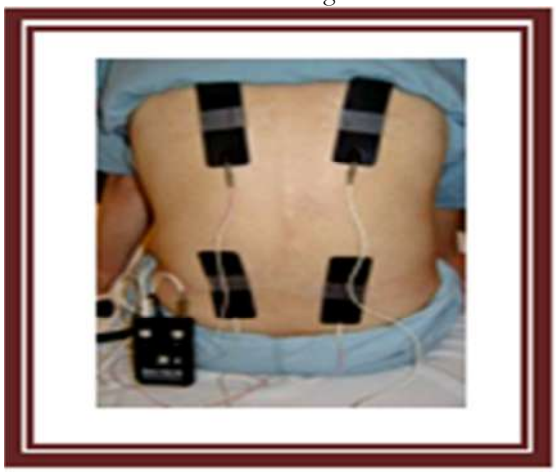
Therefore, adequate pain relief is very essential in pregnant women as it provides two benefits; the decrease in the level of circulating catecholamines which causes stabilization of maternal haemodynamics, hence improved utero-placental perfusion. In addition, successful relief of labour pain in itself is associated with high levels of satisfaction on the part of parturient women. An ideal Obstetric Analgesic should attenuate maternal anxiety, fatigue and deliver healthy baby. Drugs should not cross placental barrier, have minimal effects on mother, foetus or neonate; could be able to administer late in labour, easy to manage with minimal monitoring. It should provide rapid, profound and consistent Analgesia (Stage I & II) & preserve uterine contractility. The onset and offset should match time-course of uterine contractions. It should be easily reversible if necessary, facilitate surgical anaesthesia avoiding the GA.

Modes of Anaesthesia & Analgesia

(A) Non Pharmacological: these are complementary or alternative treatment used in the instances where a mother may not wish to use medications or regional analgesia for childbirth, or trained personnel (anaesthesiologist)/ pharmacological options (opioids or self administration IV fentanyl infusion) usually not available in most of the remote health centre of the developing countries. In these situations the non-pharmacological methods have been found to be very safe and effective (if properly utilized) to assist in dealing with the pain of labour.

1. **Education and sympathetic reassurance (Psychoprophylaxis):** These educational programs of mind –body treatment have strong focus on attention, human support, relaxation techniques of voluntary muscles, breathing techniques and specific activities to concentrate on. Psychoprophylaxis is a method for coping with labour pain by using patterned breathing techniques and relaxation. In this technique parturient are educated during pregnancy for "positive" conditioned reflexes through regular practice and by responding to simulated contractions. The woman is expected to react in the same way when experiencing real contractions during labour. Cognitively they focussed mainly on breathing and relaxation instead of pain. Thus, it improved the oxygenation and reduced the muscle tension by reducing fear and improving the sense of personal control. Lamaze is the originator of this psychoanalgesic technique, who tried to avoid medications during labour and delivery.[1]

2. **Intradermal Saline injection (Water block):** by this counter-irritation technique pain during labour can be attenuated, and allows the mother to remain fully conscious during labour. Pure sterile water is injected intracutaneously into 4 specific locations on the lower back of the mother through the 25G needle, each injection is of 0.125- 0.5 ml. The point 1: at the level of posterior superior iliac spine (PSIS) on either side. Point 2 is 1cm medial, & 1-2 cm inferior to the first one. Sharp burning pain occurs of 20-30 sec. Pain relief occurs within 2 min; pain relief lasted for 45 minutes to 3 hrs and procedure can be repeated any number of times, no side effects.[2]
3. **EnergyYoga:** Relaxation, concentration and meditation. Yoga, a method of Indian origin, proposes control of mind and body. Between the different types of yoga, 'energy yoga' can be applied to pregnancy and delivery. Through special training of breathing, it achieves changes in levels of consciousness, relaxation, receptivity to the world and inner peace. According to professionals, the yoga for delivery, shortens the duration of labor, decreases pain and reduces the need for analgesic medication.
4. **Sophrology:** The word derives from two Greek words, 'sos' harmony or serenity and 'phren' conscience or spirit. This technique derived from Indian yoga was introduced in Europe during the 1960s. Its purpose is to improve the control of body and spirit through three degrees of dynamic relaxation: concentration, contemplation and meditation.
5. **Acupuncture:** Derived from traditional Chinese medicine, its effects on pain relieving is extremely variable between different ethnic groups. It has not gained wide spread popularity and hence not studied rigorously. The placement of the needle will depend on which stage of labor patient is and kind of pain. The treatment should be done with experienced certificate practitioners. The basic theory include altering the body's levels of chemical neurotransmitters and influencing the natural electrical currents or electromagnetic fields



