

36

Pain and Pregnancy and Labor

I. Perception of pain in pregnancy

Know the factors that can influence the perception of pain in pregnancy compared with the nonpregnant state:

- A. Fear of pain (Saisto and Halmesmaki 2003): may be primary (usually in nulliparous women, and may be associated with pre-existing psychological morbidity and/or ignorance), or secondary (e.g., as a result of a previous bad experience).
- B. Increased susceptibility to pain due to generalized anxiety (related to the pregnancy, its outcome, its implications for the woman, or other concerns).
- C. Positive attitudes to pregnancy and its social implications: may increase tolerance to pain, especially in labor (pain is seen as a “positive” force rather than a destructive one).
- D. Level of education: poor knowledge and/or misinformation may exacerbate the above.
- E. Age/parity: younger women may have increased tolerance to pain, but older multiparae may be more relaxed and therefore less fearful.
- F. Neuroendocrine system (Whipple et al. 1990; Shapira et al. 1995): sex steroids, e.g., 17 beta-estradiol and progesterone, can modulate the opioid system during pregnancy (e.g., via spinal dynorphin pathways), increasing pain tolerance.

II. Causes of pain in pregnancy

Be familiar with the spectrum of conditions that can present with pain during pregnancy:

- A. Not specific to, but common during, pregnancy.
 - 1. Headache: most commonly tension headache or migraine; both have similar triggers and treatment. Recurrence may be due to reluctance to take analgesics in pregnancy, but the usual pattern is improvement over time, usually in the first trimester. It is important to exclude depression, sleep deprivation, pre-eclampsia, subarachnoid hemorrhage, cerebral tumors, and other focal lesions. Management is with simple measures, nondrug treatments, analgesics, and beta-blockers if headache is recurrent and severe.
 - 2. Back pain: occurs in approximately 50% of pregnant women (Rathmell et al. 1997). Pain is increased by preexisting problems, multiparity, and increased age. Its early presentation (commonly the first trimester) suggests that weight gain is not the only factor; neuronal and endocrine mechanisms have been implicated (the polypeptide relaxin, secreted by the corpus luteum, softens the pelvic ligaments to allow accommodation of the developing fetus and facilitate vaginal delivery, and is thought to contribute to back problems during and after pregnancy). The pain is typically described as dull (lumbar), stabbing (gluteal), burning (thoracic), and/or accompanied by paresthesia (root compression). Management includes normal daily activity where possible, physiotherapy and analgesics. Sacroiliitis is common and may respond to manipulation. Epidural steroid injections are usually avoided in pregnancy if possible.

3. Nerve entrapment: carpal tunnel syndrome is the most common; approximately 50% of sufferers experience pain. Although common in normal pregnancy, it may be associated with excessive fluid retention, e.g., pre-eclampsia, heart failure. Treatment is with elevation and splints, or surgery. Entrapment of the lateral cutaneous nerve of the thigh (meralgia paraesthetica) may also cause pain/paresthesia. Nerve entrapment may cause abdominal pain (see below).
4. Abdominal pain: nonspecific pain is common in pregnancy and may occasionally be severe; it is thought to be related to the physical presence of the enlarging uterus and stretching/displacement of abdominal structures. Softening and stretching of the ligaments of the symphysis pubis may cause suprapubic pain that can be severe, especially if there is distraction of the symphysis. Nerve entrapment may also occur.
5. Other potentially dangerous conditions that may present with pain should also be considered, e.g., sickle crisis, pulmonary embolism. Trauma is also an important cause of pain, and pregnant women are often victims of domestic violence.

- B. Specific to pregnancy: obstetric causes of abdominal pain include torsion/rupture of ovarian cysts, ectopic pregnancy, amnionitis/pelvic infection, labor, placental abruption, and uterine rupture.

III. Management of pain in pregnancy

Be familiar with the principles of management:

- A. Nonpharmacological methods are used where possible. The risk of harm to both mother and fetus should always be considered.
- B. The neuroendocrine changes of pregnancy mean that parturients are more susceptible to anesthetics (both local and general) and analgesics.
- C. Placental transfer of drugs depends on protein binding, lipid solubility, maternal metabolism, and molecular weight. With the exception of large polar molecules, e.g., insulin/heparin, all drugs are transferred to a degree. Drugs may also have indirect fetal effects via maternal effects (e.g., by affecting the mother's blood pressure).
- D. Be aware that the pharmacokinetics and pharmacodynamics of analgesics are altered in pregnancy.

