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Manual on Art of Labour

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CHAPTER 2

Analgesia in Labor

Bharti Wadhwa

INTRODUCTION

An important component of respectful maternity care, analgesia in labor reduces the physiological stress response with lower maternal exhaustion, better maternal cardiovascular stability and improved oxygenation to the fetus. Additionally, a positive birthing experience may help mitigate the long-term risk of postpartum depression and PTSD.

PAIN OF LABOR

First stage: (T10-L1 dermatomes): The pain of first stage of labor is visceral, diffuse, poorly localized over lower back and abdomen, similar to strong menstrual cramps and results from uterine stretching, distortion, ischemia and cervical dilatation

Second stage (S2, 3, 4 dermatomes): The pain of second stage of labor is sharp, localized pain, over lower back, perineum and inner side of thigh initially but mostly over perineum later and is due to stretching of pain sensitive perineum.

NEED FOR LABOR ANALGESIA

The pain induced increase in maternal catecholamines, heart rate and blood pressure, can reduce uteroplacental blood flow, and may aggravate conditions such as preeclampsia, cardiac disease and respiratory compromise. Hyperventilation due to pain and anxiety can cause respiratory alkalosis with reduced uteroplacental blood flow. Adequate pain relief improves maternal comfort, reduces anxiety, facilitates cooperation in labor and can indirectly improve fetomaternal wellbeing by providing cardiovascular stability and improved oxygenation to the fetus.

Recently, a 35% reduction in severe maternal mortality was reported in parturient who received epidural labor analgesia especially in women with preterm births and those who received epidural for medical indications.

Globally, contemporary guidelines such as WHO intrapartum care recommendations and NICE guidelines emphasize that effective pain relief is an integral part of a positive childbirth experience and that maternal request is a sufficient reason to provide analgesia.

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INDICATIONS AND PATIENT SELECTION FOR LABOR ANALGESIA

Modern practice recognizes that maternal request alone is a sufficient indication for labor analgesia, provided there are no contraindications. Other specific indications include:

- High maternal anxiety, low pain threshold or previous traumatic birth experience
- Medical conditions in which pain induced tachycardia or hypertension can be harmful, for example significant cardiac disease, severe preeclampsia, certain valvular lesions, some congenital heart diseases
- Maternal respiratory compromise where excessive work of breathing should be avoided
- High risk pregnancies where stable hemodynamics and good cooperation are required, such as multiple pregnancy, preterm labor, intrauterine growth restriction and certain endocrine or neurological disorders
- Trial of labor after previous caesarean section, where good analgesia facilitates careful monitoring and timely decision making
- Anticipated operative vaginal delivery or instrumental procedures in the second stage

PREPARING FOR LABOR ANALGESIA

Sensitization for labor analgesia should begin in the antenatal period and early involvement of anesthesiologist is advised. Routine pre anesthesia check up with informed consent is mandatory. Preoperative advice includes acid aspiration prophylaxis every 12 hours for the duration of labor. In uncomplicated laboring patients: modest amounts of clear liquids can be allowed, while in high risk parturient, additional restriction of fluids is advised. All resuscitation equipment and drugs should be kept ready and the parturient should have a functioning IV access.

METHODS FOR RELIEF OF LABOR PAIN

Labor analgesia can be divided into nonpharmacological methods, systemic pharmacological methods and regional (neuraxial and nerve block) techniques. Choice depends on maternal preference, stage of labor, contraindications, and available resources.

