

# Analgesia in labour and delivery

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## Abstract

Pain is defined as “an unpleasant sensory or emotional experience associated with actual or potential tissue injury”.

Labour pain is encountered during contractions in labour, and patient satisfaction correlates closely to how well it is managed. Doctors commonly encounter acute pain in clinical practice which can be treated simply by applying some basic rules. However, pain due to labour requires specific management which falls outside the basic principles of acute pain management and it is important for practitioners who look after these patients to understand what can be offered.

This review considers the basic principles of each of these techniques using common clinical scenarios. The type of analgesia given will determine where labour takes place and this will be reflected in each case. Specifically, the World Health Organisation (WHO) analgesia ladder is not applicable in these patients because the periodic nature and the intensity of labour pain renders this model obsolete, although is applicable after delivery.

**Keywords** anaesthetics; analgesia; delivery; labour; obstetrics

## Introduction

Analgesia in labour is complex and can fluctuate from moment to moment depending on the stage of labour; each requiring a particular skill set and equipment. Labour analgesia can be broadly classified into regional and non-regional analgesia, with a further sub-classification of non-regional as pharmacological and non-pharmacological. Early planning and antenatal counselling are essential in a multidisciplinary clinic offering an anaesthetic opinion as well as midwifery and obstetric advice for high risk patients with multiple co-morbidities such as high BMI, difficult spinal anatomy and previous obstetric or anaesthetist complications.

Labour is a physiological process which involves delivery of the baby and placenta from the uterus to the outside world. Management of pain during labour is very important to ensure

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that this is a positive experience for the woman and her partner. Understanding this physiology will enhance understanding of why certain techniques are used.

The type of pain experienced relates to the different stages of labour:

- The first stage relates to uterine contractions. Pain signals are transmitted via A $\delta$  and C afferents fibres through the sympathetic nerves to the sympathetic chain. The pain is therefore felt at T10–L1 dermatomes. Cervical pain is carried to the S2, 3 dermatomes via parasympathetic pelvic splanchnic nerves. A $\delta$  fibres are thin and myelinated with a moderate speed of signal conduction. These fibres transmit acute, sharp pain. C fibres are unmyelinated and have a slower conduction velocity. C fibres primarily transmit a deep, dissipated type of pain after the initial injury.
- The second stage of labour relates to the passage of the baby through the birth canal, where the pain is more localised to the perineum. Pain afferents are A $\delta$  fibres via the pudendal nerves, affecting the S2–4 dermatome.

## Case 1: home/midwifery led unit

**A 30-year-old G3P3 woman in early labour, contracting moderately every 3–4 minutes**

It is possible for labouring women to require minimal analgesia, particularly in the multiparous patients. Non-pharmacological methods which are recognised to help in labour include the presence of non-medical trained support, such as a doula, who can provide advice before, during or after childbirth. Other methods which have not been well-studied but may have some effect include immersion in water, relaxation, acupuncture and massage. There is insufficient evidence of the effectiveness of hypnosis, biofeedback, sterile water injection, aromatherapy and Transcutaneous Electrical Nerve Stimulation. Although robust scientific evidence may be lacking in the non-pharmacological methods, they remain available for patient to choose and their effectiveness should be considered on an individual basis. Simple analgesia such as paracetamol can be given but there is not a significant amount more than can be offered. Pharmacological solutions in this setting is rudimentary as personnel and monitoring equipment are not available unless in a hospital setting.

## Case 2: labour ward

**A 26-year-old primiparous patient with a history of pre-eclampsia (not requiring medication). She is 5 cm dilated, contracting 3–4 in 10 and now requesting analgesia**

This particular patient is not uncommon considering pre-eclampsia (PET) affects up to 8% of all pregnancies worldwide. An epidural will be beneficial for her, especially an early one in labour, for numerous reasons. Controlling her pain will help to control any excessive hypertensive responses. As covered in more detail later, the sympathetic blockade from the epidural can cause vasodilation and can improve placental blood flow to the fetus.

## Epidural analgesia

Regional anaesthesia, including epidurals, remains one of the most effective forms of pain relief in labour. This method requires the skill of an anaesthetist for insertion together with fetal

and maternal monitoring after insertion. Therefore the patient must be cared for on labour ward where monitoring can occur. An epidural is a “neuraxial” technique which offers reliable, effective and flexible analgesia to patients in labour. Importantly, drugs used in this method are not spread systemically. As shown in Figure 1, an epidural catheter is inserted via a Tuohy needle into the epidural space at an appropriate level. The anaesthetic mixture, containing a local anaesthetic (LA) and an opioid, is injected or infused into this space. The LA used is usually 0.5% bupivacaine or levobupivacaine while the opioids used are fentanyl or diamorphine. An epidural offers reliable, effective and flexible analgesia to patients in labour. The peak onset occurs after 20 minutes, but once this is reached, the pain relief is sustained and complete. An appropriate block will extend to the sacral area such that it will cover pain from the second stage of labour pain. The nerve region blocked by an epidural will depend on its primary indication – for example, a block extending to T8/T10 may be sufficient to provide analgesia for labour contraction pains, whilst a denser block extending to T4 is required for a Caesarean section (CS). Quite often, instrumental delivery and episiotomies may be performed without needing to “top up” the epidural or requiring other analgesic techniques.