6. **Acupressure**: Acupressure is a descendant of Chinese manipulative therapy in which points are stimulated by pressure, using hands, fingers and thumbs.
7. **Hypnosis:** Hypnobirthing was introduced in the nineteenth century utilizing techniques for fear release and relaxation. The classes for hynobirthing beginning at the 30th week of pregnancy meet once a week for, 2 h a class over a 4- to 5-week period. The hypnotherapist usually does not accompany the mother in the birth. This method attempts to modify the perception of pain through self-hypnosis and post-hypnotic suggestion. The advantages of this technique include minimal maternal and foetal physiological interference.[3,4]
8. **Transcutaneous Electrical Nerve Stimulation (TENS):** provides satisfactory pain relief to the

parturient enhances the release of natural endorphins and dynorphins,[5] the body's painkillers centrally, reduces the pain by nociceptive, inhibition at a presynaptic level in the dorsal horn by limiting central transmission. Electrical stimulation preferentially activates low-threshold myelinated nerves. Electrode pads are placed over the lower back region. For 1st stage electrodes are placed over T 10 - 11 on either side of spinous process, for 2nd stage analgesia electrodes are placed over S2-S4. It diminishes the need of analgesia and have variable success rate.[6] This usually used in the early stages of pregnancy and has no known side effect.

9. **Lamaze technique:** As controlled, rhythmic breathing has been found to be relaxing by women dealing with labour pain. If women takes deep breathing it can help to calm and distract from the pain. Deep breath taken at the beginning of contraction followed by rapid shallow breathing is done for duration of contraction.[7]

10. **Biofeedback**: is a treatment that uses monitoring instruments to provide visual or acoustic feedback to patient's physiological information of which they are normally unaware. It puts the patient in control and gives them a sense of self-reliance that is an important factor for laboring woman. For example childbirth classes or childbirth classes plus video session about coping with labour pain etc.
11. **Music Therapy**: The use of music to relieve pain and decrease anxiety has been known to be helpful for the relief of postoperative pain for same time. Research regarding the use of music to reduce labour pain has also demonstrated that music may be used to promote relaxation during the early stages of labour, and act as stimulant to promote movement during later stages for bearing down process.
12. **Aromatherapy:** is the therapeutic use o plant derived essential oils to promote physical and psychological wellbeing. Essential oils are lipid soluble and are rapidly absorbed when applied externally or are inhaled. They are excreted through kidneys or expired through the lungs. For labour therapeutic grade oils as lavender or jasmine in low doses for massage or as an environmental fragrance is increasing in health setting, can promote relaxation and perception of pain. Peppermint oil may be effective in decreasing nausea and vomiting. To use aromatherapy effectively, nurses should have basic understanding of the chemical.
13. **Reflexology:** Another ancient practice is which pressure in applied to specific body parts, specifically the soles of the other parts of body. During labour, a reflexologist can help woman cope with pain and speed the process of childbirth by pressure and stoking specific ankle points, which are said to stimulate the pituitary glands to release pain killing hormones. Reflexology should only be performed by an experienced practitioner.

(B) Pharmacological (Conventional Treatments)

1. **Systemic Analgesics**

A. Narcotic analgesics-usually used narcotic analgesics are-- morphine, pethidine, pentazocine, tramodol and fentanyl. All opioids crossess the placenta, in utero opioid exposure results in foetal bradycardia, decreased beat-to-beat variability and neonatal respiratory depression apart from the side effects of nausea, vomiting, dysphoria and respiratory depression.

