

Single dose epidural morphine instead of patient-controlled epidural analgesia in the second day of cesarean section; an easy method for the pain relief of a new mother

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Summary

Purpose: Pain management has a particular importance after Cesarean section. This study was undertaken in order to document the efficacy and side-effects of epidural morphine instead of patient-controlled analgesia technique used for the control of post-cesarean pain during postoperative 24-48 hours. **Materials and Methods:** This study was performed as a retrospective review of patient charts who had received combined spinal-epidural anaesthesia. Post-cesarean analgesia was performed with epidural technique either by using (Group 1) patient-controlled epidural analgesia for 48 hours, or (Group 2) patient-controlled epidural analgesia for the first 24 hours and then single dose of 3 mg epidural morphine for the second 24 hours. **Results:** Incidences of side-effects were similar in both groups. None of the patients experienced respiratory depression. Additional analgesia was used on an as-required basis in nine of 39 (23%) patients in Group 1 and six of 39 (13%) in Group 2. **Conclusion:** Small doses of epidural morphine provides up to 24 hours of pain relief from a single injection and could obviate the need for an indwelling epidural catheter on the second day of post-cesarean section, thus reducing the potential for catheter-related complications.

Key words: Postoperative analgesia; Cesarean section; Epidural; Morphine.

Introduction

Cesarean section usually causes moderate to severe postoperative pain continuing for up to 48-72 hours [1, 2]. The new mother has responsibility of caring for her newborn baby. Pain makes it difficult for the new mother to optimally care during the postoperative period and may adversely affect early interaction between mother and infant [2]. Good pain control hastens ambulation, decreases maternal morbidity, improves patient outcome, and facilitates care of the newborn.

There are a variety of techniques and agents used for post-cesarean pain management. Because pain is often more intense during the first two days after cesarean section, the use of an indwelling epidural catheter is usually a requirement for postoperative pain management. Among patients who receive regional anaesthesia, the indwelling epidural catheter facilitates the intermittent bolus injection or continuous epidural infusion of opioids or local anaesthetics during the postoperative period. However, the epidural catheter and patient-controlled epidural analgesia (PCEA) have been associated with several problems like catheter migration, accidental dislodgement, infection, and limited mobilization of the new mother. A local anaesthetic with opioid provides effective analgesia but concentration of local anaesthetics may lead to sensory and motor blockade. Although it is not a bothersome issue in the early hours of postoperative period, mobilization and ambulation of the new mother will soon be important for the care of the newborn.

Concerns about undesirable consequences associated with prolonged PCEA may force the practitioners to remove the epidural catheter earlier in the postoperative period, but realize that the new mother will still have intense pain that can limit the mobilization and the ability to optimally care for her infant on the second day. For these patients, an opportunity exists to administer a long-acting opioid in the epidural space before removal of the catheter.

The author considered that as compared to the combination of local anaesthetic and opioid by the patient controlled epidural analgesia technique, single dose epidural morphine for postoperative analgesia should provide better pain control and satisfaction (owing to increased mobility), and less risk of motor and sensory blockade. This retrospective report was undertaken in order to document the efficacy and side-effects of epidural morphine instead of PCEA technique when used for the control of post-cesarean pain during postoperative 24-48 hours.

Materials and Methods

This study was performed as a retrospective review of patient charts who had received combined spinal-epidural anaesthesia and postoperative epidural analgesia for cesarean section at the present University hospital. The charts of 78 patients were reviewed.

A standardized data collection form was completed for each patient and the variables included: patient demographics, heart rate, blood pressure, respiratory rate, pruritus, urinary retention, nausea and vomiting, time and dose of supplemental analgesics administered during the 24-48 hours, and time of accidental epidural catheter dislodgement were recorded.

Neuraxial techniques were performed by anaesthesiologists

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and residents supervised by a staff anaesthesiologist. For combined spinal-epidural analgesia, after location of the epidural space at the L3-L4 or L4-L5 interspace, dural puncture was performed. Then a spinal injection of bupivacaine 8 mg with fentanyl 20 µg was administered intrathecally and the spinal needle was removed. An epidural catheter was introduced 2-3 cm into the epidural space. Surgery was allowed to begin after the patient developed satisfactory block at least at the T5-6 level.

