



Techniques and medication in obstetric regional analgesia

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EPIDURAL ANALGESIA IS THE MOST popular and effective method of labour pain relief available in clinical practice today, but spinal analgesia and combined spinal-epidurals are also increasingly used to guarantee more rapid and reliable obstetric analgesia.

The purpose of this lecture is to review the techniques and medication currently used in obstetric regional analgesia to provide safe and effective pain relief in labour and delivery and to point out some optional modes of labour pain control.

Choice of the technique for neuraxial analgesia: LEA, CSE or ITA?

The epidural infusions used most frequently today contain 0.1 % or less bupivacaine or a stereoisomeric local anaesthetic with an opioid to sustain mobility and minimize the effect of analgesia on the mode of delivery. It has been shown that 12–35 % of parturients request for supplemental medication because of breakthrough pain in labour under continuous infusion of LEA. In other words, the need of medication required for the initiation of epidural analgesia may increase two to threefold from early and late labour along with the increasing pain intensity.

It is up to local preference if LEA is administered as continuous infusion, intermittent boluses or patient-controlled epidural analgesia, and all these modes of delivery provide a similar level of satisfactory pain relief.

However, not all parturients are satisfied with the effect of LEA. The risk factors include, for example, nulliparity, dysfunctional labour, profound fear of childbirth and suspicion of instrumental delivery. In

such cases, CSE is suggested as a feasible option. It provides immediate pain relief and results in fewer requests of supplementation for analgesia than LEA.

CSE has been used with different drugs and combinations, ranging from opioids alone to multiple combinations of local anaesthetics, and other drugs with analgesic properties. The local anaesthetic in most extensive intrathecal use is bupivacaine. The doses administered range from 1 to 2.5 mg combined with an opioid (mostly sufentanil or fentanyl). The analgesia is usually continued as needed, using the epidural technique.

In clinical practice, it is not always possible to use the epidural technique, and using a single injection of intrathecal opioid or local anaesthetic combined with an opioid and/or additives, such as clonidine (ITA), may provide adequate analgesia in spite of the limited duration of pain relief with ITA. A meta-analysis of single-injection intrathecal opioids versus epidural local anaesthetics in labouring parturients failed to reveal any differences in the outcome/mode of delivery.

Postdural puncture headache (PDPH)

When we began to use spinal analgesia in our practice, one of the main concerns was the potentially increasing incidence of PDPH and need for epidural blood patches with the consequent increase of costs. Both clinical practice and literature, however, have shown that no such increase takes place]. According to the recent studies of Paech et al and Rutter et al, the rate of accidental dural punctures in conjunction with LEA is 0.5–0.8 %. These instances are associated with a PDPH rate of 71–81 %. According to the study of Landau et al on

complications of combined spinal-epidural labour analgesia, the rate of PDPH was 0.7 % and the need for epidural blood patches 0.36 % when a 27-gauge Whitacre needle was used. These figures agree with our clinical experience and support the usage of CSE and ITA as an option for labour analgesia.

Ambulation

Ambulation is commonly believed to be of value for the progression of active labour.

In our hospital, midwives were most opposed to LEA, their main arguments being that LEA is “unnatural”, ties the mother to the bed, causes paralysis and slows down the progression of labour and delivery. But our experience with mobile LEA is that few mothers (<30 %) want to ambulate, is accordanced with other studies.

On the other hand, a recent prospective, randomized study failed to show any advantage of ambulation during mobile epidurals on the duration of labour, the use of oxytocin, the mode of delivery or the maternal and neonatal outcome. Golará et al, who studied the effects of mobilization on the second stage of labour, found it to shorten the active pushing phase at the second stage, but to have no effect on the mode and outcome of labour and delivery.

Choice of local anaesthetic

Bupivacaine continues to be most commonly used local anaesthetic in obstetrics, but single-isomer local anaesthetics, such as ropivacaine and levo-bupivacaine, have been developed to improve safety.

