Labour is recognised as a complex and highly individual process and not every woman wants or needs an analgesic intervention for birth (Eltzschig et al 2003). However, regional block for labour analgesia is a common intervention in the developed world (Chan et al 2006; Hawkins et al 1997) and has been shown to be more effective in reducing pain during labour than non-regional techniques (Anim-Somuah et al 2005, Level I). The lack of consistency in the management of regional analgesia, even between institutions, has led some countries to seek recommendations or guidelines (Stamer et al 2007). Some of the evidence in this document can also be found in the acute-pain scientific evidence NHMRC-approved document (ANZCA 2005).

Regional (epidural, combined spinal-epidural or spinal) techniques provide effective labour analgesia and are associated with a high degree of patient satisfaction (Anim-Somuah et al 2005, Level I). Current Australian data suggest that regional analgesia techniques are utilised by approximately one third of labouring women (Chan et al 2006). As with any intervention, the anaesthetist is required to balance the recognised risks of regional blocks with their expected benefits for each individual patient. Labouring women provide researchers with a challenging environment which has tended to limit the number of randomised controlled trials (RCT) in this setting. Much of the evidence of serious rare events associated with regional block comes from large cohort studies (Paech et al 1998, Level IV; Ruppen et al 2006, Level IV), maternal mortality reports (Lewis 2007, Level IV), AIMS reports (Sinclair et al 1999, Level IV), and closed claims studies (Chadwick et al 1996, Level IV). As research evidence in this setting is limited, some anaesthetic bodies have
based their recommendations on a combination of both research reports and surveys of anaesthetists reporting best practice (ASA 2007).

1. CONSIDERATIONS PRIOR TO PERFORMING REGIONAL ANALGESIA

Regional analgesia techniques have the potential not only for significant benefit, but also can be associated with adverse events which range from minor and transient to permanent and severe, including death. As with any other medical intervention it is important to evaluate the benefits versus clinical risk on the basis of estimated frequency and potential severity of the adverse outcomes. Women with co-existing medical conditions (Bucklin 2006) or those taking certain prescribed (including anticoagulants) or illicit medications (Kuczkowski 2003) present particular challenges. Pre-eclampsia and its variants can also have significant implications and this topic is covered in detail elsewhere.

1.1 Medical conditions

There are a number of specific concurrent medical conditions that are of particular importance. Principles of care are covered below for some of these. For detail, in relation to specific uncommon and rare disorders, dedicated texts are available (Gambling 2008).

Cardiovascular disease

Women with cardiovascular disease tolerate the hemodynamics of carefully conducted regional analgesia better than those without effective analgesia during labour and delivery (Bucklin 2006). Epidural analgesia use does not increase the frequencies of caesarean birth, pulmonary oedema or renal failure among women with severe hypertensive disease (Hogg et al 1999, Level III-2).

Neurological disease

The use of regional techniques in women with pre-existing disease should be based on an individual risk-benefit assessment but in general the risks may not be as great as previously supposed, occurring at a frequency of 0.0-0.03% (Hebl et al 2006, Level IV). In the United Kingdom, most anaesthetists perform regional blocks for labour in women with multiple sclerosis. Many emphasise the need for thorough pre-assessment and informed consent (Drake et al 2006, Level IV).

Musculoskeletal disease

Epidural or continuous spinal analgesia (CSA) have been used successfully in approximately 50% of women with scoliosis and/or previous spinal surgery (Crosby & Halpern 1989, Level IV; Smith et al 2003, Level IV).

In women with no pre-existing back problem, the occurrence of new long-term back pain is not increased after the placement of intrapartum regional block (Howell et al 2002, Level II).
Haematological disease

Based on current evidence it is not possible to be definitive regarding a lower limit of the platelet count below which there is likely to be an increased risk of haematoma. Current standards of practice have been drawn indirectly from a number of sources using a variety of outcome measures, including thromboelastography (TEG). Fortunately, the reported incidence of haematoma complications is generally extremely low at approximately 1:170,000 (Ruppen et al 2006, Level IV) which renders evaluation of causative factors problematic. It is noted that the majority of patients with reported spinal haematomas had haemostatic abnormalities and it is likely that the combined effect of various pathologies and drug-induced effects may be unpredictable (Horlocker et al 2003). Any difference between different regional techniques and their relative safety has not been adequately studied.

