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Maternal satisfaction with single-dose spinal analgesia for labor pain in Indonesia: a landmark study

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Abstract
The purpose of this study was to assess maternal satisfaction with single-dose spinal analgesia for the management of obstetric pain in Indonesian women. The investigation included 62 laboring women with single pregnancy at term, with 45 primigravidas and 17 multigravidas. The participants' ages ranged from 15 to 29 years. All participants were screened for physical health and were classified as healthy according to the American Society of Anesthesiologists classification system. All 62 parturients received single-dose spinal anesthesia with a 27-gauge pencil-point needle at either the L3–4 or L4–5 intervertebral interspace, with a combination of bupivacaine, 2.5 mg; morphine, 0.25 mg; and clonidine, 45 μg. Maternal satisfaction, duration of pain relief, and side effects were studied. The overall maternal satisfaction with the single-dose spinal technique for labor analgesia in our study group was high, with 50 patients (81%) being very satisfied, and 7 patients (11%) being satisfied with the quality of labor analgesia. Forty-nine patients (79%) stated that they would select single-dose spinal analgesia for pain control in labor in the future. Our study was the first one in Indonesia to assess maternal satisfaction with single-dose spinal analgesia for labor pain. We concluded that single-dose spinal analgesia with a combination of bupivacaine, morphine, and clonidine provided effective labor pain control for Indonesian women, and maternal satisfaction with this technique was very high. This technique is very cost-effective and should be recommended for routine obstetric pain control in Indonesia and other developing countries.

Key words Labor pain · Labor analgesia · Spinal analgesia · Single dose · Maternal satisfaction · Obstetric anesthesia

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Introduction

Most women rate the pain of childbirth as the most painful experience of their lives [1]. Epidural analgesia is widely considered as the most effective method of providing pain relief during labor [2]. However, in many developing countries epidural analgesia for labor pain may not be routinely available to all laboring parturients, for a number of reasons (e.g., economic).

Although popular in Europe [3] and North America [4], single-dose spinal analgesia for labor pain has not been previously studied in Indonesia. The authors of this report herein present the results of the first study conducted in Indonesia assessing maternal satisfaction with single-dose spinal analgesia (with a combination of bupivacaine, morphine, and clonidine) for the management of obstetric pain in Indonesian women.

Patients and methods

The protocol of this study was approved by the Institutional Review Board of the Cipto Mangunkusumo Hospital, University of Jakarta, Indonesia. All studied subjects provided appropriate (written) informed consent. The investigation included 62 laboring women with single pregnancy at term, with 45 primigravidas (72.5%) and 17 multigravidas (27.5%). The participants' ages ranged from 15 to 29 years. All participants were screened for physical health and were classified as healthy according to the American Society of Anesthesiologists (ASA) physical classification system. All 62 parturients received (at their request) single-dose spinal anesthesia, with a 27-gauge pencil-point needle at either the L3–4 or L4–5 intervertebral interspace, with a combination of bupivacaine, 2.5 mg; morphine, 0.25 mg; and clonidine, 45 μg. Maternal satisfaction, duration of pain relief, and side effects of labor analgesia were studied. Patients' satisfaction (subjective assessment of the

quality of labor analgesia) was assessed by a five-step score; very satisfied, satisfied, no comments, unsatisfied, and very unsatisfied. The pain level before and after induction of labor analgesia was also evaluated by the standard visual analog scale [(VAS) 0–10] method. Satisfactory analgesia was defined as a decrease in pain scores to 3 or less within 20 min after injection. The majority of patients received labor analgesia (at their request) when the VAS score reached 8. The VAS was subsequently used to assess the effectiveness of labor analgesia and maternal satisfaction during labor. The assessment of the VAS score was performed in all parturients participating in our study at 30 and 60 min after induction of labor analgesia, and then subsequent (follow-up) assessments of the VAS score were performed every hour throughout labor.

Results

The overall maternal satisfaction with the single-dose spinal technique for labor analgesia in our study group was high, with 50 patients (81%) being very satisfied, and 7 patients (11%) being satisfied with the quality of labor analgesia. Five patients (8%), for various reasons, provided no comments regarding the quality of labor analgesia they received. Forty-nine patients (79%) stated that they would select single-dose spinal analgesia for pain control in labor in the future.

The mean VAS score values were as follows: 3.3 at 30 min, 3.5 at 60 min, 3.8 at 2 h, 3.9 at 3 h, 4.1 at 4 h, 4.4 at 5 h, 4.5 at 6 h, 4.7 at 7 h, 4.9 at 8 h, 5.1 at 9 h, 5.3 at 10 h, 5.9 at 11 h, and 5.9 at 12 h after induction of analgesia.