Ropivacaine

Ropivacaine has gained popularity as an agent for LEA because of its purportedly lesser toxicity and greater selectivity for sensory fibres compared to bupivacaine. However, previous studies have suggested that ropivacaine is 40 % less potent than bupivacaine in epidural analgesia, based on the reference point of ED₅₀ (effective dose in 50 % of subjects) used in up-and-down sequential allocation studies.

Chua et al demonstrated that ropivacaine 0.125 % and bupivacaine 0.125 % were clinically indistinguishable in terms of pain relief in labour epidural analgesia administered via PCEA. Similar results of clinically indistinguishable initiation and maintenance of labour analgesia by 0.075 % ropivacaine with fentanyl 2 microg/ml vs. 0.075 % bupivacaine with fentanyl 2 microg/ml

were obtained by Owen et al, who attempted to use a local anaesthetic concentration (0.075 %) closer to the estimated ED₅₀ value. Lee et al reported that the ED₅₀ of ropivacaine required to initiate epidural labour analgesia is 18.4 mg, which is less than reported previously, thus confirming the clinical efficacy of ropivacaine. But the recent clinical results of Hoffmann-Kiefer et al supported the findings of Capogna and Polley, who postulated ropivacaine to be less potent for epidural labour analgesia compared to bupivacaine.

A recent intrathecal study comparing ropivacaine and bupivacaine for potency suggested that the anaesthetic ratio between spinal ropivacaine and bupivacaine is 2:3. However, Hughes et al compared intrathecally 2.5 mg of ropivacaine to 2.5 mg of bupivacaine, both with fentanyl 25 microg, and demonstrated equal labour analgesia, but less motor block in the case of ropivacaine.

Levobupivacaine

Levobupivacaine has recently been introduced into the clinical routine because of its more favourable safety profile compared to bupivacaine. Clinical trials have shown it to have similar potency and anaesthetic qualities as bupivacaine.

Vercauteren et al compared intrathecal levobupivacaine combined with sufentanil and adrenaline to rasemic bupivacaine as part of combined spinal-epidural labour analgesia and reported similar clinical profiles at equal doses of levobupivacaine and bupivacaine, but less motor block after levobupivacaine administration.

Options of spinal opioids

The spinal opioids most frequently used in obstetrics are fentanyl in a single dose of 10–25 microg and sufentanil 2–5 microg, which both provide analgesia of similar duration and quality when added in equal doses to a solution of local anaesthetic, such as bupivacaine. Cheng et al found the combination of intrathecal sufentanil 5 microg and bupivacaine 1.25 mg to be equally effective as fentanyl 25 microg plus bupivacaine 1.25 mg in early labour, with a mean duration of analgesia 109–118 minutes. They suggested that no further dose reduction of either the opioid or bupivacaine should be made, as that would predispose to a higher rate of analgesic failures.

Stock et al found that the addition of a small 5 microg dose of intrathecal fentanyl to bupivacaine provided a similar dose-sparing effect of bupivacaine as did doses of 15 microg and 25 microg of fentanyl

while the higher doses resulted in a longer duration of analgesia but an increased incidence of side-effects.

Adverse effects of opioids are more common in with intrathecal than epidural use. The most typical mild but annoying side effects, such as pruritus, nausea/vomiting and sedation, are usually more pronounced in connection with spinal opioids, but, the side effects of therapeutic doses are generally mild and easy to treat. Potentially more severe adverse effects, such as fetal heart rate abnormalities, low Apgar scores, need for neonatal resuscitation, uterine hypertonus, maternal respiratory depression and hypotension, are related to higher doses of spinal opioids, which should always raise some concern. The usage of higher doses in obstetric practice should be re-evaluated.

Additives with spinal analgesics

With the aim of prolonging the duration of spinal analgesia without LEA certain adjuvant drugs (additives) have been combined with spinal opioids/local anaesthetics.

