Obstetrical and Pediatric Anesthesia

Single dose diclofenac suppository reduces post-Cesarean PCEA requirements

Noelle Louise Siew Hua Lim MBBS M Med (anaes),*
Wai Kit Lo MBBS M Med (anaes),†
Jin Long Chong MBBS M Med (anaes),†
Alan Xingyi Pan MBBS †

Purpose: To assess the analgesic efficacy of administering, immediately after surgery, a single dose of diclofenac (100 mg suppository) to women who had undergone lower segment Cesarean section (LSCS) under combined spinal-epidural anesthesia, and received post-operative patient-controlled epidural analgesia (PCEA) with ropivacaine 0.2% and fentanyl 2 µg·ml⁻¹.

Methods: Forty-eight ASA physical status I or II term parturients scheduled for elective LSCS under regional anesthesia were enrolled into this randomised double-blind study. The patient-controlled epidural analgesia device was programmed to deliver a bolus of 4 ml of local anesthetic mixture with a lockout period of ten minutes and an hourly limit of 12 ml. There was no baseline infusion. The study commenced upon the patient's first demand for analgesia post-operatively and the patients were assessed at one, six, 12 and 24 hr post-operatively for pain scores on movement, dermatomal level of sensory blockade, degree of motor blockade and volume of local anesthetic used. At conclusion of the study, patients' satisfaction scores were recorded.

Results: The two groups of patients were similar demographically. Patients who received a diclofenac suppository used 52.8 ± 17.8 ml of local anesthetic mixture while those who did not, used 74 ± 25 ml ($P < 0.005$). Pain scores and satisfaction scores did not differ significantly between the groups.

Conclusion: A single administration of 100 mg diclofenac suppository is effective in reducing post-Cesarean epidural local anesthetic/opioid requirements by 33% for the first 24 hr post-operatively.

césarienne basse (CB) sous anesthésie rachidienne et péridurale combinée (ARPC) et qui ont reçu une analgésie péridurale autocontrôlée (APAC) postopératoire avec de la ropivacaine à 0,2 % et 2 µg·ml⁻¹ de fentanyl.

Méthode : Quarante-huit parturientes d'état physique ASA I ou II, admises pour une CB planifiée sous anesthésie régionale ont été réparties de façon aléatoire pour participer à une étude en double aveugle. Le programme d'analgésie péridurale autocontrôlée comprenait l'administration d'un bolus de 4 ml d'un mélange d'anesthésique local, suivie d'une période réfractaire de dix minutes, selon une limite de 12 ml à l'heure et sans perfusion de départ. La première demande d'analgésie postopératoire marquait le début de l'étude. Une, 6, 12 et 24 h après l'opération, on détermine les scores de douleur au mouvement, le niveau du bloc sensitif, le degré du bloc moteur et le volume d'anesthésique local employé. À la fin de l'étude, on enregistre les scores de satisfaction des patientes.

Résultats : Les données personnelles des patientes des deux groupes étaient similaires. Les patientes qui ont reçu un suppositoire de diclofénac ont utilisé $52,8 \pm 17,8$ ml du mélange d'anesthésique local tandis que les autres en ont utilisé 74 ± 25 ml ($P < 0,005$). Les scores de douleur et de satisfaction n'ont pas présenté de différence intergroupe significative.

Conclusion : L'administration d'un seul suppositoire de 100 mg de diclofénac réduit de façon efficace les besoins post-césarienne d'anesthésique local péridural/d'opioïde de 33 % pendant les 24 premières heures postopératoires.

Objectif : Évaluer l'efficacité analgésique de l'administration, immédiatement après l'intervention chirurgicale, d'une seule dose de diclofénac (suppositoire de 100 mg) à des femmes qui ont subi une

From the Department of Anaesthesia and Surgical Intensive Care,* Changi General Hospital, and the Department of Anaesthesia,† Kandang Kerbau Women's and Children's Hospital, Singapore.

Address correspondence to: Dr. Noelle Louise Siew Hua Lim, Changi General Hospital, 2 Simei Street 3, Singapore 529889, Singapore. Phone: (65)8503831; Fax: (65)2601693; E-mail: nllsh@singnet.com.sg

Research was carried out at Kandang Kerbau Women's and Children's Hospital, Singapore.

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EPIDURAL bupivacaine, with or without fentanyl, has been used for post-operative analgesia for patients who have undergone lower segment Cesarean section (LSCS).¹⁻³ Limitations to its usefulness include motor blockade and cardiovascular toxicity, especially in parturients. As a result, ropivacaine was developed as an alternative to bupivacaine. Being the S-isomer of bupivacaine, it has less cardiotoxicity and may be more selective for sensory fibres.