Only minor side effects (e.g., nausea, pruritus, and occasional shivering), which did not impact overall maternal satisfaction with this technique were reported. Specifically, the incidence of these minor (clinically insignificant) complications were as follows: nausea, 9.6%, occasional shivering, 6.5%; and pruritus, 8%. No major maternal (e.g., respiratory depression, hypotension) or fetal (fetal distress, fetal bradycardia) complications were observed in our study group. The onset of analgesia was within a few minutes, and the average duration of labor pain relief in our study group was 12 h.

Discussion

The perception of pain, including the pain of uterine contractions, is a complex process that involves the interaction of both central and peripheral mechanisms, and the continuous interchange of information among ascending nociceptive and descending antinoceptive pathways. Pain perception involves sensory, emotional, behavioral, and environmental factors. Most women rate the pain of childbirth as the most painful experience of their lives [1].

During labor, many parturients experience intense personal conflict when trying to balance their needs, including the need for labor analgesia, with the desire to ensure the safety of their baby and to avoid possible adverse fetal effects of drugs administered for labor analgesia [2,5,6]. Maternal stress during labor is a complex psychological response, which can be influenced by many factors (e.g., the patient's expectations, her level of education, and the severity of the labor pain) [5]. The relief of peripartum pain does not guarantee the relief of labor-induced psychological stress; however, effective, satisfactory labor analgesia can be one of the most effective means of providing safe passage for both the mother and her fetus from the antepartum to the postpartum period [5,6].

The quality of labor analgesia as perceived by the patient has often been assessed by a simple statement that describes the degree of the patient's satisfaction with the pain relief from her labor analgesia [6].

Neuraxial drug administration was initially developed in the form of spinal anesthesia (spinal block) over 100 years ago [7]. Since then, neuraxial drug administration has evolved, and today it includes a wide range of techniques (e.g., spinal, epidural, combined-spinal epidural) used to administer a large number of different medications to provide anesthesia and analgesia [8]. The pharmacological agents most commonly used for spinal (intrathecal/subarachnoid) blocks in the clinical practice of anesthesia include combinations of local anesthetics (e.g., bupivacaine) and opioids (e.g., morphine). Another group of newer drugs administered for spinal anesthesia includes clonidine, dexmedetomidine, and epinephrine. These medications provide neuraxial analgesia via alpha-adrenergic receptors and are used mainly as adjuvants to local anesthetics and opioids [8].

The effect of the addition of clonidine to bupivacaine for spinal anesthesia has been investigated by several researchers in recent years [9–12].

First, van Tuijl et al. [9] investigated the effect of the addition of clonidine (75 μg) to hyperbaric bupivacaine on postoperative morphine consumption after cesarean section in a randomized controlled double-blind trial. A group of 106 women received spinal anesthesia using either bupivacaine 0.5% (2.2 ml) with 0.5 ml normal saline 0.9% or bupivacaine 0.5% (2.2 ml) with clonidine (75 μg) in 0.5 ml normal saline 0.9%. The authors concluded that the addition of clonidine (75 μg) to hyperbaric bupivacaine prolonged spinal anesthesia after cesarean section and improved early analgesia, but did not reduce the postoperative morphine consumption during the first 24 h. No clinically relevant maternal or neonatal side effects were reported in their study [9].

Second, in a recent prospective, double-blind study, Kanazi et al. [10] evaluated the duration of anesthesia, hemodynamic stability, and the side effects of intrathecal bupivacaine supplemented with 30 μg of clonidine, and concluded that clonidine, 30 μg, when added to intrathecal bupivacaine, produced prolongation in the duration of the motor and sensory block with preserved hemodynamic stability and lack of sedation.

Third, Davis and Kopacz [11], in a double-blind, randomized crossover study, compared spinal anesthesia with preservative-free 2-chloroprocaine (30 mg) with and without clonidine (15 μg) in healthy volunteers. These authors concluded that low-dose clonidine increased the duration and improved the quality of 2-chloroprocaine spinal anesthesia without systemic side effects.

Fourth, Rochette et al. [12] conducted a controlled, prospective, dose-ranging study of clonidine in spinal anesthesia in 75 neonates undergoing elective inguinal herniorrhaphy. The patients were given a spinal anesthetic with either 0.5% plain isobaric bupivacaine ($1\,mg \cdot kg^{-1}$), or bupivacaine plus 0.25, 0.5, 1, or $2\,\mu g \cdot kg^{-1}$ clonidine. Mean arterial blood pressure, heart rate, peripheral oxygen saturation (S_{PO_2}), sensory block extension, and duration of anesthesia were the main data recorded. The authors concluded that clonidine $1\,\mu g \cdot kg^{-1}$, added to spinal isobaric bupivacaine, doubled the duration of the block without significant deleterious hemodynamic or respiratory side effects [12].