Vercauteren et al found that adrenaline added to spinal bupivacaine-sufentanil at a low dose of 2.25 microg significantly prolonged the duration of intrathecal labour analgesia.

Clonidine has been used in combination with subarachnoid bupivacaine and opioid in doses of 50–200 microg to prolong the duration of spinal analgesia. In clinical use, however, clonidine may result in more hypotension and sedation. In a randomized, double-blind study, Paech et al were unable to show any clinical benefit of clonidine administered in doses of less than 50 microg in combination with subarachnoid fentanyl and bupivacaine administered for CSE during active labour.

The use of neostigmine in the clinical routine is problematic due to the predictable incidence of untoward effects.

If epidural fails, what are the options?

In the clinical practice, there may be several things that affect the success of LEA. And as it is known, obstetric patients may pose an even greater challenge, due to the physiological changes produced by pregnancy, compared to surgical patients. Failures in the induction of epidural analgesia may be due to technical problems or problems relating to the patient's intrinsic features/pre-existing diseases. On the other hand, LEA may cause inadequate analgesia due to the marked individual variation in

the subjective sensation of pain, or LEA may be too slow to relieve intense pain in rapidly progressing delivery.

In such cases, ITA may be a good solution and in some special cases with a contraindication to regional analgesia (i.e. coagulopathy, anticoagulation treatment), intravenous remifentanil may be an option.

ITA

Lim et al showed that intrathecal fentanyl 25 microg alone provided good analgesia for approximately two hours in early labour, but it has been shown that the effect is not sufficient for the whole period of labour and delivery. Yeh et al demonstrated that an intrathecal combination of 25 microg of fentanyl, 2.5 mg of bupivacaine and 150 microg of morphine produced satisfactory analgesia for more than four hours with acceptable side effects. Spinal clonidine combined with a local anaesthetic and an opioid prolonged labour analgesia, but a combination with neostigmine produced no further advantage and induced severe nausea.

Remifentanil

Remifentanil, a new ultrashort-acting μ -receptor agonist, has rapid onset and offset with a plasma context-sensitive half-life of 3 minutes. It rapidly crosses the placenta but is quickly metabolised and distributed in the fetus. These features should make it an ideal drug for obstetric analgesia whenever there are contraindications for regional analgesia. Bolus doses of 0.2–0.5 microg/kg in PCA (patient-controlled analgesia) and continuous infusion of 0.025–0.05 microg/kg/min have been used. Volmanen et al defined the median effective PCA dose in labouring parturients to be 0.4 microg/kg with a range of 0.2–0.8 microg/kg. As shown by Volmanen et al, the administration of remifentanil is associated with a high incidence (approximately in 60 % of the study parturients) of maternal respiratory depression, as evidenced by peripheral oxygen desaturation.

Thus, the role of remifentanil in obstetric analgesia will be under research until safety profile is established.

Safety aspects of regional analgesia

Neuraxial analgesia is now safer than ever. Modern low-dose spinal/epidural regimens provide efficacious analgesia, stable maternal haemodynamics and few, tolerable side effects. As shown by Hawthorne et al, the modern epidural technique maintains a stable

mean arterial pressure and cardiac index regardless of whether or not preloading is used. According to these findings, maternal hypotension appears highly unlikely during regional analgesia in clinical practice, and if some hypotension occurs, it is mild and easily treatable. This is related to the fact that the dose of local anaesthetic administered for analgesia has been reduced five to tenfold from the first attempts to use epidural analgesia for obstetric pain relief. But, in spite of that, complications are possible due to the invasive nature of neuraxial analgesia, the influence of the drugs used in neuraxial anaesthesia, patient characteristics, such as comorbidities, or medical malpractice. Severe complications are extremely rare, i.e. published mainly as case reports. However, high doses of intrathecal opioids involve serious side effects.

