Canadian Journal of Rural Medicine | Journal canadien de la médecine rurale

Fall 2000 Contents • Automne 2000 Table des matières

Intrathecal narcotics for labour analgesia: the poor man's epidural

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CJRM 2000;5(4):226-9.

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What do you do when all of your non-pharmacological pain-relieving techniques have been tried but have failed to give your labouring patient an acceptable level of pain control? If you are in a large urban maternity centre you call for the epidural service. If you are in a rural community hospital (and even in many larger centres) your patient will not likely have access to 24/7 epidural analgesia services. Other pharmacological interventions at your disposal, such as intravenous narcotics or inhaled nitrous, are much less effective than epidural analgesia, have short duration and may have unwanted maternal or fetal sedation as potential side effects.1

Intrathecal narcotic (ITN) administration rivals epidural analgesia2,3 in providing labour analgesia, but is faster in onset,3 safer, less technically demanding and can potentially be provided by non-anesthetists.1,4 ITN is well received by those women who choose to have it and has a high degree of patient satisfaction following its use.2,5–7

ITN does have limitations and cannot and will not replace epidural analgesia/anesthesia. But it is a technique that has its own merits and limitations and I believe it has a significant potential for improving pain control in rural maternity services that have no full-time epidural services.

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How does it work?

Intrathecal narcotics provide a selective blockade of pain transmission without significant sympathetic or motor blockade. The patient gets significant, even profound, pain relief without sedation, hypotension or paralysed legs. The technique is simpler than continuous epidural techniques, has a more rapid onset and requires less maintenance and monitoring than an epidural.

Physiology

Pain in the first stage of labour is a visceral pain resulting from the contraction of the uterus and dilation of the cervix. Input to the CNS is via slowly conducting unmyelinated "C" afferent nerve fibres entering the spinal cord at the T10–12 and L1 spinal segments. These impulses are modulated at the dorsal horn level in the spinal cord. Narcotics in the spinal fluid actively block this transmission by binding to the opiod receptors in the substantia gelatinosa in the dorsal grey matter of the cord.

Pain in the second stage of labour is associated with perineal stretching. This results in pain stimuli, which travel up the pudendal nerve, entering the spinal cord at the S2-4 segments via quick-conducting myelinated "A" fibers, and which are not modulated at the spinal cord level. Intrathecal narcotics do not relieve this somatic pain significantly. Additional pain management for the second stage may be required. Pudendal block is quite complementary to this technique if additional analgesia is required in the second stage.

What are the risks?

Adverse effects can be grouped into the effects of the medication and the possible complications of the route of administration.

Medication-related risks
Medications for the intrathecal space must be preservative-free preparations. Preservatives used in medication preparations may cause neurological damage if injected into the spinal fluid. Sublimaze® (fentanyl) or Epimorph® (morphine) are specifically preservative-free.

The side effects of ITN are the same side effects we see with narcotics used parenterally. These side effects are pruritis, nausea, sedation and respiratory depression. An additional side effect specific to ITN, urinary retention, is a fairly common occurrence. Fetal respiratory depression has not been noted, probably due to the very small doses of narcotic required in this technique.

Quality and duration of labour does not seem to be affected.1,8,9 There have been a few anecdotal reports of uterine hyperactivity following intrathecal fentanyl,10 but no adverse outcomes have been reported. Larger studies have not found this to be a problem.

Narcotic side effects are generally due to central nervous system (CNS) stimulation by the narcotic in the cerebrospinal fluid (CSF). They are more common with the water-soluble narcotic morphine than the highly lipid-soluble narcotics such as fentanyl and sufentanil, which are more rapidly "fixed" in the lipid-rich tissues of the spinal cord and are less likely to spread cephalad. Side effects with morphine are more prolonged and may occur much later, up to 12 hours, than the more lipid-soluble narcotics. Side effects are also dose related.7,11

Studies showing the dose response relation for intrathecal fentanyl and morphine have been done.7 These have shown that the analgesic effect seems to maximize at about 25 µg for fentanyl and at about 0.25 mg for morphine. Above these levels analgesic effect is not significantly increased. Duration of action does increase with higher doses but unfortunately so does the incidence of adverse effects; therefore, the doses mentioned seem to be the best compromise between efficacy and duration versus adverse effects.