Nonpharmacological Methods

These are mostly effective in first stage of labor but particularly important in resource limited settings. Systematic reviews suggest modest reduction in pain, increased maternal satisfaction and are often used as adjunct or part of a multimodal strategy. These include:

- Continuous labor support by a doula or birth companion

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- Childbirth education, breathing and relaxation exercises, guided imagery
- Position changes, ambulation, use of birthing ball
- Massage, acupressure, warm baths or showers, application of heat or cold
- Transcutaneous electrical nerve stimulation devices
- Water immersion where facilities exist
- Sterile water injections

Sterile water injections provide significant relief of lower back pain during first stage labor with no maternal-fetal adverse effect apart from the administration pain. The technique involves intradermal injections of 0.1 mL sterile water over posterior superior iliac spines (both sides) and 1 cm medial and 2–3 cm inferior to the first injections (on both sides). The injection is transiently painful for 30 sec followed by pain relief within 2 min that lasts till 45–120 minutes. Administration of SWIs is an easy, low-cost technique with a short learning curve. There is no restriction of mobility and can repeated as often as desired which makes it a suitable option for the overworked, low resource labor rooms and also for women who wish to avoid epidural analgesia.

Systemic Pharmacological Methods

1. *Intramuscular or intravenous opioids:* Commonly used agents include pethidine, tramadol, fentanyl and more recently remifentanil. They are easy to administer, relatively inexpensive and widely available. However, they provide only moderate pain relief and may cause maternal nausea, vomiting, sedation and transient fetal respiratory or neurobehavioral depression, especially if given close to delivery.
2. *Intravenous remifentanil patient-controlled analgesia infusion:* This offers better analgesia than traditional opioids and has the advantage of rapid termination of action due to esterase-based metabolism. It is recommended in women who cannot or do not wish to have neuraxial analgesia, provided close monitoring and appropriate facilities are available.
3. *Inhalational nitrous oxide and oxygen*: A 50:50 mixture (Entonox or equivalent) is self-administered via a demand valve face mask. It is simple, rapidly acting and has minimal accumulation, though analgesic potency is modest and effective scavenging systems are important.

REGIONAL TECHNIQUES

1. *Epidural analgesia:* Includes continuous lumbar epidural, combined spinal epidural (CSE) and Dural puncture epidural techniques.
2. *Single shot spinal (intrathecal) analgesia:* A small dose of opioid with or without low dose local anesthetic can provide rapid onset analgesia of limited duration, useful in advanced labor or where epidural is not feasible.

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3. Pudendal nerve block for perineal analgesia in the late second stage or for instrumental delivery
4. Paracervical block, now rarely used because of risk of fetal bradycardia, primarily for early first stage pain

EPIDURAL LABOR ANALGESIA

Lumbar epidural analgesia using dilute local anesthetic with opioid is widely regarded as the gold standard for labor analgesia because it provides superior pain relief with minimal motor block and ability to ambulate when modern low dose low concentration local anesthetics regimens are used. Additionally, there is flexibility of extension of the block for surgical anesthesia. Common drug regimens include low concentration local anesthetic, often combined with opioids such as bupivacaine 0.0625–0.125% or ropivacaine 0.1–0.2%, combined with fentanyl 2 μg/mL.

EFFECT OF LABOR ANALGESIA ON PROGRESS OF LABOR AND MODE OF DELIVERY

Historically, epidural labor analgesia was associated with prolonged labor, higher rates of instrumental vaginal delivery and caesarean section. Many of these associations came from older studies that used higher concentrations of local anesthetic, which produced dense motor block. Contemporary evidence using low concentration local anesthetic opioid mixtures paints a more nuanced picture.

Several large observational studies and randomized trials show that epidural analgesia may modestly prolong the first and second stages of labor, particularly in nulliparous women, but without major clinical consequence when labor is well managed. A recent study found an approximately one hour longer active phase and a modest increase in second stage duration among women with epidurals. Withholding analgesia until the patient has achieved an arbitrary cervical dilatation during the first stage of labor is unnecessary. Best time to administer ELA: linked to parturient demand not cervical dilatation provided established labor is ensured.

Systematic reviews indicate that neuraxial analgesia does not increase the incidence of caesarean delivery. The effect on instrumental vaginal delivery is more complex. Some earlier meta-analyses suggested a small increase in forceps or vacuum delivery, whereas more recent work with low dose protocols and flexible pushing policies shows little or no difference. Instrumental delivery appears to be influenced by multiple factors, including obstetric practice, fetal position and use of oxytocin, rather than epidural alone.