Post-cesarean analgesia was performed with an epidural technique either by using (Group 1) patient-controlled epidural analgesia for 48 hours, or (Group 2) patient-controlled epidural analgesia for the first 24 hours, and then single dose epidural morphine 3 mg for the second 24 hours. In both of the groups, the epidural catheter was connected to a patient-controlled analgesia (PCA) pump, set to deliver a continuous infusion of 7 ml/hr of 0.05% bupivacaine and fentanyl 1.5 µg/ml. The patient-controlled bolus was 7 ml and the lock-out time was 20 minutes. The patient-controlled epidural analgesia was continued in Group 1 for 48 hours and in Group 2 for 24 hours. Morphine was administered through the indwelling epidural catheter as a single 3 mg dose in a 5 ml volume at the 24th hour after surgery in Group 2 and then the epidural catheter was removed.

After discharge from the recovery room, vital signs were monitored by postpartum unit nurses. Also, all patients were interviewed by a nurse or by an anaesthesiology resident for 48 hours. They were asked about the side-effects and their satisfaction with pain relief.

Before placement of the epidural catheter, baseline pain was assessed by Verbal Rating Scale (VRS; 0 = no pain, 10 = worst pain imaginable). Effective pain relief was considered when the patient had VRS < 3. If the patient had inadequate analgesia, supplementary rescue analgesia with oral paracetamol was available. Patient supplemental analgesic requirement times were recorded. Severe vomiting defined as more than two episodes in 24 hours was treated with intravenous metoclopramide 10 mg.

Patients were monitored for respiratory depression using pulse oximetry and respiratory rate. Respiratory depression was defined as either a SpO₂ < 85% or respiratory rate < 10 breaths/min. Intravenous naloxone was readily available to be administered in the event that patients suffered from respiratory depression.

All statistical analyses were performed using SPSS for windows 13.0. Data were analyzed using independent Student's t-test and Chi-square test. A *p* value of < 0.05 was considered statistically significant. The results are expressed as means with (±) standard errors.

Results

Seventy-eight patients undergoing cesarean section were included in this retrospective observational study (39 in each group). There were no significant differences between groups in maternal demographic characteristics (Table 1). No difference in the quality of sensory and motor block before and during surgery was noted in all patient records. No complications from the combined spinal-epidural block were noted. Systolic, diastolic blood pressures, heart rates, and oxygen saturations remained stable and there was no significant perioperative difference between the two groups (*p* > 0.05). There were no cases of significant hemodynamic instability

Table 1. — Demographic data values are expressed as mean ± SD.

	Group I (n = 39)	Group II (n = 39)
Age (years)	30.3 ± 6.0	29.5 ± 5.3
Height (cm)	162.5 ± 5.7	160.1 ± 5.8
Weight (kg)	75.8 ± 7.9	73.4 ± 8.4

**p* < 0.05.

Table 2. — Side-effects of epidural opioids.

	Group 1 (n = 39)	Group 2 (n = 39)
Nausea, n (%)	3 (8%)	2 (5%)
Vomiting, n (%)	1 (3%)	1 (3%)
Pruritus, n (%)	3 (8%)	5 (13%)
Urinary retension, n (%)	1(3%)	1 (3%)

**p* < 0.05.

during the postoperative 48 hours and arterial blood pressures were similar during this period.

The incidence of nausea, vomiting, pruritus, and urinary retension related to the use of epidural opioids are presented in Table 2. Nausea affected eight percent of patients in Group 1 and five percent in Group 2 (*p* > 0.05). Incidence of vomiting was similar in both groups (*p* > 0.05). Three patients in Group 1 and five patients in Group 2 complained of pruritus. Also, the incidence of urinary retension was similar in both groups (*p* > 0.05). None of the patients experienced respiratory depression.