For normal healthy women there is no increased risk of complications with platelet counts >100x10^9/L (Rolbin et al 1988, Level IV). A count of >80x10^9/L has been proposed as an adequate level for regional blocks when there are no risk factors and the count is not falling (Douglas 2005). A very similar figure of >75x10^9/L has been identified in the setting of pre-eclampsia (Dyer et al 2008; Orlikowski et al 1996; Sharma et al 1999).

von Willebrand’s disease is a cluster of disorders of the endothelium and platelet-derived von Willebrand’s factor (vWF) which manifest as various forms of abnormal bleeding with a prolonged bleeding time. There are several subtypes that respond to different therapies using D-arginine vasopressin (DDAVP), Factor VIII concentrates or both. The most common form is type 1, accounting for approximately 70% of cases. The synthesis of vWF has been shown to increase during pregnancy in type 1 and epidural analgesia for labour has been used without complication (Marrache et al 2007, Level IV).

Morbid obesity

Obese patients featured prominently in the most recent CEMACH report (Lewis 2007). Prophylactic placement of an epidural catheter when not contraindicated in labouring morbidly obese women potentially decreases anaesthetic and perinatal complications associated with attempts at emergency provision of regional or general anaesthesia (Saravanakumar et al 2006).

1.2 Obstetric indications

Planning for epidural analgesia may be appropriate for some obstetric indications. In particular, a regional block and the presence of an anaesthetist have been advocated for twin vaginal birth (Tsen 2008). As many as 27% of women require anaesthetic intervention during second stage and 6% require emergency caesarean section (Carvalho et al 2008, Level IV).
1.3 Medications with implications for managing regional analgesia

Low molecular weight heparin (LMWH)

Anticoagulation is the most important risk factor for the development of epidural haematoma after regional blockade (Horlocker et al 2003). Discontinuing LMWH more than 12 hours before delivery is safe in relation to maternal hemorrhagic complications (Maslovitz 2005, Level IV).

Regional block should be avoided for at least 12 hours after standard doses of prophylactic LMWH. Epidural catheters should not be removed for at least 12 hours after the last dose of such treatment, and any subsequent dose should not be given until at least two hours after catheter removal (Horlocker et al 2003). Detailed consideration of the timing of regional block insertion and epidural catheter removal in relation to prophylactic and therapeutic anticoagulation is covered elsewhere.

Low dose aspirin

In women taking low-dose aspirin there are no adverse effects related to epidural anaesthesia. In spite of an increased bleeding time in a subset of pregnant women, maternal-neonatal bleeding complications are not increased (Sibai BM et al 1995, Level II).

1.4 Fluid pre-loading

Intravenous fluid preloading may help to reduce maternal hypotension but using lower doses of local anaesthetic and opioid-only blocks may reduce the need for pre-loading. Intravenous fluids before epidural analgesia with what are now considered to be high-dose local anaesthetics (such as 0.25% bupivacaine or greater) reduces hypotension. This benefit is not seen when low-dose local anaesthetic techniques are employed (Hofmeyr et al 2004, Level I).

1.5 Consent

Pregnant women want information about analgesia and the risks associated with regional blocks for labour (Jackson et al 2000, Level IV; Kelly et al 2004, Level IV). There is, however, considerable individual variation and the disclosure of information and the form in which it is presented should be tailored to highlight issues of particular relevance to the individual (Bethune et al 2004, Level IV).