IV. Mechanisms and characteristics of labor pain

Understand the causes, pathways, and features of labor pain:

A. Causes

1. First stage: uterine contractions and dilatation of the lower uterine segment and cervix to allow passage of the fetus.
2. Second stage: greater pressure of the presenting part on pain-sensitive pelvic structures and distension of surrounding structures.

B. Pathways

1. Uterus and cervix: mainly via A-delta and C fibers passing in the sympathetic nerves to the sympathetic chain; referred to the T10–L1 dermatomes.
2. Vagina and pelvic outlet: via A-delta and C fibers passing in the parasympathetic bundle in the pudendal nerves; referred to the S2–S4 dermatomes.
3. Other: contributions from the ilioinguinal, genitofemoral, and perforating branch of the posterior cutaneous nerve of the thigh; somatic pain experienced in the L2–S5 dermatomes.

C. Features

1. Over 90% of women experience severe/unbearable labor pain, although recollection fades with time.

2. Typically, pain is similar to other types of visceral pain, i.e., intermittent, severe, and colicky; it starts in the lower abdomen and back, spreading to the perineum and thighs (Lowe 2000).
3. Pain may be influenced by the factors already listed above, in particular by social, societal, and cultural aspects. Certain cultures are more emotive and expressive than other, more stoic ones, leading possibly to differences in pain *behavior* rather than in the extent of pain felt. Fatigue and general debility, common in late pregnancy, may also contribute to the experience of labor pain.

V. Consequences of labor pain

A. Understand that labor pain may have adverse physiological and psychological consequences:

1. Respiratory: causes hyperventilation, leading to hypocapnia and respiratory acidosis.
2. Cardiovascular: increases cardiac output and blood pressure via sympathetic activity; this may be problematic in cardiac disease and pre-eclampsia. Increased venous return associated with uterine contractions may also contribute.
3. Neuroendocrine: increases maternal catecholamine secretion with risk of uteroplacental constriction.
4. Gastrointestinal: effect of labor on gastric emptying and acidity is unclear, although delayed emptying and increased acid secretion have been suggested. Opioids are well known to induce gastric stasis.
5. Psychological: severe labor pain has been implicated in contributing to long-term emotional stress, with potential adverse consequences on maternal mental health and family relationships.

B. Understand also that pain during labor may have benefits:

1. Indicates to the mother and those assisting labor/delivery that contractions are occurring.
2. May have positive connotations regarding childbirth, related to societal/cultural influences.
3. May indicate problems (e.g. uterine rupture, placental abruption).

VI. Management of labor pain

Be familiar with methods of management of labor pain (available techniques will vary according to local resources and customs):

A. Nonpharmacological:

1. Psychological preparation/support, e.g., sympathetic partner, relatives and care-givers; appropriate relaxing environment; psychoprophylaxis, i.e., positive conditioning, distraction, and relaxation techniques (Simkin and O'Hara 2002).
2. Hypnosis: needs appropriately trained hypnotist; 10–20% women are not susceptible to hypnosis, and side effects include anxiety states.
3. Aromatherapy, reflexology, and acupuncture: labor-intensive, and their role is thought to be limited.
4. Transcutaneous electrical nerve stimulation (TENS): often used in early labor and for low levels of pain, but its efficacy in labor is not supported by a systematic review (Carroll et al. 1997).
5. Others: include abdominal decompression and distraction techniques.

B. Systemic analgesia:

1. Parenteral:
 - a. “Pure” opioids, e.g., pethidine (meperidine), morphine, diamorphine; more recently fentanyl and remifentanyl. Many of the apparent “analgesic” effects may be due to sedation (Olofsson et al. 1996). All cross the placenta easily, and both mother and baby need monitoring during and after labor.
 - b. Mixed agents, e.g., meptazinol, tramadol: show no evidence of greater efficacy or safety than traditional opioids.

2. Inhalational:

- a. Nitrous oxide: available premixed 50:50 with oxygen in many countries, where it is widely used but of limited efficacy. May cause nausea, drowsiness, or euphoria and may interact with opioids to cause maternal desaturation.
- b. Volatile agents: most have been studied and found to be helpful, though limited by difficulties in delivery (e.g. draw-over vaporizers and scavenging required) and side effects, particularly sedation.

C. Regional analgesia:

1. Local infiltration/nerve blocks:

- a. Paracervical block: rarely used because of the high risk of intravascular injection and fetal bradycardia.
- b. Pudendal block: used for vaginal deliveries (including instrumental). Blocks the pudendal nerve (S2–S4) arising from the sacral plexus, supplying the lower vagina, vulva and perineum. Ineffective for procedures requiring extensive manipulation e.g. mid-cavity forceps/rotations.