In summary, with contemporary low dose neuraxial techniques, epidural labor analgesia does not increase caesarean section rates and has at most a modest effect on labor duration and instrumental delivery rates, particularly when coupled with good obstetric management.

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MONITORING DURING EPIDURAL LABOR ANALGESIA

- Measure BP and HR every 3–5 minutes for first 15 minutes, then every 15 minutes during the infusion and until the block wears off.
- Uterine contractions, FHR, cervical dilatation
- Patient should turn from side to side every 30 minutes to avoid a one-sided block
- Temperature 4 hourly—If increased then hourly
- *Sensory level:* sensation to cold: Every 1 hour
- Adequacy of analgesia → Pain Score: Every 1 hour
- *Motor block:* Ability of the patient to lift legs Every 1 hour
- Sit patient forward and check integrity of epidural dressing/dislodgement of epidural catheter intermittently every 2–3 hours
- CTG for at least 30 minutes with establishment of regional analgesia and after administration of each further bolus of 10 mL or more.

AMBULATORY LABOR ANALGESIA

Any neuraxial analgesic technique with minimal motor block that allows safe ambulation. First coined to describe low-dose CSE opioid analgesia because motor function was maintained and ability to walk was not impaired. Equally effective with low dose epidurals.

Benefits of ambulation: Include better analgesia, stronger uterine contractions, minimal aortocaval compression, ability to void spontaneously, lower incidence of DVT, improved maternal satisfaction, lower instrumental delivery rate. For the Labor room personnel, the improved patient mobility reduces the manpower requirements.

MANAGING THE SECOND STAGE OF LABOR

Early pushing can result in maternal exhaustion and frequent variable decelerations. Thus, parturient should be actively encouraged to push during contractions (Delayed pushing) rather than early pushing with full dilatation as it increases likelihood of spontaneous vaginal delivery. Routine use of oxytocin and arbitrary termination of the second stage of labor for women with regional analgesia is discouraged.

COMPLICATIONS AND SIDE EFFECTS OF EPIDURAL LABOR ANALGESIA

Maternal Complications

Adverse effects common to epidural block:

- Hypotension from sympathetic block
- Pruritus, nausea and urinary retention, particularly with opioid containing solutions

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- Shivering and mild sedation
- Post dural puncture headache

Adverse effects specific to labor analgesia:

- *Epidural related maternal fever:* Women who receive ELA are more likely to develop hyperthermia [incidence: 15–25%] with an average temperature increase of approximately 1°C over 7 hours. The duration and type of epidural technique does not influence the risk of developing maternal fever and the cause is likely inflammatory rather than infectious, but the presence of maternal fever often triggers neonatal sepsis evaluations
- *Backache:* There is no convincing evidence that epidural labor analgesia causes chronic back pain; large studies have shown similar rates of long-term back pain in women with and without epidurals.

Fetal Effects

When maternal blood pressure is maintained and drug doses are appropriate, epidural labor analgesia has minimal direct effect on the fetus. Potential issues include transient fetal heart rate abnormalities secondary to maternal hypotension or rapid changes in uterine tone, which improve with maternal resuscitative measures.

CONCLUSION

Pain relief in labor is both a clinical necessity and part of respectful motherhood. While a range of options exists, neuraxial techniques, particularly lumbar epidural analgesia with low concentration local anesthetic opioid mixtures, remain the gold standard, offering excellent analgesia with minimal impact on labor outcomes and a favorable safety profile for mother and baby. Epidural analgesia can further aid in reducing severe maternal mortality and expanding epidural access could improve maternal health. Use of sterile water block is a suitable option for the Indian labor rooms and can provide safe and effective analgesia with minimal cost and manpower requirements.

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