Providing safe and effective analgesia to laboring parturients presents a challenge to anesthesia providers in small hospitals. The necessary time commitment and additional staff needed to provide coverage for the obstetrical area can strain resources. Offering the spinal opioid block as the first choice for labor analgesia and the combined spinal epidural block in selected cases permits a labor anesthesia service to address the needs of the community hospital. Sufentanil injected into cerebral spinal fluid provides effective analgesia for 124 minutes. Adding 2.5 mg of bupivacaine further increases effective analgesia time to 170 minutes.

The combined spinal epidural block offers the advantages of spinal opioid analgesia but with the flexibility of having an epidural catheter in place. The epidural catheter can be dosed intermittently for parturients in whom labor is prolonged, who require surgical manipulation for vaginal delivery, or who require cesarean section for delivery. By offering both blocks to laboring parturients, the appropriate block can be applied in each situation.

Key words: Combined spinal epidural, labor analgesia, narcotic, spinal.

Introduction
Providing safe and effective analgesia to laboring parturients presents a challenge to anesthesia providers in small hospitals (fewer than 500 births per year). The necessary time commitment and additional staff needed to provide coverage for obstetrics can strain the resources of the individual anesthesia provider or the small anesthesia group. The number and availability of anesthesia providers are not the only factors that affect the ability to offer labor analgesia services. Other determinants include the number of annual deliveries per facility, physician interest and support of analgesic techniques, community interest in labor analgesia services, available institutional financial resources, and sufficient nursing support staff. Simultaneous availability of the anesthesia provider to several departments within the hospital adds yet another variable to the list of considerations.

A 1986 survey found that only 18% of vaginal deliveries in small hospitals receive some form of anesthetic, excluding pudendal blocks.1 Reasons for the low percentage included:

1. The unpredictability of labor and delivery.
2. The unavailability of anesthesia personnel.
3. Insufficient remuneration for services.
4. Insufficiently trained anesthesia providers.

A better understanding on the part of the delivering physician about what is and is not possible with labor analgesia could lead to more mutually agreeable choices regarding type and timing of an-
esthesia for labor and delivery, thereby increasing the adoption of such services.

A variety of options are available when developing a labor analgesia service. Parenteral medications, commonly used for labor analgesia, can depress the mother and the baby without providing adequate prolonged pain relief. Continuous lumbar epidural analgesia by infusion, although very effective at relieving the pain of labor, places high demands on obstetric nurses and anesthesia personnel. First, depending on the mixture of local anesthetic and opioid used and the length of time infused, continuous lumbar epidural analgesia can produce undesirable adverse effects, such as hypotension or motor blockade with the possibility of slowed labor and ineffective pushing. Second, continuous epidural infusion requires the purchase and preparation of infusion devices, tubing, and solutions along with a certain knowledge and skill level for management by anesthesia and nursing staff. It also begs the question of whether nursing personnel (whose obstetric unit staffing may consist of only 1-3 nurses per shift in the small hospital) should be continuously present in the labor room. With an epidural infusion, there always exists the possibility of a high block or epidural catheter migration into the cerebral spinal fluid (CSF) or epidural blood vessels. Anesthesia staff availability and the time commitment required for this method of labor analgesia can tax small anesthesia departments or solo anesthesia providers beyond their capabilities.

Cohen, in her overview of growth and change in obstetrical anesthesia, mentions the "inevitable disparity in resources and personnel between large urban medical centers and smaller rural hospitals. Providing a 24-hour continuous laboring epidural service can place an impossible staffing burden on small anesthesia groups." The poor reimbursement for continuous obstetric epidural anesthesia further complicates the problem.2

Spinal opioid labor block

The injection of opioids into CSF provides simple, effective, and safe analgesia to laboring parturients. The term intrathecal (IT) will be used throughout to refer to the subarachnoid space. The technique of administering IT opioids involves a single injection of medication into CSF using a spinal needle. It avoids the need for an infusion pump, tubing, and the mixing of solutions. Opioids given by the IT technique produce pain relief by acting at spinal opioid receptors. Depending on the opioid injected, there is minimal to no resulting numbness, motor blockade, or hypotension. The parturient maintains excellent motor control, a stable cardiovascular profile, and experiences labor analgesia, albeit of limited duration.