Additional analgesia in the form of oral paracetamol was used on an as-required basis in nine of 39 (23%) patients in Group 1 and six of 39 (13%) in Group 2 on the second day after cesarean section.

Discussion

This retrospective study has shown that 3 mg of epidural morphine provides up to 24 hours of pain relief from a single injection and could obviate the need for an indwelling epidural catheter on the second day of post-cesarean section, thus reducing the potential for catheter-related complications.

Besides other common disadvantages of postoperative pain as atelectasis, pneumonia, and thromboembolic complications, pain management has a particular importance after cesarean section. In obstetric patients, persistent pain interferes with early postpartum interaction between mother and baby [3] and it has shown that infant care and breast-feeding success can be improved by superior postoperative analgesia [4]. On the contrary, unsatisfactory pain control may lead to adverse cognitive changes, such as increased new mother's anxiety. Anxiety and discomfort caused by pain may reduce the mother's ability of effective breast-feeding. These activities are also hampered by the excess sedation and other side-effects associated with the administration of analgesic agents used in different routes. Nursing mothers are especially concerned about neonatal exposure to analgesic drugs, and this fear impels most of them to avoid medications that may accumulate in breast milk [3].

All of these factors render it difficult to designate an

optimal analgesic technique and agent for post-cesarean pain relief. In general, the method of postoperative pain control is determined by different factors such as: patient characterization, availability of the drug or resources, institutional protocols, individual preferences, and financial considerations. Clearly, PCEA is one of the most effective techniques for post-cesarean analgesia in many clinics. Whether it offers distinct advantages over other analgesic techniques, it also has some disadvantages like the necessity to maintain a functioning epidural catheter during the postoperative period [5]. As Miaskowski *et al.* reported that dislodgement and migration of epidural catheters have resulted in a high catheter failure rate reaching 25%, adding to the nursing time required for this already-intensive analgesic modality [6]. Many studies describe the late migration of a well-functioning epidural catheter into the intravascular space [7, 8]. On the other hand, PCEA may run for many hours, at constant infusion rates, and with on-demand bolus doses administered by the patient. This may lead to an unnecessary accumulation of the drug as a result, unless the anaesthesiologist is able to periodically assess and manually readjust infusion and bolus settings on the epidural pump devices [9]. Unfortunately, it is not practical in most circumstances and this may be a primary reason for the need of single dose injection. Also, the use of single dose epidural technique reduces the potential resource utilization that is encountered with PCEA technique.

Epidural administration of local anaesthetics, in most cases with opioids, is a commonly-used modality for post-cesarean section analgesia. The concentration of local anaesthetics added to PCEA must be low to avoid significant sensory and motor blockade, because many patients are ambulatory within hours of surgery. On the other hand, with a lower concentration of local anaesthetics, ambulation may not be affected, but in this situation opioid concentration had to be increased for pain relief of the new mother. This may give rise to another problem associated with the high-dose neuroaxial opioid related side-effects like respiratory depression, pruritus, nausea, vomiting, sedation, and urinary retention [10-12].

Morphine is the most widely used epidural opioid for post-cesarean analgesia and pain relief from this agent follows a consistent dose-response relationship [5]. It is more advantageous compared to local anesthetics as it has the advantages of producing analgesia without motor and sensory blockade or interference with neuromuscular function or causes depression of sympathetic nervous system [13]. Administering a long-acting opioid, such as morphine, into the epidural space and securing an efficient analgesia before removal of the catheter is an attractive opportunity, but an optimal effective dose of epidural morphine is still a matter of controversy with regards to its duration of action and side-effects. Studies have found that epidural morphine had an effective analgesic technique after cesarean section, with 3 mg being the optimal dose [1, 14]. However single dose neuroaxial techniques have an inherent disadvantage of providing limited period of analgesia. It is demonstrated that, with the usual dose

range, epidural morphine is insufficient to achieve more than 30 hours pain-free. It is consequently not sufficient on the second postoperative day, when patients begin to care for their newborns [1, 15]. Administering of a higher-dose of morphine may provide more satisfactory, longer lasting analgesia to all patients, but at the cost of a higher incidence of undesirable side-effects.