Patient-controlled analgesia is not a new concept. In existence for more than 20 years,⁴ it has been used for post-operative pain relief, labour analgesia and even for alleviation of chronic pain. The epidural route utilising a combination of local anesthetic and opioid provides better pain relief, improved mental status and bowel activity after major abdominal surgery.⁵ The addition of a single dose of diclofenac suppository post-operatively may enhance the quality of post-operative pain relief and may reduce the epidural local anesthetic/opioid requirements.

Methods

With institution ethics committee approval and patient informed consent, 48 women, ASA status I or II, scheduled to undergo elective LSCS under regional anesthesia, were enrolled in the study. They were randomised to receive either a 100 mg diclofenac suppository post-operatively or no suppository. Both groups received patient-controlled epidural analgesia (PCEA) with ropivacaine 0.2% and fentanyl 2 µg·ml⁻¹ post-operatively. Patients who declined a regional anesthetic, with a history of allergy to non-steroidal anti-inflammatory agents, bleeding tendency, bronchial asthma, peptic ulcer disease, liver disease, kidney disease or who were unable to grasp the concept of PCEA, were excluded from the study. The anesthesiologist administering the regional anesthetic was not involved with subsequent post-operative patient assessment.

The patients were premedicated with 30 ml 0.3 molar concentration of sodium citrate when called to the operating theatre (OT). In OT, they received 500 ml Hartmann's solution intravenously while baseline non-invasive blood pressure, electrocardiogram and pulse oximetry were recorded. After positioning the patient in the right lateral position, after lidocaine 1% infiltration, combined spinal-epidural anesthesia was instituted in the L2-3 or L3-4 interspace, using a 19G Weiss® epidural needle and a 27G Whitacre® spinal needle; 1.5 ml of hyperbaric bupivacaine 0.5% (7.5 mg) was administered intrathecally after which the epidural catheter was inserted 4 cm into the space. The patients were then turned supine and a wedge placed under the

right hip to effect left uterine displacement. Sensory level to cold using an ice pack was recorded and surgery allowed to commence when a dermatomal level of T4 - T6 was achieved. None of the patients required additional epidural local anesthetics for surgery.

Post-operatively, in randomly selected patients, 100 mg diclofenac suppository was administered after digital removal of blood clots from the vagina was done by the surgeon. Patient grouping was decided by the drawing of shuffled coded envelopes. The patients were then monitored in the post-anesthesia care unit (PACU) for a variable period of time, depending on the moment of first demand for post-operative analgesia. No bolus dose of local anesthetic mixture was administered prior to starting the PCEA. The PCEA device was programmed to allow a bolus dose of 4 ml of ropivacaine 0.2% with fentanyl 2 µg·ml⁻¹, lockout period of ten minutes with an hourly dose limit of 12 ml and no basal infusion. Subsequently, the patients were seen by an independent observer one, six, 12 and 24 hr from the time of first PCEA demand. Parameters recorded were the sensory level, degree of motor blockade using a modified Bromage score (0=no motor blockade, 1=able to flex hip and knee but unable to straight leg raise, 2=able to move ankle only and 3=unable to move lower limb), number of PCEA demands, volume of local anesthetic solution infused, pain score on movement using a visual analogue scale of 0 to 100 mm and the presence or absence of side effects such as nausea, vomiting or excessive drowsiness. Blood pressure, heart rate and pulse oximetry were monitored hourly for eight hours, four hourly subsequently if stable. Pain score and sedation score were monitored hourly. No additional analgesics were prescribed and the study was terminated 24 hr after the first PCEA demand, after which the patients were prescribed oral analgesics. Satisfaction score (0-100%) and the desire to have a PCEA should they present for surgery again were recorded at the end of the 24-hr study period.

Patients, nursing and medical staff were unaware of patient grouping. A computer package (SPSS) was used for statistical analysis. Results were compared using Student's *t* test for demographic data and Mann-Whitney test for non-parametric data. A *P* value of <0.05 was considered significant.

Results

Twenty-four women were enrolled in each group. In group D (a diclofenac suppository was administered) PCA pump malfunction occurred in two patients, the epidural catheter was dislodged in one patient, data collection was incomplete in one patient and one

TABLE I

	Group D	Group N	P value
Age (yr)	30 (22–39)	32 (26–39)	NS
Height (cm)	156 (6)	155 (6)	NS
Weight (kg)	66 (14)	67 (11)	NS
24 hr volume of local anesthetic solution used (ml)	53 (17.8)	74 (25)	*

Patient data for groups D and N (mean (range or SD))

NS= not significant

* $P < 0.005$ (Mann-Whitney)

TABLE II

	Group D	Group N	P value
PCEA use between 0–6 hr (ml)	13.1 (7.7)	18.1 (11.9)	NS
PCEA use between 6–12 hr (ml)	10.0 (3.1)	18.7 (6.1)	*
PCEA use between 12–18 hr (ml)	11.1 (5.2)	20.0 (7.8)	*
PCEA use between 18–24 hr (ml)	16.4 (6.3)	17.7 (12.5)	NS

Six hourly volumes of local anesthetic used (mean (SD))

NS=not significant

* $P < 0.005$ (Mann-Whitney)

patient requested for the pump to be removed as she was unable to tolerate the lower limb weakness. In group N (no suppository was administered), the epidural catheter was dislodged in one patient, data collection was incomplete in two patients while one patient had been given *im* meperidine within the duration of the study.