* Use of IT morphine. Scott and coworkers reported the use of IT morphine, 1.5 mg, to provide pain relief during labor.3 Although the study was small (n = 12), they made several important observations. First, patients still felt contractions, although they obtained pain relief. This could be viewed as beneficial to the patients who want to participate more fully in the delivery experience. The absence of motor block also could allow for more effective pushing during the second stage of labor. Second, IT morphine achieved analgesia only, not surgical anesthesia. If surgical manipulation during delivery became necessary, such as the use of forceps or episiotomy, then local anesthesia was administered by local infiltration or by spinal or epidural routes.

Morphine provided good analgesia for the first stage of labor but was associated with long latency at 15 to 60 minutes onset time and a high incidence of adverse effects at 62% to 100%.4 5 Occurring rarely is the clinically significant incidence of delayed respiratory depression (0.25% to 7%).6 Because morphine is hydrophilic, it diffuses slowly into the lipid-rich spinal cord while gradually ascending within the CSF to the respiratory centers of the brainstem. It can take from 6 to 24 hours for the morphine-laden CSF to reach these brain centers. Respiratory depression is characterized by increasing levels of sedation, decreasing respiratory rate, and/or decreased oxygen saturation.6 7 The latent effect of IT morphine requires 24 hours of patient monitoring with continuous pulse oximetry and hourly respiratory rate and sedation level.

Other side effects include pruritus (80% incidence), nausea and/or vomiting (53% incidence), and urinary retention (43% incidence).7 The pruritus may range from mild facial itching to generalized, highly irritating itch. Urinary retention can be relieved by catheterization of the bladder as needed. Finally, IT morphine appears to have no effect on the fetus during the intrapartum or immediate postpartum period.3 4 7

The slow onset of analgesia with IT morphine is a drawback. One possible approach to a more rapid onset of analgesia and decreased adverse effects is to combine an opioid of short latency and brief duration of action with a lower dose of IT morphine.

* Combination of IT morphine and IT fentanyl. It was hypothesized that the combination of IT morphine, 0.25 mg, and IT fentanyl, 25 µg, would provide satisfactory labor analgesia with a shorter latency and a lower incidence of adverse effects than IT morphine administered alone.8 The less
costly technique of IT opioids for labor analgesia was investigated, in part, due to the refusal of some health maintenance organizations to pay for epidural analgesia. Morphine, 0.25 mg, and fentanyl, 25 µg, injected by the IT route were found to produce profound analgesia within 5 minutes lasting a mean ± SD of 140 ± 51 minutes when given at 4 to 6 cm of cervical dilatation. The spinal opioid block lasted to perineal distention in 60% of patients studied. The lack of perineal anesthesia was the same as observed with IT morphine administered alone. Patient satisfaction was comparable to previously reported maternal satisfaction with epidural analgesia (80% versus 79%). The study found the combination of IT fentanyl and morphine to be preferable over IT morphine alone as it provided a more rapid onset, increased efficacy, and fewer adverse effects. The researchers made the anecdotal comment that a number of patients and obstetricians preferred the IT narcotic to epidural analgesia.

**IT morphine not recommended.** The usefulness of IT morphine as part of the “spinal cocktail” for labor analgesia has been questioned. Although decreasing the dose and combining IT morphine with a lipid-soluble fast-acting opioid improved the pharmacologic profile, the associated adverse effects still remained problematic, especially as they often persisted after delivery. Furthermore, the need for 24 hours of postinjection monitoring for delayed respiratory depression and dealing with the adverse effects contributed to low patient satisfaction and frustration for the anesthesia provider managing labor analgesia. In an attempt to alleviate or prevent the adverse effects of IT morphine, investigators have given a long-acting narcotic antagonist (naltrexone, 25 mg orally) 30 minutes postpartum to women who had received IT morphine, with reportedly good results. The anesthesia practitioner should hesitate to adopt this practice until the evidence on the use of IT morphine for labor analgesia has been weighed.

It was initially believed that adding morphine to the IT opioid block contributed to prolonged labor analgesia. The decision about whether to use morphine in the analgesic block for labor was aided by the 1993 article by Grieco et al. Combining IT morphine, 0.25 mg, with sufentanil, 10 µg, extended the duration of labor analgesia by approximately 20 minutes when compared with IT sufentanil, 10 µg alone. However, the extra 20 minutes of pain relief provided by the morphine was accompanied by a statistically significant increase in maternal nausea and pruritus. In addition, the authors noted a high incidence of persistent, severe, postpartum adverse effects in patients who received IT morphine. There was also the need to monitor for postinjection respiratory depression for 24 hours when morphine was added compared with 4 to 6 hours with sufentanil alone. By adding morphine to the spinal cocktail for labor analgesia, the adverse effects outweighed the benefit of the extended duration of analgesia (approximately 20 minutes). The routine use of IT morphine is, therefore, not recommended for labor analgesia.