Morphine is a controlled drug, used in the past; known to cause addiction, but no problem of addiction in the acute phase when used for analgesia or anaesthesia. It freely crosses the placenta and can affect the foetus in the form of respiratory depression and bradycardia, should be given after the extraction of baby, for sedation in latent phase; not for labour analgesia. Dose for intra-operative analgesia is 50- 100 mcg/kg boluses to achieve effect, with thorough monitoring for safe anaesthesia and analgesia. An anti-emetic should be given as it leads to nausea and vomiting in the postoperative period. It causes anorexia, constipation and anaphylaxis; though rare, as histamine release is not uncommon so it is best avoided in those patients with asthma or respiratory diseases. The effect of morphine will be additive with other sedatives. One should be careful if slow, deep respiration, deep sedation and pinpoint pupils, which characterize over dosage. This can be fatal due to the respiratory depression or to cardiovascular collapse and arrest, hence monitor the patient in a high dependency area. Pethidine (meperidine): used commonly in the past as parenteral analgesic during labour. Many of its effects are the same as morphine but side effects are of shorter duration. The intramuscular (IM) dose ranges from 50 to 100 mg with a peak onset of effect at 40 to 50 minutes. Intravenous (IV) doses of 25 to 50 mg start to act within 5 to 10 minutes. Analgesic effect lasts up to 3 to 4 hours, foetal exposure is highest between 2-3 hours after maternal administration, but causes less respiratory depression in the neonate than morphine does. It causes loss of beat-to-beat variability of FHR tracings. Its active metabolite is norpethidine, which causes prolonged sedation and respiratory depression. It should not be administered in parturients with Cx dystocia.[8] Pentazocine: is a partial opiate agonist, have a ceiling on its effects. This has advantages and disadvantages. The intensity of analgesia is same as with morphine/pethidine; but the amount of respiratory depression is least as compared to

morphine /pethidine. There is very little PONV. It can be given oral or IM/IV/SC, the dose is 0.25- 0.5 mg/kg bolus. Fentanyl: A Synthetic opioid 1000 times more potent than meperidine, rapid onset (peak effect occurs within 3 to 5 min), brief duration (30 to 60 min), usual dose for labour analgesia is 25 to50 μg intravenously (IV), repeated doses result in drug accumulation and long duration of action. It has short half-life which makes it suitable for prolonged use in labour. It is given either as an i.v. bolus or as an analgesic administered by means of a PCA delivery system, can be used by other routes like transdermal patch /transnasal / lollypops. It provides reasonable levels of analgesia with minimal neonatal depression. The reproduction care programme of Nova Scotia (RCN) proposed a guideline for the use of IV fentanyl (39), according to them the fentanyl should be administered by a trained nurse who has current cardiopulmonary resuscitation and neonatal resuscitation certificates. It should be avoided or lower Fentanyl doses may be required in preterm labour, obese women (BMI > 45), recently received other opioids, delivery anticipated within ½ hour, women on high doses of antipsychotics (e.g. haloperidol), not recommended with concurrent use of monoamine oxidase inhibitors, maternal respiratory rate less than 8 breaths/min, or with an oxygen saturation of < 94%, women at risk for respiratory complications may be those with COPD, asthma, CF etc, liver or kidney disease [39].

Step for IV administration of fentanyl- 1. Informed consent to be obtained & documented, 2.to be administered slowly over 1-2 min with continuous close monitoring of respiratory rate and oxygen saturation. 3. It should be diluted as 2 ml of (100 micrograms) fentanyl added into 8 ml of NS to obtain 10 ml of fluid, which results in a final concentration of 10 microgram/ml. Initial dose: 0.5-1 microgram/kg given IV direct over 1-2 minutes. 4. Maximum initial dose should not exceed 100 micrograms; wait 5 - 10 min for effect. 5. Observe closely for signs of adverse reaction and possible respiratory distress, respiratory depression, O2 desaturation. 6. Naloxone should be at hand for emergency administration.

Side effects: causes skeletal muscle rigidity if given fast I.V. injection, known as wooden chest syndrome.[9]

Tramadol: is a pethidine-like synthetic centrally acting opioid analgesic having low affinity for mu(μ) receptors, good oral bioavailability, Minimal haemodynamic effects, causes less respiratory depression, sedation, constipation and urinary retention. 100 mg of tramadol I.V. is equi-analgesic to 10 mg morphine, at usual doses of 1-2 mg/kg body weight; it has no clinically significant respiratory depression. The onset of action is within 10 min of intramuscular administration and the duration lasts for approximately 4-6 hours. It is less potent than pethidine; as the mothers receiving tramadol had higher pain scores. Therefore, crossover to alternate methods of relief is very common.[10] Side effects are dizziness, nausea, sleepiness, dry mouth and sweating.