Conclusions

Hence, up till now, there has been no single new drug to overcome the superiority of LEA

used in obstetric analgesia. Rather, the multi-drug regimens of neuraxial analgesia have turned out very safe options. These techniques allow the parturient to participate actively in the course of labour and delivery, preserving motor function and strength for pushing during the second stage. Thus, the outcome of labour and delivery and the welfare of the neonate are minimally affected without compromising the quality of analgesia. □

Kirjallisuusviitteet:

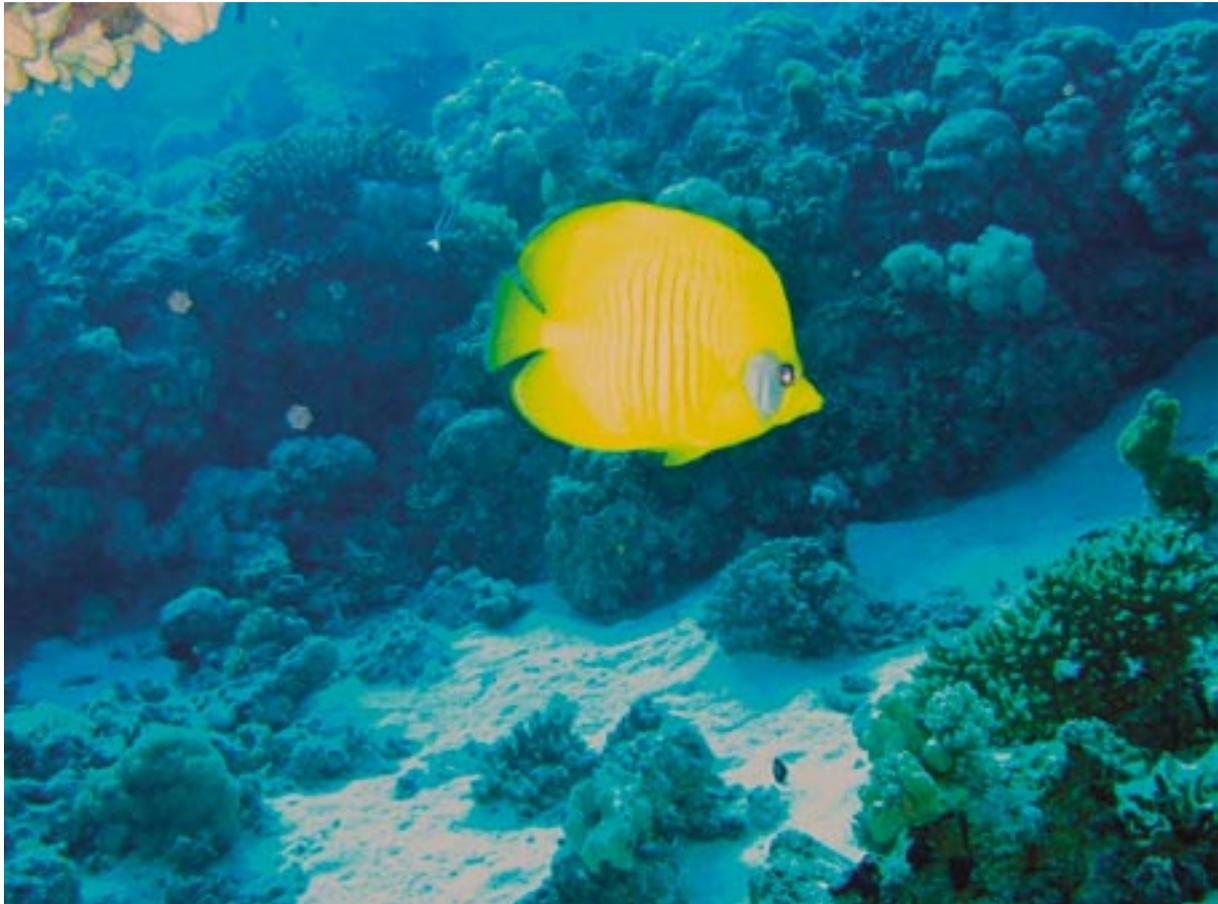
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