The consent process should include a description of the procedure, the alternatives, and risks and benefits. When possible, such information should be given in the antenatal period because the opportunity for discussion is necessarily shortened during labour and might be less than optimal (Cyna & Dodd 2007; Paech 2006). Obstetric anaesthetists report that they provide less information on risk to women in labour than when they are seen in the antenatal period (Black & Cyna 2006, Level IV). The provision specifically of
written information may improve patient knowledge (Gerancher et al 2000, Level II).

The five risks most commonly discussed by anaesthetists in Australia are post dural puncture headache (PDPH), block failure, permanent neurological injury, temporary leg weakness and hypotension. Verbal consent is commonly practiced prior to the provision of regional block for labour analgesia (Black & Cyna 2006, Level IV).

2. MANAGING REGIONAL TECHNIQUES FOR LABOUR ANALGESIA

A retrospective analysis in the USA of 19,259 deliveries showed a rate of regional block for labour analgesia of 75% with an overall failure rate of 12% (Pan et al 2004, Level IV). Irrespective of the technique used, patient satisfaction is very high and typically in excess of 90% (Simmons et al 2007, Level I).

2.1 Epidural analgesia

Epidural analgesia versus non-regional labour analgesia techniques

Epidural analgesia is more effective than non-regional labour analgesia techniques (Anim-Somuah et al 2005, Level I; Liu & Sia 2004, Level I) and may improve neonatal acid base status (Reynolds et al 2002, Level II).

Compared with systemic opioid analgesia, epidural analgesia is associated with up to a four-fold increased incidence of maternal fever. The cause of this has not been defined but associations appear to be prolonged labour and nulliparity (Philip et al 1997, Level II).

Loss of resistance

A loss of resistance technique using saline is associated with better initial analgesia than loss of resistance to air (Beilin et al 2000, Level II).

Test dose

A low concentration of local anaesthetic for a test dose such as 0.125% bupivacaine, rather than a traditional lignocaine-adrenaline test dose, permits ambulation in the early post-block period for most parturients (Cohen et al 2000, Level II).

Timing of block initiation and cessation

Those women who experience severe pain in early labour and desire analgesia can be given safe, effective pain relief with the use of regional labour analgesia regardless of the degree of cervical dilatation. Regional analgesia in early labour does not increase the rate of caesarean delivery, provides better analgesia and results in a shorter duration of labour than systemic analgesia (Wong et al 2005, Level II).
There is insufficient evidence to support discontinuing epidural analgesia late in labour in order to reduce the rate of instrumental delivery. There is evidence that this practice increases the rate of inadequate pain relief in the second stage of labour (Torvaldsen et al 2004, Level I).

**Choice of local anaesthetic**

The concentration of local anaesthetic may influence birth outcome. Regional block for labour analgesia with low concentrations of local anaesthetic (e.g. ropivacaine 0.2% or bupivacaine 0.1%) has been associated with an increased incidence of spontaneous vaginal birth compared with concentrations equivalent to bupivacaine 0.25% or greater (COMET Study Group 2001, Level II).

Studies have attempted to define any differences between various types of local anaesthetic drugs. Bupivacaine and ropivacaine have been specifically compared across a range of concentrations and modes of administration and whilst results are somewhat heterogeneous it is appropriate to conclude on current evidence that there is no difference between the two agents in relation to pain scores, total dose of local anaesthetics used, sensory or motor blockade, labour duration, mode of delivery, side effects, patient satisfaction, or neonatal outcome (Halpern & Walsh 2003, Level I). For practical purposes at small concentrations, ropivacaine and bupivacaine when combined with fentanyl are equally effective for labour analgesia and can be used interchangeably (Owen et al 2002, Level II) and this possibly also applies to levobupivacaine (Sah et al 2007, Level II).

**Effect of opioid adjuvant**

The addition of epidural fentanyl combined with bupivacaine reduces operative deliveries and confers other advantages that may increase maternal satisfaction (Lyons et al 1997; Murphy et al 1991, Level II).