As it is reported that cesarean section induces moderate to severe postoperative pain for 48 hours [1], its control is an indispensable necessity for the new mother. Therefore, practitioners need something that prolongs an analgesic effect for at least for 48 hours, preferably without depending on a device or a catheter. In this manner, using a continuous epidural technique during the first post-cesarean day and preferring a single dose long acting epidural technique for later period becomes more attractive. Additionally, patients may be able to transition directly to oral medications, because of the prolonged analgesic activity of morphine with a single dose. The simplified technical aspects of this therapy, when compared with prolonged continuous epidural infusion, may result in fewer adverse events and complications related with indwelling epidural catheter.

The effectiveness of epidural morphine in the control of post-cesarean pain is documented by the request of additional analgesic in this study. The incidence of the additional analgesic seems to be different in PCEA and epidural morphine used in patients (23% vs 13%). Epidural single dose morphine was well-tolerated in all patients, and found no significant differences of adverse events between PCEA group. The most consistent disadvantage of using epidural opioid is its increased rate of pruritus and the incidences of this complication were not statistically different in this retrospective study (8% vs 13%). Nausea and vomiting are well-documented side-effects of epidural morphine [5, 13]. The rates of these complications were also similar in epidural morphine and PCEA used patients (8% vs 5% for nausea and 3% vs 3% for vomiting).

Respiratory depression is the most feared side-effect of epidural morphine. The potentially life-threatening side-effect of delayed respiratory depression did not appear with epidural morphine used in these patients. Nevertheless, Kumarasamy *et al.* [13] reported that respiratory depression does not have the same incidence nor severity as seen in other surgical patients, since obstetric patients are relatively younger, healthier, and are motivated to care for their neonates. Additionally, progesterone has shown to improve ventilation by increasing the sensitivity of the respiratory centre to CO₂ [13].

There are several limitations of the present study that must be considered. Firstly, this is a retrospective, observational, and non-randomized study and the choice of analgesic technique was left to the individual anaesthesiologist. Secondly, because of the retrospective nature of the study, the quality of pain relief could not be objectively assessed, making it impossible to know whether the patients in PCEA group received equivalent analgesics. The total amount of local anaesthetic and opioid

administered via PCEA could not be calculated because of the variability of bolus demand doses used for each patient. The third limitation is that standard dose morphine was used in all patients. As Stamenkovic *et al.* criticised themselves in their report, a 'one-size fits all' approach to postoperative analgesia may result in pain under-treatment for some patients, because of significant analgesic requirement variability between patients [16]. In this manner, frequent patient visits and additional analgesics used on an as-required basis were the main rescuers for the determination of unsatisfactory pain relief in this study.

This retrospective study did not aim to discuss the efficacy of epidural morphine. Morphine has long been used for postoperative analgesia for post-cesarean analgesia. It has been demonstrated in many studies that the quality of analgesia from epidural morphine is no less than that from continuous epidural analgesia [5, 14]. The main principle was to comfort the patient by satisfactory pain relief, less risk of motor and sensory blockade, and consequently earlier mobilization of the new mother. Increasingly, the trend to reduce the length of hospital stay with enhanced recovery surgery is being introduced for cesarean section. The reduction in hospital stay includes factors, such as quality of analgesia and absence of epidural motor blockade allowing for early mobilization. On the other hand, epidural single dose morphine should be found more cost-effective than the PCEA set-up.

In conclusion, the use of single dose epidural morphine for postoperative analgesia should provide better pain control and satisfaction (owing to increased mobility), less risk of motor and sensory blockade. Small doses of epidural morphine provides up to 24 hours of pain relief from a single injection and could obviate the need for an indwelling epidural catheter on the second day of post-cesarean section, thus reducing the potential for catheter-related complications. Ideally randomized and prospective studies should be performed to determine the exact role of single dose epidural morphine compared with patient-controlled epidural analgesia technique for the control of post-cesarean pain during postoperative 24-48 hours.

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