Sufentanil with very high lipophilicity may become bound in the lipid membranes of the placenta itself, reducing total transfer to the foetus.[40]

B. Non-narcotic analgesics- Diclofenac, Ketorolac Diclofenac sodium and ketorolac tromethamine is one of the nonsteroidal anti-inflammatory drugs, in a single dose they have analgesic effect and in a regular full dose they have both analgesic and anti-inflammatory action, both are metabolized in the liver and excreted through renal route. For acute pain diclofenac is given in a dose of 75 mg once or twice daily by deep intramuscular injection or intravenous.[11] Ketorolac is given in the dose of 30 mg either intramuscular or intravenous. Long-term administration of NSAIDs has resulted in renal papillary necrosis and other renal injury, may cause a dose-dependent reduction in prostaglandin formation and, secondarily, the reduction in renal blood flow, which may precipitate overt renal decompensation. Patients at greatest risk of are those with impaired renal function, heart failure, liver dysfunction, those taking diuretics and ACE inhibitors, and the elderly. Warnings: Diclofenac has been assigned to pregnancy category C prior to 30th week's gestation and to category D starting at 30 weeks of gestation by the Food and Drug Administration (FDA). Use of diclofenac or other NSAIDs late in pregnancy after 30th week's gestation may cause premature closure of the ductus arteriosus, foetal renal impairment, inhibition of platelet aggregation, prolong the labour and delivery contraindicated in a breastfeeding mother, as excreted into human milk. Therefore, diclofenac should be given during pregnancy only when the potential benefits outweigh the potential risks.[12] However, it was found to be safe and effective as an analgesic agent in the first stage of labour.

2. Others—Ketamine

Ketamine: is the preferred induction agent in presence of hypovolaemia or hypotension. Intravenous ketamine, is promoted by some clinicians as a sole anaesthetic for labour pains. However, it is not safe as the labouring mother often requires anaesthetic dosages that may compromise the airway. Further, the benzodiazepines used to counteract delirium can cause neonatal respiratory depression. Its usage in labour should, be discouraged.[13] Pre-anaesthetic evaluation and antacid prophylaxis should be done before loading dose of ketamine 10-15 mg bolus (0.2-0.25 mg/kg), which is usually followed-by an infusion (0.2 mg/kg/h) until the delivery of the neonate always monitor the sensorium of parturient.[14]

3. Adjuvant drugs

A. Sedative Tranquilizers- benzodiazepines, phenothiazines Benzodiazepines: Diazepam & Midazolam

Diazepam: Long acting sedative, metabolites are also active, causes anterograde amnesia and hypnosis, given in the increments of 2-2.5 mg till the desired effect is achieved. Side effects --Diazepam is painful on injection, continuous infusion may have additive effects, may cause respiratory depression, hypotension in hypovolemic patients, secreted in the breast milk, crosses placental barrier, risk of neonatal respiratory depression, and decreases APGAR SCORE. Midazolam: 3 times more potent than diazepam, short acting, given in the increments of 1 mg. Flumazenil is the benzodiazepine antagonist, used in the reversal of neonatal/maternal respiratory depression. It is given in the incremental doses of 0.2 mg every minute till the desired effects are achieved.

A.) Antispasmodics- Buscopan and Drotavarine

Prolong labour is also an important concern for obstetrician as it contributes to increased perinatal and maternal morbidity. Inhibitory impulses in the form of spasm often impair the cervical dilatation and prolong the duration of labour. Hyoscine and drotavarine are widely used in labour room to manage labour actively and safely, as it shortens the duration of painful labour, reduces the incidence of caesarean sections and other foetal and maternal complications during spontaneous labour.