The recently published (April 2007) document, *Practice guidelines for obstetric anesthesia: an updated report by the American Society of Anesthesiologists Task Force on Obstetric Anesthesia, single-injection spinal opioids with or without local anesthetics* section states "The literature suggests that spinal opioids with or without local anesthetics provide effective analgesia during labor without altering the incidence of neonatal complications" [4].

Metaanalysis of the pertinent literature has determined that the timing of labor analgesia does not affect the frequency of cesarean section [4]. The literature also suggests that other delivery outcomes (e.g., spontaneous or instrumental delivery) are also unaffected by the early initiation of labor analgesia [4].

A dedicated obstetric anesthesia service (Labor Epidural Service) can be quite expensive (even in developed countries), especially from the staffing standpoint [13,14]. Therefore, in 1995, the Anesthesia Service at Reynolds Army Community Hospital, Fort Sill, Oklahoma, United States, implemented a program of intrathecal narcotic injection as an alternative to costly labor epidural analgesia [13]. After reviewing a patient fact sheet, 150 laboring patients volunteered for labor intrathecal analgesia. Once active labor began, the patient received intrathecal morphine, 0.25 mg, and fentanyl, 25 μg. The pain level before and after the induction of labor analgesia was evaluated by the VAS method. At 2 weeks' follow-up, the intrathecal narcotic-assisted labor analgesia was subjectively reported by the patients. Ninety-four percent of the patients agreed that the intrathecal labor analgesia worked well and that they would do it again. The authors stated that intrathecal labor analgesia was found to be a well-accepted, cost-saving, and very effective approach to labor pain [13].

Intrathecal labor analgesia can be also effective in late, rapidly progressing labor [14]. In 1998, the Central Hospital of Seinajoki, Seinajoka, Finland, implemented the use of single-shot spinal block for pain relief in multiparous parturients. Two hundred and twenty-nine consecutive multiparous parturients presenting for vaginal delivery and requesting analgesia were asked to participate in this prospective study. All parturients received the same standard intrathecal labor analgesia: 2.5 mg bupivacaine (1 ml) + 25 μg fentanyl (0.5 ml) injected via the L2–3 or L3–4 interspace. Routine monitoring included maternal vital signs, uterine contractions, and fetal heart rate tracing. Pain scores (VAS), sensory levels, motor block, side effects, and maternal satisfaction were recorded. Two hundred and nine parturients were included in the study. Satisfactory analgesia was achieved in 153 (73%) parturients. Fifty-five (26%) women requested additional analgesia: 38 (18%) because of unsatisfactory analgesia and 17 (8%) because the analgesia ended before delivery. The duration of spinal block was 101 ± 34 min. Pruritus occurred in 64%, fetal bradycardia in 7%, and hypotension in 2% of deliveries. Pain relief was rated excellent by 65%, moderate by 20%, and inadequate by 14% of the parturients. One hundred and sixty-nine (81%) women stated that they would like to have spinal analgesia again for pain relief during delivery. The authors concluded that the majority of multiparous parturients in their study found intrathecal labor analgesia adequate for pain relief during delivery [14].

Although a number of studies [9–12] concluded that clonidine, when added to spinal bupivacaine, prolonged the duration of the block (both motor and sensory) without clinically significant deleterious hemodynamic or respiratory side effects, our study appears to have established the longest duration of the block (labor analgesia) ever reported in the literature. It might be tempting to speculate that the low expectations of our patients regarding pain relief in labor (single-dose spinal analgesia for labor as an alternative to no analgesia in labor) might have impacted the patients' satisfaction in our study group; we believe that further studies are needed to confirm (reproduce) the results of our investigation.

The purpose of our study was to access the suitability of single-dose spinal analgesia with a combination of

morphine, bupivacaine, and clonidine (which had not been previously studied in Indonesia) for pain control in labor in Indonesian women (as a model for the developing world). It is important to emphasize that we did not study single-dose spinal analgesia with a combination of these medications as an alternative to epidural labor analgesia (which, for economic reasons, is not widely available in many developing countries).

In conclusion, we believe that single-dose spinal analgesia with a combination of bupivacaine, 2.5 mg; morphine, 0.25 mg; and clonidine, 45 μg provides effective labor pain control for Indonesian women, and maternal satisfaction with this technique is very high. This technique is very cost-effective (e.g., as compared to epidural labor analgesia) and should be recommended for routine obstetric pain control in Indonesia and other developing countries.

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