**IT meperidine.** Meperidine by the IT route has been investigated for use in labor analgesia. In laboring parturients with an indwelling spinal catheter, IT meperidine, 10 mg, had a longer duration of effective opioid analgesia at a median time of 301 minutes compared with IT fentanyl, 15 µg at 227 minutes and IT sufentanil, 6.5 µg, at 251 minutes. The patients in the meperidine group also had significantly lower visual analogue scale pain score once cervical dilation reached 6 cm and beyond. Meperidine exhibits analgesia and a weak local anesthetic effect. Some practitioners elect to use IT meperidine when patients request analgesia in advanced labor and delivery is anticipated within 1 hour, while others consider it experimental. When compared with IT fentanyl or sufentanil, IT meperidine’s higher incidence of nausea and vomiting and a greater likelihood of hypotension are limitations to its use for labor analgesia.

**IT sufentanil for labor analgesia.** Sufentanil is currently the most frequently used IT opioids for the first stage of labor. Lipid-soluble sufentanil exhibits a high safety and efficacy profile. It would appear that sufentanil may confer an advantage over fentanyl due to a higher lipid solubility (octanol water partition coefficient of 1778 compared with fentanyl’s 813) and greater receptor affinity. Nonetheless, no measurable advantage of sufentanil over fentanyl is noted when comparable doses are examined.

Sufentanil, 10 µg, injected intrathecally has an onset time of 3 to 5 minutes and will provide labor analgesia for a mean ± SD of 124 ± 68 minutes. An early study emphasized the absence of sensory or motor changes and the lack of hypotension or effect on fetal heart rate (FHR) when IT opioids were used. In contrast, other investigators found an 11% to 14% incidence of hypotension and a 15% incidence of FHR changes after IT sufentanil, 10 µg, was administered for labor analgesia. A bolus infusion of IV fluids prior to administration of IT sufentanil was recommended to offset possible hypotension. Uterine displacement and ephe-
ically significant, and none resulted in interven-
tion to treat fetal compromise.

Pruritus is a very common side effect of all opioids, and sufentanil is no exception. Intrathe-
cal sufentanil may have an incidence of pruritus as high as 95%. Diphenhydramine, 25 to 50 mg IV, can provide relief for cases of severe persistent itching, although rarely does severe pruritus persist beyond the first hour. As an anecdotal observation, many parturients seem to find acceptable the perceived tradeoff of pruritus over inadequate labor analgesia. Nausea and vomiting are infrequent side effects of IT sufentanil, with a reported incidence of about 1% to 2%. Respiratory depression is rare, and if it were to occur, it would most likely do so within the first hour given that IT sufentanil reaches its maximum concentration in the plasma at approximately 40 minutes after administration.

Unlike IT morphine, IT sufentanil exhibits a rapid resolution of symptoms, which corresponds with data demonstrating rapid clearance of sufentanil from the CSF and absorption to plasma after IT administration.

Although sufentanil has been shown to be effective for IT labor analgesia, the reported duration of action has a wide range (56-193 minutes), and in the case of advanced cervical dilation or a rapidly progressing labor, some parturients may not receive adequate analgesia. Investigators began to experiment with combining other medications with IT sufentanil to potentially improve or prolong labor analgesia. Epinephrine was one medication added to IT sufentanil. The addition of 0.2 mg of epinephrine to 10 μg of sufentanil did not significantly prolong labor analgesia, and although the incidence and severity of pruritus was decreased, the incidence of nausea increased. In general, research suggests there is little reason to add epinephrine to IT sufentanil for labor analgesia.