Hyoscine butylbromide(Buscopan)/scopolamine butylbromide: one ampoule=20 mg, acts by inhibiting cholinergic transmission in the abdominal and pelvic parasympathetic ganglia, thus relieving spasm in the smooth muscles of gastrointestinal, biliary, urinary tract and in female genital organs, especially the cervico-uterine plexus, thus aiding cervical dilatation.[35] Uterine contractions are not affected, rather due to better co-ordination between uterine contractions and cervical dilatation, the latter is increased. It is barely absorbed and detectable in the blood and does not penetrate the blood-brain barrier and is therefore, generally well tolerated.[36] Hyoscine butylbromide is effective in reducing the duration of the first stage of labour,[37] and it is not associated with any obvious adverse outcomes in mother or neonate, commonly injected intramuscularly.

Drotaverine hydrochloride: one ampoule (40mg) injected intramuscularly at 3 cm dilatation. It is highly potent antispasmodic agent acting on the smooth muscle but is devoid of anticholinergic effects, acts through inhibitory effects on phosphodiesterase enzyme, used to enhance cervical dilatation during childbirth. Overdose effects are vomiting, seizures and fatal cardiac toxicity.[38] Buscopan and Drotatvarine being potent antispasmodic, relieving smooth muscle spasm, at cervico-uterine plexus and aiding cervical dilatation, thus causing mild to moderate reduction in labour pain.

Warning: Buscopan and Drotavarine are used in pregnant women only after 3-4 cm dilatation, > 37-41 weeks gestation, with vertex presentation without any contraindications for vaginal delivery. Their use in preterm labour, previous caesarean section, twin pregnancy, APH, history of cervical encirclage and malpresentation in prohibited.

2. Inhalational Analgesia

Entonox (N_2O:O_2 = 50:50) %
Sevoflurane (0/2%)
Isoflurane (0/2%)
Enflurane (0/2%)
Desflurane (0/2%)

Nitrous oxide has been used in obstetric practice for over a century. Entonox (50 % nitrous oxide in oxygen) provides analgesia within 20-30 seconds of inhalation with a maximum effect after about 45 seconds. Advantages includes: ease of use, no requirement for physician supervision, minimal accumulation with intermittent use, self-administration provides some control. Disadvantages are drowsiness, disorientation and nausea may occur including brief episodes of loss of consciousness (observed in 0.4% of cases after prolonged use), does not provide complete analgesia. The efficacy of inhaled nitrous oxide for labour pain has been much debated. Current clinical data suggest it relieves labour pain to a significant degree in most women but does not provide complete analgesia for many. Nitrous oxide remains a useful analgesic modality for labour pain and is especially beneficial in units where other analgesic options are limited.[15]

Sevox - Patient-controlled inhalation analgesia

Sevoflurane is a volatile inhalational agent commonly used during general anaesthesia. Because of its short onset and offset of action, it appears to be the best-suited inhalational agent for labour analgesia and can be administered as patient-controlled inhalation analgesia.[16] It is used in the concentration of 0.8% with oxygen and needs specialized equipment. Further, there is a concern for environmental pollution, maternal amnesia and loss of protective airway reflexes. Larger studies are needed to assess the incidence of maternal compromise. Combination of Systemic opiates and Entonox- was also used for successful labour analgesia.

C .Regional anaesthesia& analgesia techniques-techniques used are-

- Local infiltration
- Pudendal block
- Paracervical block
- Paravertebral (lumbar sympathetic block)

- Epidural-1. Continuous epidural 2. Patient controlled epidural analgesia
- Spinal-1. Single shot spinal 2. Continuous spinal analgesia
- Combined spinal-epidural (CSE)

Even though the exact mechanism of the increased sensitivity of the central and peripheral nervous system to general and local anaesthetics is not known, it is prudent to reduce the dose of anaesthetics in pregnant women, at least on initial dosing.[1] Various local anaesthetic used in the regional blocks are lignocaine (rapid onset, dense motor block, risk of cumulative toxicity, used either alone or with epinephrine) and bupivacaine (an amide local anaesthetic, onset of action is rapid, duration of anaesthesia is significantly longer, has a high protein binding capacity (95%) has a low foetal/maternal (F/M) ratio (0.2 to 0.4) relative motor sparing, cardiotoxic and good sensory and minimal motor block. Its 0.0625%-0.125% solution is used for epidural labour analgesia without adverse effects on labour, the effect lasted at least 2hrs). Levobupivacaine S(-) enantiomer of bupivacaine, no difference in onset, spread and duration of analgesia, but lower toxic and less motor block.[17] Ropivacaine- is a homologue of bupivacaine, formulated as a single levorotary enantiomer. Its latency and duration of action are similar to bupivacaine but it has less potential for cardiac toxicity. It is approximately 40% less potent than bupivacaine.[18]