Data from these patients were included up to the assessment time before premature exclusion from the study.

The two groups of patients were similar demographically (Table I). Group D used 52.8 ± 17.8 ml of local anesthetic mixture while group N used 74 ± 25 ml ($P < 0.005$). There was no significant difference in the volumes of local anesthetic mixture used in the first and last six hours from the time of first PCEA demand. However, between six to 18 hr, PCEA use differed significantly between the two groups ($P < 0.005$) (Table II). Pain scores did not differ significantly between the two groups (Figure). Overall satisfaction was high and did not differ significantly between the groups.

One patient in group D and another in group N had moderately severe motor blockade (modified Bromage 2), when assessed at 12 hr and six hours post-operatively respectively. At completion of the

FIGURE Comparison of pain scores (median, interquartile range) between groups D and N. P value not significant. VAS=visual analogue scale.

study, 18 patients in group D had no motor blockade (modified Bromage 0) while one patient in group D had mild motor blockade (modified Bromage 1). None of the patients in group N experienced motor blockade (modified Bromage 0).

All the patients were keen to have a PCEA should they have another operation except for the patient who had moderately severe motor blockade in group D and three in group N, one of whom detested the back discomfort due to the dressing over the epidural insertion site, the second preferred *im* opioid injection and the third was unsure.

One patient in each group required oxytocin infusion for post-partum hemorrhage. None of the patients experienced nausea or vomiting. There was no pruritus or excessive sedation.

Discussion

Our data supports the practice of a multi-modal approach to post-operative analgesia.⁶ In our study, a single post-operative dose of diclofenac (100 mg suppository) reduced epidural ropivacaine 0.2% with fentanyl $2 \mu\text{g}\cdot\text{ml}^{-1}$ requirements by 33%. Previous studies demonstrating the opioid-sparing effect of non-steroidal anti-inflammatory drugs (NSAIDs) have been published but there has been no prior study on the epidural local anesthetic-sparing effect of NSAIDs.^{7,8}

Our data show a significant difference in the volume of local anesthetic solution used between six to

18 hr post-operatively. Residual operative analgesia may account for the similar volumes of local anesthetic solution used in the first six hours post-operatively. Subsequently, the analgesic effect of the administered suppository came into play, enhancing the quality of analgesia for the ensuing 12 hr.

Diclofenac, being an NSAID, is thought to act via inhibiting prostaglandin synthesis, hence its efficacy in post-Cesarean analgesia by the reduction of pain from uterine contractions. A central anti-nociceptive effect has also been postulated.^{9,10}

Rectal diclofenac has a rapid onset of absorption, although slower than that from enteric coated tablets administered orally. Peak plasma concentrations are attained on average within an hour with a 50-mg suppository.

There is a theoretical risk of post-partum hemorrhage with the use of diclofenac as it prolongs the bleeding time and reduces platelet aggregation.^{11,12} However, diclofenac-induced post-operative hemorrhage is infrequent in clinical practice.^{11,12} NSAIDs, being weak acids, are not readily distributed to breast milk as they are readily ionised in the range of pH of breast milk. Therefore, they are not a concern for breastfeeding mothers.

Pain scores on movement did not differ significantly between the two groups. This is hardly surprising as all patients had the PCEA pump at their disposal.

Epidural ropivacaine 0.2% has been found to have a high incidence of motor block during labour analgesia, possibly because higher volumes of epidural ropivacaine 0.2% are used. We did not find a high incidence of motor block in our study although we did not make any attempt to assess the ability of the patients to ambulate. In fact, sensory loss in the lower extremities may have an adverse effect on ambulation.³ However, we acknowledge that post-Cesarean patients should be encouraged to ambulate as early as possible in order to minimize post-operative complications and also to allow for care of the newborn.

We conclude that the use of a single post-operative dose of diclofenac (100 mg suppository) in conjunction with PCEA with ropivacaine 0.2% and fentanyl 2 µg·ml⁻¹ provides effective post-Cesarean analgesia and reduces epidural local anesthetic/opioid requirements by 33% for the first 24 hr post-operatively.

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