**Combination of IT sufentanil with low-dose local anesthetic.** The combination of a low-dose local anesthetic with an IT opioid was studied after researchers hypothesized a parallel synergistic effect as seen with epidural labor analgesia. In an endeavor to potentially improve or prolong labor analgesia, this study evaluated the addition of a low dose of IT bupivacaine to sufentanil. The administration of IT bupivacaine, 2.5 mg, alone was compared with IT sufentanil, 10 μg, alone and with the IT combination of bupivacaine, 2.5 mg, and sufentanil, 10 μg, when given to nulliparous laboring parturients at 2 to 5 cm of dilation. The mean ± SD duration of labor analgesia provided by IT bupivacaine alone was 70 ± 34 minutes, by IT sufentanil alone, 114 ± 26 minutes, and by the combination of bupivacaine and sufentanil, 148 ± 27 minutes. The authors concluded that the addition of bupivacaine to sufentanil significantly prolonged IT labor analgesia (by about 34 minutes) compared with either drug alone and also significantly improved the analgesic profile. In addition, no detectable degree of motor blockade, excessive somnolence, FHR abnormalities, nor increase in adverse effects was observed.

Abouleish et al investigated the addition of 2.5 mg of bupivacaine to 10 μg of sufentanil after observing that pure opioid analgesia was often less than optimal for the patient in advanced labor and that epidural analgesia was often accompanied by slow onset time for the parturient in severe pain. Thirty-eight mostly multiparous patients in advanced labor (6 cm or greater) received this combination of IT medication. All patients achieved satisfactory analgesia in less than 5 minutes. Of the patients studied, 60% delivered with no further supplemental medication before delivery. In all cases, the mean ± SD duration from IT drug administration to delivery was 127 ± 99 minutes. All neonates were vigorous, seemingly unaffected by the IT medication.

**Dural puncture and incidence of postdural punc-
ture headache.** One major disadvantage of IT anesthesiology in obstetrics has been the relatively high occurrence of postdural puncture headache (PDPH) in this patient population. Being female and younger than 40 years of age places most obstetric patients who experience dural puncture at high risk for PDPH. The spinal needle size and design are important factors in minimizing the development of PDPH. The cutting needles have an overall incidence rate of 11% to 20% for PDPH even when small gauge needles are used. This compares with an incidence of 1.0 to 3.8% and less than 1% when small gauge, noncutting spinal needles are used. Halpern and Preston reviewed 450 articles on PDPH and spinal needle design and found that there was a reduction in the occurrence of PDPH when noncutting needles rather than cutting needles were used (P < .05). The use of small gauge, noncutting spinal needles has reduced the development and severity of PDPH in the obstetric population, thus increasing the feasibility and acceptance of spinal anesthetic technique in this high-risk patient population.

**Summary of spinal opioid block.** The injection of IT opioids alone or in combination with a low-dose local anesthetic is an effective, simple, and safe technique requiring a minimum of equipment. This block provides profound labor analgesia of rapid onset with minimal motor blockade and side effects. Intrathecal sufentanil, 10 μg, alone or IT sufentanil, 10 μg, in combination with bupivacaine,
2.5 mg, appear to be the most efficacious and safe drug choices for the laboring parturient and her fetus. Although the duration of analgesia is a limitation to this technique, close collaboration and communication among the attending physician, the labor nurse, and the anesthesia provider will aid in the appropriate timing of block administration. The spinal opioid block can be repeated in the patients whose labor continues beyond the duration of the initial injection. A number of patients and attending physicians may prefer the spinal IT opioid block for labor analgesia due to the lack of motor block, no apparent marked delay in advancement through stage one, and the ability of the patient to participate more fully in delivery. A labor analgesia service can be implemented by offering only the spinal opioid block.

Combined spinal epidural block for labor

The combined spinal epidural (CSE) labor block offers more flexibility in the treatment of labor pain. This technique has the advantages of IT opioid analgesia plus the flexibility of having an epidural catheter in place. Brownridge described the successful use of this block using a two-segment approach for elective cesarean section. The technique was later modified to become a needle-through-the-needle, single-segment approach for cesarean section and for labor. The block administration begins by identifying the epidural space by loss-of-resistance technique using a 17-gauge epidural needle. A 25-gauge × 4 1/2 inch noncutting spinal needle is then introduced into the subarachnoid space by passing through the lumen of the epidural needle.

After confirming clear flow of CSF, the desired medication is injected. The spinal needle is removed, and identification of the epidural space is reconfirmed by loss-of-resistance technique. Then with the bevel of the epidural needle cephalad, a 20-gauge epidural catheter is inserted 3 to 4 cm into the epidural space. The catheter is taped securely to the patient's back and is available for subsequent use. Some anesthesia services will not use the epidural catheter until the patient requests additional analgesia, while others will begin a continuous epidural infusion immediately after the spinal opioid injection.