### 2.2 Combined spinal-epidural (CSE) versus epidural analgesia for labour

When CSE is compared with epidural, both provide effective labour analgesia. CSE has a slightly faster onset of effective analgesia from time of injection but is associated with more pruritus. No studies have meaningfully evaluated the time taken from maternal request to the onset of analgesia. There are no differences in maternal satisfaction, maternal hypotension, mobilisation in labour, mode of birth, incidence of post dural puncture headache or blood patch or neonatal outcome (Simmons et al 2007, Level I).

Large retrospective studies have been reported as an attempt to more clearly define the occurrence of uncommon and rare outcomes. Pan et al (2004, Level IV) reported that after adequate analgesia from initial placement, the incidences of overall failure, intravenous epidural catheter, wet tap, inadequate epidural analgesia and catheter replacement were lower in patients receiving CSE when compared with epidural analgesia. However, the technique used for CSE may influence some of these outcomes. The frequency of paraesthesia is increased with the needle-through-needle
technique when compared with the double segment technique (Ahn et al 2006, Level II).

2.3 Patient-controlled epidural analgesia (PCEA) and continuous infusions (CIEA)

PCEA without background infusion reduces local anaesthetic use and is associated with less motor block and the need for anaesthetic intervention when compared with continuous epidural infusion (van der Vyver et al 2002, Level I).

2.4 Intrathecal (spinal) techniques

Single injection spinal opioids with or without local anaesthetics may be used to provide effective, although time-limited, analgesia for labour when spontaneous vaginal delivery is anticipated. If labour is expected to last longer than the analgesic effects of the spinal drugs chosen or if there is a good possibility of operative delivery, a catheter technique instead of a single injection should be considered. A local anaesthetic may be added to a spinal opioid to increase duration and improve quality of analgesia. The ASA Task Force noted that the rapid onset of analgesia provided by single injection spinal techniques may be advantageous for selected patients such as those in advanced labour (ASA 2007).

Single injection intrathecal opioids are as effective as epidural local anaesthetics for the management of pain in early labour. There is comparable analgesia but with increased pruritus (Bucklin et al 2002, Level I). Continuous spinal analgesia is associated with better early analgesia, less motor block and higher satisfaction than epidural analgesia but pruritus is more common and it is technically more difficult with more catheter failures (Arkoosh et al 2008, Level II).

2.5 Fetal heart rate changes

Fetal heart rate (FHR) changes occur both after systemic opioids and in the presence of epidural analgesia. Other than for decelerations, the incidence of these changes is greater after systemic opioid analgesia than after epidural (Hill et al 2003, Level II).

During the insertion of a regional block continuous recording of the fetal heart rate may be neither necessary nor possible (ASA 2007, Level IV) and at any time reduced uterine blood flow from significant maternal hypotension may contribute to fetal heart rate changes.

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) has identified epidural analgesia as an intrapartum risk factor for which electronic fetal monitoring is recommended (RANZCOG 2006). However, there is some evidence that the various regional techniques available may influence fetal heart rate patterns differently. Local anaesthetics alone have little effect on maternal blood pressure except at
what are now considered to be very large doses (Husemeyer & Crawley 1979, Level III-2) and may actually improve intervillous perfusion when there is no maternal hypotension (Hollmen 1982, Level III-2).

Fetal heart rate changes are more frequent after CSE compared with other forms of regional labour analgesia (Van de Velde et al 2004, Level II) but this does not translate to any difference in overall rate of caesarean birth (Simmons et al 2007, Level I).

When compared with non-intrathecal opioid analgesia, intrathecal opioids increase the risk of fetal bradycardia. This is most likely in the first hour after injection and when high doses are used (Mardirosoff et al 2002, Level I). The incidence of fetal bradycardia with intrathecal fentanyl doses of 25μg has been reported as 5% (Palmer et al 1999, Level II). Problems with the fetal heart rate seem less frequent when using low doses of opioids in combination with local anaesthetics for the initiation of spinal–epidural analgesia (Van de Velde et al 2004, Level II).