Side effects seem to be more common if the pain level is lower; this is generally also true for parenteral narcotics.2 For example, there has been a higher reported incidence of nausea and vomiting post-partum in women who have had ITN. The mechanism is unclear. Medication side effects are generally well tolerated and can be managed easily when they need to be.

Pruritis is common, with a frequency of 40%–70% across all studies. The pruritis is generally mild, and most patients are comfortable with it, especially in view of the profound analgesia the technique affords them. In those women in whom the pruritis is uncomfortable, treatment with antihistamines may, or may not, be effective due to the central CNS cause. Treatment of side effects with narcotic agonist/antagonists is very effective and does not alter the analgesic effect once it is established; this is because the analgesic effect is from the binding of the narcotic to the cord tissues and the antagonist does not seem to displace the narcotic once it is bound in the cord tissues.

Occasionally, significant nausea may occur and is more likely to occur post partum.2 Intra-partum nausea is common in women who have not had any ITN, so it is difficult to know whether to ascribe the nausea to the medication or to the labour. Postpartum nausea is more likely a medication effect and it is quite amenable to treatment with metaclopramide or with naloxone

or naltrexone.

Watch out for urinary retention, which is also common (up to 20%).7 The intrathecal narcotic seems to interfere with relaxation of the sphincter muscle of the bladder. Urinary retention can be managed by catherterization if necessary.

Respiratory depression is a rare but potentially serious occurrence following ITN. This is due to the effect of the narcotic on the respiratory centre of the brain if the narcotic spreads cephalad. This is more likely to occur early (1 hour) with lipid-soluble narcotics such as fentanyl, which are absorbed rapidly into CNS tissues, but it can be quite delayed (up to 12 hours) with water-soluble narcotics such as morphine. Most of the respiratory depression reported in the literature occurred with higher doses of morphine (1 mg to 5 mg) and more recent studies limiting the dose of morphine to 0.25 mg have had large series without respiratory depression occurring.1,6,8,12

Respiratory depression may or may not be accompanied by any change in other CNS functions, so it may appear to cause abrupt respiratory difficulty. If respiratory depression occurs it tends be progressive and generally can be anticipated by regularly checking the patient's respiratory rate; rates of less than 10 breaths/min should be treated promptly. Pulse oximetry may be helpful but should not be used as the sole method of monitoring. Careful attention to the respiratory rate by the attending nurse is required.

Respiratory depression may be potentiated by additional administration of oral or parenteral narcotics. These should be avoided in the postpartum period for up to 24 hours after administering morphine and for 12 hours after administering fentanyl. Fortunately, postpartum pain is generally managed well with non-narcotic analgesics in this patient population, presumably due to a residual effect of the original intrathecal dose.

Should it occur, respiratory depression is managed using naloxone. Naloxone (Narcan®) should be kept at the bedside so that it is immediately available. One must recognize that the ITN effect may outlast the short duration of naloxone and that repeat dosing or continuous infusion or the additional use of a longer duration antagonist like naltrexone may be required. Some sites routinely give naltrexone, 12.5–25 mg by mouth, postpartum, to prevent respiratory depression.6 My experience is that if you stay within the dosing suggested, this does not seem warranted because the risk is very low with these doses. Your facility's ability to adequately monitor the patient postpartum may guide you here.

Supplies for ventilatory support should be readily available in the unlikely event that intubation is required.3 Sedation may also occur but is uncommon at the doses recommended here. Management is the same as for respiratory depression.