The analgesic relief from the IT narcotic injection may be all that is needed to deliver the parturient. Cohen et al reported that 17 of the 90 patients studied (19%) required no further analgesia before delivery. This contrasts with the 23 of 38 parturients (60%) in advanced labor (6 cm or greater) who required no further supplemental analgesic medications in the study by Abouleish et al. If additional pain relief is needed and no continuous infusion is in effect, the epidural catheter can be intermittently dosed for prolonged labor, for perineal anesthesia for delivery, or for cesarean section.

CSE technique versus epidural technique. Does the CSE technique lead to additional complications compared with epidural analgesia alone? The incidence and severity of anesthetic-related complications in 388 laboring epidurals and 536 CSE blocks was studied. Women who received CSE analgesia were more likely to itch (41% versus 1%) or complain of nausea (2% versus 1%) or vomiting (3% versus 1%) than those receiving solely epidural analgesia. Patients who received CSE analgesia were no more likely to suffer an unintended dural puncture than those who received epidural analgesia. The risk of headache was the same with both blocks and did not differ from the incidence in women receiving no labor block. The incidence and severity of hypotension was the same with either technique. Neither CSE nor epidural analgesia had a significant effect on the incidence of cesarean delivery in all patients (P = .20) and in a subgroup of 470 nulliparous women (P = .86). The CSE analgesia appears to be a safe alternative to epidural analgesia for labor and delivery.

Potential technical difficulties with CSE. A theoretical risk of CSE analgesia is the passage of the epidural catheter or epidurally injected local anesthetic through the dural puncture created by the spinal needle. There is at least one case report of an epidural catheter going through the hole made by the dural puncture during CSE. Two studies used percutaneous epiduroscopy on fresh cadavers to assess the risk of catheter passage through the dural puncture left by the spinal needle when CSE block is performed. Although extensive dural tenting was seen, investigators found it impossible to force an 18-gauge epidural catheter through the dural hole made by a 25-gauge spinal needle.

The possibility of epidurally injected local anesthetics passing into the CSF through this same hole in the dura was investigated. No significant clinical evidence was found in human subjects that dural puncture increased the spread of sensory blockade in CSE patients after local anesthetics were injected into the epidural space. This contrasts with a study using an animal model that demonstrated not only that dural punctures are associated with a size-dependent increase in the transfer of epidural medication into the CSF, but also that this transfer results in markedly larger concentrations of medication at the brainstem.

One infrequent technical difficulty with the CSE labor block is the inability to obtain CSF.
through spinal needle after it is passed through the epidural needle. Norris et al reported a 4.9% incidence of the inability to obtain CSF when attempting to induce CSE analgesia. There are several explanations for this occurrence. The simplest is that the epidural needle was not in the epidural space when the spinal needle was passed through the lumen attempting to puncture the dura. Removing the epidural needle and reidentifying the epidural space will often resolve this difficulty.

In other cases, the epidural space is correctly identified, but no CSF is obtained through the spinal needle. This may occur because the epidural needle was located laterally within the epidural space, and the spinal needle tented the dura but did not perforate it. The anesthesia practitioner then has the choice of removing both needles and starting anew to relocate the epidural space, of threading the epidural catheter and using only that catheter for labor analgesia, or of performing a double-segment approach. This involves threading the epidural catheter into the epidural space and then performing dural puncture with a spinal needle at a different interspace. Placing the patient in the sitting position rather than the lateral position helps with identifying midline and also increases CSF pressure that may increase the likelihood of dural puncture with the spinal needle during CSE analgesia.

Clinical application

Providing a labor analgesia service was a valuable and desirable part of our three-provider anesthesia service to a 66-bed facility where previously only IV analgesia was given for labor analgesia. Annual deliveries at the facility had increased, and there was sufficient interest for more options for labor analgesia. With a general orientation toward natural childbirth in the community and by most of the delivering physicians, it was important to offer effective analgesia while maintaining as much patient participation as possible. The simplicity, effectiveness, and the safety of spinal opioid analgesia along with its low incidence of adverse effects and lack of motor block made it an attractive choice for labor analgesia. Acknowledging the limited duration of analgesia, we maintain that a successful labor analgesia service can be set up by offering only spinal opioid analgesia. It was our choice to also offer the combined spinal epidural block as we were already skilled with epidural administration, and we believed that it expanded our analgesic capabilities and options.