3. IMMEDIATE MANAGEMENT OF REGIONAL BLOCK COMPLICATIONS

As with any procedure there is the potential for complications and technical difficulties occurring at the time of the intervention. Some of the issues that may arise are covered below and in some cases are dealt with in more detail elsewhere as indicated:

- **Inadvertent dural puncture** - this occurs in approximately 1% of regional blocks for labour analgesia (Pan et al 2004, Level IV).

- **Bloody tap** - 6% of epidural catheters had initial intravenous placement but 46% were made functional by simple manipulations without higher subsequent failure (Pan et al 2004, Level IV).

- **Paraesthesia** - a retrospective observational study of 6497 women receiving regional analgesia in a tertiary hospital found the incidence of paraesthesia more frequent in women receiving a CSE rather than an epidural (Miro et al 2008, Level IV).

- **Hypotension** - the incidence of this is very small if low concentrations of local anaesthetic are used for regional block (Hofmeyr et al 2004, Level I) and there is attention to avoiding aortocaval compression.

- **Inadequate block** - multi-holed epidural catheters are associated with a lower incidence of inadequate analgesia in labour than single end-hole catheters, but this has still been reported to be at least 12% (Collier & Gatt 1994, Level II). The optimal length of catheter insertion when 3, 5 and 7cms were compared, was 5cms (Beilin et al 1995, Level II), and it would appear that further injection of local anaesthetic may be more useful at improving the quality of the block after initial placement compared to catheter withdrawal (Beilin et al 1998, Level II).
KEY MESSAGES

1. Regional block provides more effective pain relief when compared with systemic analgesics during labour (Level I).

2. Intravenous fluid pre-loading prior to regional block for labour analgesia decreases the incidence of hypotension when high doses of local anaesthetic, equivalent to 25mg bupivacaine or more, are used (Level I). Routine fluid loading is not required with low dose techniques as hypotension is uncommon (Level I), but intravenous access should be established in all cases prior to regional block insertion.

3. In view of the potential for maternal hypotension, motor block and fetal heart rate changes associated with regional block for labour analgesia, monitoring these parameters should commence immediately prior to the regional procedure and continue whilst the block is in place.

4. A low-dose local anaesthetic test dose, such as 0.125% bupivacaine rather than a traditional lignocaine-adrenaline test dose, permits ambulation in the early post-block period for most parturients (Level II).

5. There is no difference in analgesic effectiveness or adverse effects between ropivacaine and bupivacaine for epidural analgesia during labour (Level I).

6. PCEA without background infusion reduces local anaesthetic use and motor block when compared with continuous epidural infusions (Level I).

7. Both CSE and epidural regional techniques provide effective analgesia for labour, with a high degree of maternal satisfaction of at least 90%. CSE is associated with more pruritus. There are no differences in the quality of analgesia or maternal mobility if low concentrations of epidural local anaesthetic combined with opioid are used (Level I).

8. Single injection intrathecal opioids provide comparable early analgesia to epidural local anaesthetics with less motor block but with an increased incidence of pruritus (Level I).

9. Combination of spinal opioids such as fentanyl with local anaesthetics reduces dose requirements for either drug alone and may help minimise motor block (Level I).

10. Regional analgesia is associated with increased duration of the second stage of labour and instrumental vaginal birth, but has no effect on the risk of a caesarean, long term backache or the immediate status of the neonate (Level I).

11. Women should be advised, preferably in the antenatal period and with written information, of the full range of both pharmacological and non-pharmacological techniques including the risks (particularly PDPH) and benefits of regional block for labour analgesia (Level IV).
12. Epidural analgesia should not be withheld late in labour in an attempt to reduce the rate of instrumental delivery as this practice does not affect the incidence of spontaneous vaginal birth but does increase the rate of inadequate pain relief in the second stage of labour (Level I).

13. Early regional block for labour analgesia should be considered in obese patients and those with cardiovascular disease or obstetric indications, such as twin pregnancy or pre-eclampsia (Level IV).

REFERENCES


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