Paracervical block No pain relief during the 2nd stage of labor. Side effects such as profound foetal bradycardia (most common), systemic local anaesthetic toxicity, infection, and postpartum neuropathy can happen. Local anaesthetic is injected submucosally into fornix of the vagina lateral to the cervix, blocking the paracervical ganglion and providing analgesia to the cervix and uterus, but not the sensory fibers of the perineum. This is a technique used commonly for gynecologic surgical procedures, but its use is limited in obstetrics for the aforementioned reasons.[19,20]

Pudendal Block The pudendal nerves are derived from S2-S4 and provide sensory innervations for the perineum, vulva and lower part of vagina. Local anaesthetic is injected behind each sacrospinous ligament transvaginally, which provides good analgesia for vaginal delivery, but not labour analgesia, this block is safe and effective for only the second stage of labour. Maternal complications are low but include bleeding, infection, and local anaesthetic toxicity.[21] Foetal complications include trauma and/or direct foetal injection of local anaesthetic.[34]

Paravertebral lumbar sympathetic block provides only first-stage labour analgesia and though it requires expertise to perform this block, it may speed cervical dilatation in nulliparous women.[22]

These alternative techniques do not have the flexibility of epidural or CSE analgesia, they are technically difficult to perform and produce more frequent complications. However, they can be used in special circumstances such as: i) failed or inadequate neuraxial analgesia. ii) any contraindications to neuraxial techniques as spinal deformity, previous spine surgery or abnormal coagulation. iii) Absence of qualified anaesthesia personnel.

Neuraxial analgesia Neuraxial analgesia is widely accepted as the most effective and the least depressant method of providing pain relief in labour. Over the last several decades the neuraxial labour analgesia techniques and medications have progressed to the point of quality care where they provide high quality pain relief with minimal side effects to both mother and the foetus, thus maximizing the maternal autonomy also.[23]

Epidural Analgesia Epidual analgesia is considered as gold standard technique for pain control in obstetrics, where low doses of local anaesthetic or opioid combinations are administered to provide a continuous T10-L1 sensory block during the first stage of labour. Safe and effective pain relief is achieved without much motor block (walking epidural), if required, a means for surgical anaesthesia, and decrease in maternal catecholamines. With supplementation, it is possible to achieve sacral block for second stage of labour. Contraindications include: patient refusal, infection at access site, overt coagulopathy, and hemodynamic instability. Previous research has suggested that epidural analgesia is associated with low back pain; however, it is not known whether this association is causal.[24] A popular technological advances in epidural analgesia technique includes, patient-controlled epidural analgesia (PCEA), where continuous infusion pumps are used which deliver medication on demand (PCEA). Advantages are excellent patient satisfaction, reduces the total amount of local anaesthetic used, less unwanted effects as motor block, hypotension etc. Reduces the demands on staff on the labour floor, gives many parturient a feeling of empowerment. Continuous infusions with patient-controlled top-ups are considered better than bolus-only technique.[25]

Spinal Analgesia

Intrathecal neuraxial analgesia is a safe and effective alternative to epidural anaesthesia. Single shot spinal with opioid or local anaesthetic plain, provides a good labour analgesia, especially early in labour, in distressed parturients, or as an analgesic for instrumental deliveries. Here, low-dose combination (fentanyl 25 μg, bupivacaine 2.5 mg, and morphine 250 μg) in one injection provides up to 4 hours of ambulatory pain control. Thus, this Light or "Ultra-light Analgesic Technique is also a type of single shot spinal anaesthesia, where very low dose of Bupivacaine/ Ropivacaine or Levobupivacaine is mixed with Opioid, given intrathecally. Single shot spinal have disadvantage of inability to titrate the