Candidates for the IT opioid block or the CSE block include parturients in active labor, dilated at least 3 to 4 cm, who request labor analgesia and have no contraindication to regional anesthesia. Optimizing the time of the labor block can be accomplished by close collaboration and communication among the attending physician, the labor nurse, and the anesthesia provider. We consider spinal opioid analgesia to be the first choice for labor pain relief, reserving the CSE block for selected cases. For spinal opioid analgesia, we administer sufentanil, 10 µg in 1 to 2 mL of preservative-free saline using a 24-gauge Sprotte spinal needle and a basic spinal tray. An IV must be in place and 1,000 to 1,200 mL of Ringer's lactate infused before the block administration. Bupivacaine, 2.5 mg, is added to the sufentanil dose to prolong the block duration in parturients whose labor is progressing slowly or to improve the quality of analgesia for parturients presenting in advanced dilation and rapid transition. The patient's position during IT injection is based on the anesthesia provider's preference since position should not affect the spread of these isobaric IT medications.

The CSE block is administered to selected patients who could potentially benefit from the placement of an epidural catheter. Patients in whom labor is progressing slowly and who are tolerating labor poorly, who may require cesarean section for delivery, or those who may need surgical manipulation for vaginal delivery are examples of candidates for CSE. Our technique for administration of the CSE block is a needle-through-the-needle, single-segment approach as described (see “Combined spinal epidural block for labor”) in this article. We use a Braun epidural anesthesia tray (B. Braun Medical, Inc., Bethlehem, Pennsylvania) and separately add a sterile BD Durasafe combination spinal epidural anesthesia needle set (Becton Dickinson, Franklin Lakes, New Jersey), which consists of a 17-gauge epidural needle with a hub that interlocks with a 25-gauge x 41/16 inch BD Whitacre spinal needle (Becton Dickinson). Some separately packaged, noncutting spinal needles and epidural needles may be sufficient for combined use. Yet to achieve appropriate hub fit and adequate protrusion length of the spinal needle through the end of the epidural needle and to avoid the likelihood of a bent or broken spinal needle, a combined needle set specifically manufactured for single-space use is recommended.

Once the CSE block has been administered, the epidural catheter is secured to the patient's back with tape and is available for use as needed. Although attaching a continuous infusion to the epidural catheter is an option, we choose not to do so, dealing with additional analgesic needs by intermittent injection only. This avoids the necessary
equipment and infusion solutions along with the various dynamics inherent with continuous infusion discussed earlier. Although the level of analgesia may fluctuate compared with the steady state provided by continuous infusion, it is less expensive and more manageable in our setting. Injecting into the epidural catheter is restricted to anesthesia personnel only.

Before bolus injection, the epidural catheter should be test dosed for placement. We do not test dose the epidural catheter for placement until the patient begins to request additional analgesia, this time is not less than 1 hour after the IT injection of medication. Xylocaine 1.5% with 2 to 3 mL of 1:200,000 epinephrine can be injected epidurally with symptoms of intravascular or IT injection assessed after 3 to 5 minutes. Results of the epidural test dose do not appear to be altered or masked by the previously administered IT sufentanil with or without low-dose bupivacaine. There is little or no resulting motor block after initial IT administration of these medications, and any symptoms of adverse effects usually have resolved by the time additional analgesia is required. When additional analgesia is needed, the patient should be positioned with the head of the bed elevated about 30° with uterine displacement provided. After a negative test dose, the epidural medication is injected in fractioned doses of 5 mL.

Depending on the progress of labor, an opioid only, local anesthetic only, or a combination of both may be given through the epidural catheter. To give specific examples, we might administer sufentanil, 20 μg, in 10 mL of preservative-free normal saline to the parturient in labor whose dilation is less than 5 cm and is unchanged from when the IT injection was performed. Ten to 12 mL of 0.25% bupivacaine would be a good choice for the laboring parturient who is close to delivery but still requires additional analgesia. If progression through labor is slow but consistent, and the patient is not yet close to delivery, we may give 0.25% bupivacaine, 10 mL, in combination with 10 to 20 μg sufentanil. Further flexibility provided by the epidural catheter is exhibited in the ability to provide anesthesia for cesarean section if that becomes necessary. We also have left the epidural catheter in place after using it for labor in order to dose it later for postpartum tubal ligation. The anesthesia provider is responsible for epidural catheter removal when its use is discontinued.