2. Neuraxial techniques:

- a. Caudal: rarely used in developed countries because lumbar epidurals are easier to manage and more flexible.
- b. Spinal: useful for single procedures, e.g., instrumental delivery, but less commonly used for labor, because the effect of a single-shot spinal may not last long enough, even if opioids and local anesthetic are used together.
- c. Lumbar epidural: widely used in developed countries. Has the following advantages:
 - i. Thought to be the most effective form of analgesia in labor.
 - ii. Provides analgesia for instrumental/assisted delivery.
 - iii. Avoids the need for general anesthesia with its attendant risks, since the epidural can be topped up for cesarean section or other procedures.
 - iv. Improves the management of pre-eclampsia and thought to be of benefit in multiple pregnancy and prematurity.
 - v. Reduces cardiovascular, respiratory, and neurological stress in systemic disease.
 - vi. May improve neonatal acid-base status in maternal exhaustion.

3. Contra-indications are similar to those in non-obstetric practice; hypovolemia and coagulopathy are the most common. Thrombocytopenia, e.g., associated with pre-eclampsia, may contraindicate neuraxial techniques, although the benefits must be weighed against the risks, and the “safe” cut-off for platelet count is unknown (most authorities using a cut-off of $70\text{--}100 \times 10^9/l$).

4. Brief summary of techniques:

- a. An epidural catheter is usually placed at L3–L4 or L4–L5. In combined spinal-epidural (CSE) techniques, intrathecal local anesthetic and opioid (e.g., bupivacaine 2–4 mg with fentanyl 10–20 μg) are injected first, using either a needle-through-needle or separate-space method. More rapid onset and better analgesia have been claimed for CSE, but these are disputed.
- b. Epidural analgesia is commonly achieved using low-dose mixtures (e.g., bupivacaine 0.1% with fentanyl 2 $\mu\text{g}/\text{mL}$) by infusion (8–15 mL/h) or bolus (10–15 mL as required). Patient-controlled analgesia is also used, but it requires more complex delivery systems, and its advantages and disadvantages are still disputed.
- c. Bupivacaine is still widely used; ropivacaine and levobupivacaine have been introduced more recently. Fentanyl is the most commonly used opioid; in the United States sufentanil is popular.

5. Complications are as for nonpregnant patients. If accidental dural puncture occurs during epidural analgesia, postdural puncture headache occurs in ~50% of cases; the risk of headache after spinal anesthesia with 25–27 G pencil-point needles is <2% (Choi et al. 2003). Neurological lesions are common after childbirth, so women should be warned of the small extra risk from regional analgesia (Loo et al. 2000).

REFERENCES

- Carroll D, Tramer M, McQuay H, Nye B, Moore A. Transcutaneous electrical nerve stimulation in labour pain: a systematic review. *Br J Obstet Gynaecol* 1997; 104:169–175.
- Choi PT, Galinski SE, Takeuchi L, et al. PDPH is a common complication of neuraxial blockade in parturients: a meta-analysis of obstetrical studies. *Can J Anaesth* 2003; 50:460–469.
- Loo CC, Dahlgren G, Irestedt L. Neurological complications in obstetric regional anaesthesia. *Int J Obstet Anesth* 2000; 9:99–124.
- Lowe N. The nature of labor pain. *Am J Obstet Gynecol* 2000; 186:S16–24.
- Olofsson C, Ekblom A, Ekman-Ordeberg G, Hjelm A, Irestedt L. Lack of analgesic effect of systemically administered morphine or pethidine on labour pain. *Br J Obstet Gynaecol* 1996; 103:968–972.
- Rathmell J, Viscomi C, Ashburn M. Management of nonobstetric pain during pregnancy and lactation. *Anesth Analg* 1997; 85:1074–1087.
- Saisto T, Halmesmaki E. Fear of childbirth: a neglected dilemma. *Acta Obstet Gynecol Scand* 2003; 82:201–208.
- Shapira SC, Magora F, Chrubasik S, et al. Assessment of pain threshold and pain tolerance in women in labour and in the early post-partum period by pressure algometry. *Eur J Anaesthesiol* 1995; 12:495–499.
- Simkin P, O'Hara M. Nonpharmacologic relief of pain during labor: systematic reviews of five methods. *Am J Obstet Gynaecol* 2002; 186:S131–159.
- Whipple B, Josimovich JB, Komisaruk BR. Sensory thresholds during the antepartum, intrapartum and postpartum periods. *Int J Nursing Stud* 1990; 27:213–221.