dose or provide continuous analgesia. Inabilities to titrate the dose lead to pruritus and nausea, which can be treated with naloxone (oral/ IM/IV); nausea can also be treated with metoclopramide.[26] Therefore, in 1980s, continuous spinal analgesia was achieved with the help of intrathecal microcatheters, introduced through spinal needle. There were several reported cases of cauda equina syndrome,[27] when used for caesarean section, which was attributed to direct or indirect trauma, infection, and spinal cord compression. Other iatrogenic causes reported are manipulation, ischemia to spinal cord,[28] direct toxicity from injected local anaesthetic agents (concentrated hyperbaric 5% lidocaine) for SA and postoperative complications, e.g., hematoma.[29] Spinal anaesthesia provides a reasonable option for providing analgesia, especially in high risk parturient and in cases of accidental dural puncture during epidural analgesia, where it can reduce the incidence of post-dural puncture headaches. Hypotension following spinal anaesthesia is the major adverse affect, having high incidence if the patient is not properly prepared and dosed.

Combined Spinal-Epidural (CSE) Analgesia

It is a regional anaesthetic technique, combines the benefits of both spinal anaesthesia and epidural anaesthesia and analgesia, this technique is suitable where a rapid onset of analgesia is required but the period of analgesia required exceeds that of a single spinal injection. In this technique spinal component gives a rapid onset of a predictable block, while indwelling epidural catheter gives the ability to provide long lasting analgesia and ability to titrate the dose, to get desired analgesia throughout labour. Techniques: 1.The needle-through-needle technique- where Tuohy needle (epidural needle) is introduced into the epidural space, using standard technique of loss of resistance to saline injection. Now through this epidural needle, a fine spinal needle (25G) is then introduced to puncture the dura and enter, into the subarachnoid space. A small pop is felt as the dura is punctured, and the correct position is confirmed when cerebrospinal fluid can be seen dripping from the spinal needle. A small dose of local anaesthetic (e.g. bupivacaine) is then instilled. An opioid such as fentanyl may also be given if desired. The spinal needle is then withdrawn and the epidural catheter inserted in the standard manner.[30] Alternatively, a two-level approach may be undertaken. The epidural space is first located in the standard manner. Then, at another level, a standard spinal is performed. Finally, the epidural catheter is threaded through the Tuohy needle.[30] Theoretically it is advantageous as it may increase mobility from reduced motor block with good labour analgesia; especially the duration of the first stage of labour is significantly reduced in primipara if it is well planned[31]

The most common techniques used in neuraxial analgesia are continuous lumbar epidural analgesia, and combined spinal–epidural analgesia. Because the duration of most labours are longer than the duration of action of most neuraxial analgesics, single-shot spinal and epidural techniques lack flexibility. Caudal analgesia is uncommon in modern-day labour analgesia because injection of large doses of local anaesthetics is required to obtain surgical anaesthesia for caesarean delivery.[32]

Recommended Technique for spinal/ epidural analgesia The Informed consent should be obtained, obstetrician is consulted. The technique is performed in operation theatre (OT) with facility for resuscitation drugs and equipments by the adequately trained anaesthesiologist only. The drugs to be present in the OT are thiopentone sodium, succinylcholine, ephedrine atropine, epinephrine, phenylephrine, calcium chloride, sodium bicarbonate and naloxone. Equipment part includes oxygen supply, self-inflating bag and mask for positive-pressure ventilation, face masks, oral and nasal airways, laryngoscopes, endotracheal tubes, suction (good suction pressure) and suction catheter, drip set, intravenous cannula, fluids, syringes and needles. Pre-hydration, with 500 ml of Ringer's lactate solution is must for spinal anaesthesia. Positioning of mother either lateral decubitus or sitting position is made. Following aseptic precautions, L3-4/L4-5 intervertebral space is chosen, 2-2.5 ml of sensorcaine heavy (0.5%) with or without adjuvant is given. Continuous recording of maternal BP, and fetal heart rate should be done and verbal communication to be maintained after giving a bolus dose of local anesthetic. During induction and maintenance of spinal anaesthesia, continuous haemodynamic stability is to be maintained by managing the hypotension and bradycardia promptly.