Provisions for the monitoring of blood pressure, Sa02, sedation, and motor movement and for treatment of adverse effects are necessary after the IT opioid block and the CSE block. These are provided to the nursing personnel by preprinted orders (Table). Adverse changes in the FHR and/or

### Table

**Orders for laboring epidural and intrathecal analgesia**

<table>
<thead>
<tr>
<th>Single drug/dose:</th>
<th>Time:</th>
<th>Administered by:</th>
</tr>
</thead>
</table>

Orders and IV discontinued (date/time):

1. Obtain physician order for labor analgesia.
2. Infuse 1,000-1,200 mL lactated Ringer’s intravenously (IV) over 15 minutes prior to administration of labor block.
3. Respiratory rate and sedation scale every 10 minutes for first hour and then hourly until 4 hours after last injection.
4. Oxygen saturation continuously until 4 hours after last injection. Notify anesthesia for SaO2 < 95%. Patient may be up without monitoring.
5. May ambulate 1 hour after intrathecal or epidural opioids if patient and fetal heart rate is stable. Ensure adequate motor function by assessing ability to move legs and bear weight. Assist to dangle, then stand. Bedrest for patients receiving local anesthetic through epidural catheter until full motor function returns.
6. After each intermittent bolus injection, blood pressure every 5 min for 30 min or until stable, then every 15 min. Notify anesthesia for systolic blood pressure < 98 mmHg. Provide uterine displacement prior to injection.
7. Have oxygen available in room. Oxygen at 10 L per mask as needed to keep SaO2 ≥ 95%. Notify anesthesia for SaO2 < 95% not increased by oxygen application.
8. Treatment of adverse and side effects:
   a. Notify on-call CRNA if respiratory rate is < 10 per minute.
   b. Notify on-call CRNA if sedation scale* = 3.
   c. Naloxone, 0.1 mg, IV stat every 2 min up to 0.4 mg for sedation scale = 3 and respirations < 10 per min. Give positive-pressure ventilation with bag and mask if needed, otherwise apply oxygen at 10 L per mask. Stay with the patient and have desk notify the on-call CRNA stat.
   d. Metoclopramide, 10 mg, IV over 1-2 minutes every 6 h as needed for nausea and/or vomiting. Notify CRNA if severe symptoms persist.
   e. Diphenhydramine, 25-50 mg, IV every 3 hours as needed for severe itching unrelied by comfort measures. If severe symptoms persist after first dose, notify CRNA.
9. Epidural catheter to be handled by anesthesia only.
10. Consult anesthesia prior to the administration of analgesics for pain not relieved by epidural or intrathecal narcotics.

*Sedation scale

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>(none): awake, oriented</td>
</tr>
<tr>
<td>1</td>
<td>(mild): occasionally drowsy, easy to arouse</td>
</tr>
<tr>
<td>2</td>
<td>(moderate): frequently drowsy, easy to arouse</td>
</tr>
<tr>
<td>3</td>
<td>(severe): somnolent, difficult to arouse</td>
</tr>
<tr>
<td>S</td>
<td>(none): normal sleep, easily aroused</td>
</tr>
</tbody>
</table>
maternal hypotension occurring after a labor block are treated with uterine displacement, application of oxygen by face mask, and administration of IV fluids. The concomitant administration of systemic opioids is avoided when intraspinal opioids are in effect. Combining systemic and intraspinal opioids increases the risk of maternal respiratory depression and also could result in a depressed neonate at delivery. Agonist/antagonist pain medications (e.g., butorphanol) may offer some protection from respiratory depression and are administered at our facility by physician order up to 1 hour before the administration of a labor block.

Using a multidisciplinary approach has been an important factor in the success of our labor anesthesia service. Close collaboration and communication with the attending physician and the obstetric nursing staff is necessary. The obstetric nursing staff must be educated in the care of the parturient who receives labor analgesia. Good monitoring is the key to the safe use of opioids by any route of administration.

Anesthesia personnel also should have a very active role in the development of related policies and procedures. The American College of Obstetricians and Gynecologists and the American Association of Nurse Anesthetists provide guidelines for regional anesthesia that can be very helpful and were instrumental in the development of our service.\(^3\)\(^{31}\) It must be kept in mind that guidelines are meant to guide... implying “they should be followed under most circumstances, but depending on the patient, the circumstances, and other factors, they can and should be tailored to fit individual needs.” Each individual institution should interpret the obstetric guidelines as it applies to the specific situation and should develop related policies and procedures consistent with that interpretation while maintaining quality patient care.

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