Hypotension has been reported anecdotally and has generally been seen with larger doses or when combined with other anesthetic drugs. It has been rare with pure narcotic techniques where

the dosing has been limited. It is more likely when the patient is already dehydrated. Hypotension should be managed by placing the patient in the left lateral supine position and by administrating an intravenous fluid bolus. Intravenous ephedrine may also be used as a peripheral vasoconstrictor. Having intravenous access with a large bore (18ga, or better yet, 16 ga) intravenous catheter prior to administering the intrathecal narcotic will allow for prompt management should hypotension occur. This intravenous catheter could be saline locked to allow greater freedom of motion when the ITN is established and it is clear that there is no need for a continuous infusion.

Technique-related complications
Post-dural puncture cephalgia (a.k.a. spinal headache) is much less common with new, small-gauge (25 gauge or smaller) pencil-point needles (Whitacre, Sprotte). Spinal headache has a reported incidence of 1%–8% with these needles.

The spinal headache is typically frontal and generally postural-related. It disappears when the patient is supine and comes on when the patient sits or stands. This type of headache generally is mild and self-limited. Post-spinal cephalgia is best treated by good hydration, mild analgesics as required, and keeping the patient in a supine position for 24 hours if it does occur. A very small percentage of patients, less than 1%, may require autologous blood patch to alleviate this symptom.6

Infection is a potentially serious complication in the subdural space but is very rare when this technique is used. Care in using aseptic technique is indicated.

Contraindications to ITNs are the same as for any spinal medication: coagulopathy, infection at needle insertion site (some would also say sepsis regardless of site), hypovolemic shock and lack of patient consent.

Other limitations

The technique of ITN is limited in duration.3 Fentanyl (25 µg) lasts 1–3 hours, and morphine (0.2–0.25 mg) may last 4–7 hours.7,13 Intrathecal morphine alone has a slow onset (40–60 min) so it is best used in combination with fentanyl, which has a rapid onset (3–5 min).

Leighton2 reported using a combination of fentanyl (25 µg) with morphine (0.25 mg) and getting onset of profound analgesia within 5 minutes and lasting up to 8 hours. This technique is generally limited to a single use per labour. Repeated doses may be much less effective in their

analgesic effect and will have a very limited duration of action.6,8 Given these limitations it would seem best suited to use during the active phase of labour, where the duration of labour is not expected to be longer than the duration of the ITN.

ITN may also have some use as an analgesic technique for women with an obstructed labour who are requiring transfer to a centre that has cesarean section capability.

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Politics

A recent provincial guideline in Manitoba requires that only physicians with anesthesia privileges be allowed to perform ITN techniques. It cites side effects and complications as being unacceptable for management by non anesthesia-trained physicians.14

This position is in direct contradiction to studies, done in sites utilizing non-anesthetists, that have shown good effect and outcomes.1,4,12 These sites have seen ITN as a way to provide patients with superior analgesia when they do not have the resources of 24/7 anesthesia services. The studies support intrathecal narcotic administration as a technique suitable for non-anesthetists, provided they are familiar with the technique and its complications and know how to treat complications, should they arise.

The management of hypotension is within the skill set of most rural physicians, and the management of respiratory depression is familiar to those of us who work in the emergency department.

Additionally, a clear-cut educational protocol for the monitoring requirements and interventions for nursing colleges should be in place so that complications will be recognized in a timely fashion and treated promptly should they occur.

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Summary

Intrathecal narcotic administration is an effective analgesia option to consider for women in

labour. ITN will have particular appeal for facilities that do not have readily available 24/7 epidural services.

ITN is a technique that could be done by rural physicians who are not trained in anesthesia, provided they are familiar with the technique of lumbar puncture and that they are well informed on the management of potential complications of the dural-puncture procedure and the side effects of the medications.

Implementing ITN in a facility would require that the facility also provide staffing levels to ensure that monitoring of the patient, intra- and postpartum, is adequate to recognize complications in a timely fashion should they arise.

Competing interests: None declared.

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This article has been peer reviewed.

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