In epidural analgesia, using midline approach the identification of epidural space is done with the loss of resistance (LOR) technique using saline, bevel direction to be kept cephalad, multiport epidural catheter to be inserted 5cms in the epidural space. After aspiration, a test for intrathecal or IV placement is be done either with total of 3 ml of 1.5% lidocaine (45mg) + epinephrine 15µg or 0.25% Bupivacaine 7.5mg + Epinephrine 15 µg (total 3ml). Initial catheter dosing with divided (5ml) doses of: 0.9%-2.0% lidocaine (10-12ml) or 0.0625%-0.25% bupivacaine (10-12 ml) or 0.1%-0.2% ropivacaine (10-12 ml) or 0.0625%-0.25% levobupivacaine (10-12 ml). Adjuvant as fentanyl (1-2µg/ml of total volume of local anaesthetic chosen, total 50 µg) is used for good quality analgesia without maternal and foetal compromise. Later on, infusion of bupivacaine (0.0625%-0.125%) +fentanyl (1-2 µgml/ml) to be continued at the rate of 12-16 ml/hr, depending upon the severity of labour pain.

Intra-spinal (Epidural/Intra-thecal) Opioids ---- Preservative free opioids are given either intra-spinally as a single injection or intermittently via an intra-thecal catheter (not popular in India) or epidurally. This is useful for patients who have co existing disease who is going to affect adversely by sympatholysis produced by epidural or spinal block e.g. (Severe CVS disease, hypovolemia, aortic stenosis, tetralogy of Fallot, pulmonary

hypertension). Mechanism of action --Spread of Opioids in the Cerebrospinal Fluid. Opioids that are injected into the lumbar intrathecal space exert their analgesic effect by activation of spinal opioid receptors located in the substantia gelatinosa of the dorsal horn.[33] In addition, they can spread upward through the passive flow of cerebrospinal fluid to reach the vasomotor, respiratory, and vomiting centres of the brain. The rostral spread of intrathecal opioids is thought to be responsible for unwanted effects such as respiratory depression, pruritus, hypotension, nausea, and vomiting. Systemic absorption and redistribution to the brain is an alternative route for activating brain-stem opioid receptors that may account for early side effects, whereas rostral spread within the cerebrospinal fluid may be responsible for late side effects. Advantages: Intra-spinal opioids, when used alone do not produce motor blockade and do not interfere with pushing the baby out; do not cause maternal hypotension. Disadvantages: Complete anaesthesia may not be there, lack of perineal relaxation, pruritus, nausea, vomiting, sedation, respiratory depression. . Complications of regional analgesia in labour -Some immediate serious complications of obstetric epidural analgesia include: i) Massive misplaced injection: intravascular, intrathecal or subdural, ii) High or total spinal block, iii) Hypotension, iii) Local anaesthetic induced convulsions, iv) Local anaesthetic induced cardiac arrest, v) Delayed complications. vi) Postdural puncture headache, vii) Transient backache. viii) Urinary retention. ix) Epidural haematoma, abscess or meningitis, x) Permanent neurologic deficit (are fortunately rare complications). Most obstetric neurologic injuries are not directly related to neuraxial analgesia but rather are intrinsic to labour and delivery. However, strict attention to technique may further limit the rare injury directly related to anaesthesia.

Conclusion

Parturient experience varying degrees of labour pain, which intensifies as labour progresses. Among the various techniques documented for labour analgesia, non-regional techniques are more commonly employed methods for labour analgesia in our hospital. Buscopan and Drotavarine are the most common option for labour analgesia and for faster, smooth and uncomplicated vaginal delivery without any maternal and neonatal side-effect. However, a woman with severe intolerable pain, intramuscular injection tramadol hydrochloride (opioid) is commonly employed along with Buscopan. NSAIDs are never practised method of analgesia for labouring parturient in our hospital. Epidural labour analgesia or combined spinal epidural analgesia is used only in circumstances of planned painless labour for co-existing CVS diseases, aortic stenosis, tetralogy of Fallot, pulmonary hypertension or hypovolemic patient by the trained anaesthesiologist. In view of limited sources (poor patient, unable to afford Epidural/CSE set and lack of availability of spare anaesthesiologists' team at floor for 24 hrs) non-pharmacological means of pain relief is still utilized, though it provides incomplete analgesia. Till date, no randomized controlled trial is conducted in this regard. Therefore, future research is warranted to explore the extent of pain relief with antispasmodic (buscopan and drotavarin) in labour pain.

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