The patient must be fully consented before a regional block. Contraindications are listed in Table 1 and these apply to the other regional techniques used. Due to the nature of the epidural, there may be lower limb motor block. This motor function deficit has been linked to prolonged second stage of labour and increase use of instrumental deliveries. Some patients may find this distressing as they are unable to mobilise. The anaesthetist will assess the effectiveness of the block looking at both the motor block using the Bromage scale and sensory block, then adjust the dose to patient comfort with minimal motor blockade. A different

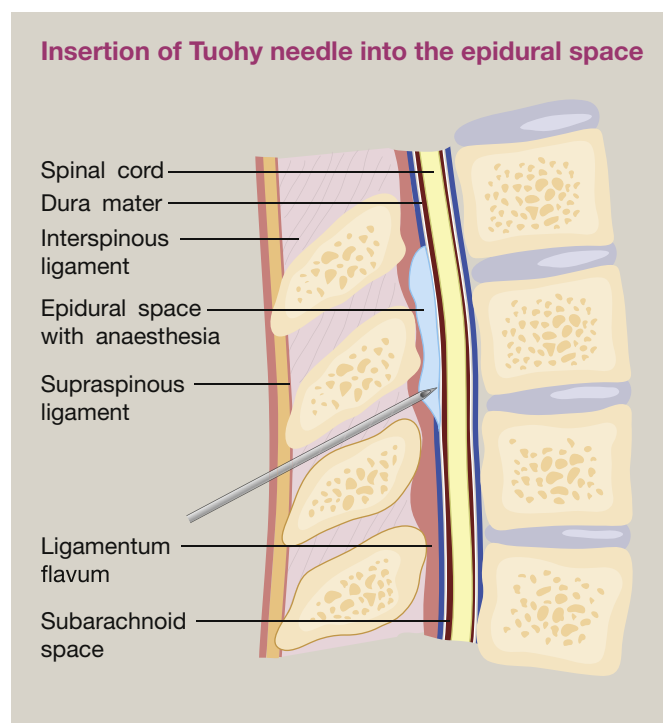


Figure 1

### Contraindications for regional anaesthetic blocks

Absolute	Relative
Maternal refusal	Significant haemorrhage is expected
Local infection	Untreated systemic sepsis
Uncorrected hypovolaemia	Certain cardiac diseases – shunts, where rapid BP changes are not tolerated
Coagulopathy (platelets $<75 \times 10^9$ /litre, use of antiplatelet agents such as clopidogrel)	Previous spinal injuries or surgeries
Raised intracranial pressure	

Table 1

LA agent, ropivacaine instead of bupivacaine, can produce less motor blockade but is not as potent. Hypotension can occur due to vasodilating effects of preganglionic autonomic B fibres inhibition. This should be anticipated and managed as appropriate with vasopressors such as metaraminol or phenylephrine.

Epidurals can provide other benefits beside analgesia; by blunting sympathetic nervous activities they can attenuate the sympathetic response to anxiety and pain. There is also a reduced risk of thromboembolism in the lower limbs. This regional method means that women can have skin-to-skin contact with their babies immediately after birth – this is a recommendation by The Royal College of Obstetrics and Gynaecology (RCOG) to improve bonding. Paradoxically, breastfeeding after having an epidural may be problematic. It has been found that women undergoing an epidural will have more difficulty starting an infant on breastfeeding within the first 24 hours. This phenomenon is not entirely understood but if feeding is not established within the first hour, these mothers run a high risk of needing bottle supplementation instead.

**Spinal tap:** if the epidural catheter punctures an epidural vein, the LA can be injected directly to the central venous system and results in toxicity even with small doses. This is particularly dangerous as epidural doses of bupivacaine are of much larger quantity than spinal doses (~20 ml versus ~2.5 ml). If the catheter pierces the dura, an excessively high block can result due to injection into the subarachnoid space, which at worst can result in a total spinal block. A patient with total spinal block will require ventilatory and circulatory support. Epidural abscesses or haematomas are rare (under 1 in 160,000) and serious complications but should be considered if a patient still complains of motor blockade more than six hours after cessation of the infusion or has new onset incontinence. These conditions can result in permanent paraplegia if not identified and treated in a timely fashion. Urgent radiological imaging and discussion with the spinal team are warranted to salvage the situation before damage becomes permanently irreversible.

**Epidural block:** an epidural block has a similar side effect profile to that of a spinal. There is a risk of infection in procedures and a spinal infection can be particularly catastrophic, requiring potent

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