Research Article

A comparative study of postoperative analgesia of transversus abdominis plane block versus intrathecal nalbuphine injection in preeclamptic patients undergoing cesarean section

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Abstract
Introduction: Effective pain relief aids in early mobilization and decreases risk of thromboembolic diseases following Post-cesarean section. The transversus abdominis plane (TAP) block is a well-known analgesic technique with established role in postoperative analgesia for lower abdominal surgeries. Intrathecal opioids (as Nalbuphine) are synergistic with local anesthetics and intensify the sensory block without increasing the sympathetic block. **Patient and methods:** 90 patients divided into three groups (30 patients in each), all groups received intrathecal bupivacaine and TAP injection, group S had TAP injection with saline, Group B had TAP injection with bupivacaine, and Group N had intrathecal nulbuphine and TAP injection with saline. Postoperative follow up of analgesic time, first analgesic request time and total analgesic dose in 24h. **Results**: as regards analgesic time and first analgesic request time there was a significant increase in group N compared with other two groups and in group B compared with group S. while there was a significant decrease in total analgesic dose in group N compared with other two groups and in group B compared with group S. **Conclusion:** intrathecal nulbuphine and TAP block produce a significant prolongation in postoperative analgesic time and decrease postoperative analgesic consumption. However intrathecal nulbuphine showed significant advantages over TAP block.
Key words: intrathecal nulbuphine, TAP block, Bupivacaine, Cesarean section.

Introduction

Post-cesarean section effective analgesia is important. Pain and subsequent anxiety impair the mother's ability and early mobilization. Effective pain relief aids in early mobilization and decreases risk of thromboembolic diseases which is common after cesarean delivery. Essentially, analgesic technique should be safe, effective and prevent development of chronic pain (Horlocker, Burton et al., 2009).

The transversus abdominis plane (TAP) block is a regional analgesic technique which blocks T6 – L1 nerve branches and has an evolving role in postoperative analgesia for lower abdominal surgeries (Petersen, Mathiesen et al., 2010).
TAP block is a simple and safe technique and is a potential alterative to spinal opioid for analgesia after Caesarean section, whether guided by traditional anatomic landmarks or by ultrasound (Belavy, Cowlishaw et al., 2009).

It has been shown to be effective in Caesarean section and after hysterectomy, open prostatectomy, laparoscopic cholecystectomy, and appendicectomy (McDonnell, Curley et al., 2008)

TAP block would have the advantage of improved analgesia, a reduction in opioid-associated adverse effects, and the absence of motor blockade (Tornero-Campello 2007)

Intrathecal opioids are synergistic with local anesthetics and intensify the sensory block without increasing the sympathetic block. They are commonly added to local anesthetics for potentiating their effects, reducing their doses, and thereby reducing their complications and side effects and

offer hemodynamic stability. They also prolong the duration of postoperative analgesia (Tan, Chia et al., 2001)

Nalbuphine, a mixed agonist–antagonist opioid, has a potential to attenuate the μ - opioid effects and to enhance the kappa-opioid effects. It was synthesized in an attempt to produce analgesia without the undesirable side effects of μ agonist; meanwhile, the benefits of both μ and κ reseptors analgesia can be obtained (Eisenach, Carpenter et al., 2003)
Lumbar neuraxial analgesia reduces pain-mediated hypertensive responses (Dennis 2012).
There are few studies examining different analgesic options for women with pre-eclampsia after caesarean birth. Neuraxial techniques, local anaesthetic techniques, opioids, paracetamol and tramadol have not been examined to any significant degree in this population (Macintyre and Walker 2010).

Non-steroidal anti-inflammatory agents are frequently used for analgesia after child-birth; however, these agents have well-documented adverse effects and contraindi-cations and there have been specific case reports of hypertensive crises in women with pre-eclampsia (Makris, Thornton et al., 2004).

Our study aims were (i) to determine the analgesic efficacy of TAP block and intrathecal nulbuphine, (ii) to compare TAP block with intrathecal nalbuphine.

Patient and methods

After approval of the institutional ethics committee; 90 ASA grade II sever pre-eclamptic women systolic blood pressure >160 and, or diastolic blood pressure >110, with proteinuria and gestational age>38 weeks were admitted for emergency caesa-rean section under spinal anesthesia in a prospective, randomized, double-blinded, placebo-controlled trial.

All patients under treatment of I.V infusion Glyceryl Trinitrate if sever preeclampsia (systole >160mmgh or diastole >110 mmgh).
A written informed consent was obtained from each patient.

Patients were excluded if there was a history of relevant drug allergy, tolerance to opiates, BMI>30 kg m^{-2} at initial hospital visit, or contraindication to neuraxial anesthesia. Patient with Platelet count <100,000 per mm3, Elevated liver enzymes (twice normal concentrations), Renal insufficiency (serum creatinine concen-tration >1.1 mg/dl or a doubling of serum creatinine concentration) or oliguria (<500ml in 24h), Pulmonary edema or cyanosis, New-onset cerebral or visual disturbances, Severe persistent right upper quadrant or epigastric pain were also excluded from study.

All patients were clinically assessed and routine preoperative investigations were done: hemoglobin, platelet, INR, Alanine transaminase (ALT), serum creatinine, fasting blood sugar and ECG.

The patients were divided equally into three groups according to and using sealed envelopes to one of three groups (n=30 in each group) to:
Group (N): Thirty patients received intrathecal injection of 2.4ml of 0.5% hyperbaric bupivacaine plus 2 mg (0.1ml) nalbuphine HCL (Nalufin 20mg/ml, Amoun Pharmacutical CO.), an ultrasound-guided TAP block was performed at the end of surgery a total of 20 ml normal saline was injected in each side (left and right).

Group (B): Thirty patients received intrathecal injection of 2.5ml of 0.5% hyperbaric bupivacaine plus, An ultrasound-guided TAP block was perfor-med at the end of surgery a total of 20 ml 0.375% bupivacaine HCL was injected in each side (left and right).

Group (S): Thirty patients received intrathecal injection of 2.5ml of 0.5% hyperbaric bupivacaine, An ultrasound-guided TAP block was performed at the end of surgery a total of 20 ml normal saline was injected in each side (left and right).

The patients, their anesthesiologists, and staff providing postoperative care were blinded to group assignment.

Each patient received an intravenous infusion of 500mL (100ml/hr) of saline solution were given via a 16-gauge intravenous catheter and 10 mg metoclopramide intravenously before spinal block.
In addition to the loading dose of IV fluids, patients received a further saline solution during the remainder of the operation. Only minimal sedative medications were administered during the operation (midazolame 1–2mg). Standard continuous electrocardiogram monitoring and pulse oximetry was included.

Baseline maternal heartbeat and blood pressure values were established before the lumbar puncture.

Patients received a standard spinal anesthetic comprising hyperbaric 0.5% bupivacaine 12.5 mg. All patients were put in the sitting position with leaning forward. Sterilization was done.
Dural puncture was performed at or L3–L4 interspace with a 25 gauge Quincke spinal needle.

After confirming the correct placement of the spinal needle by aspiration of the cerebrospinal fluid (CSF) and after completion of the injection (the spinal volume was injected over 20–25 seconds) the patients were immediately returned to the supine position with 15 to 20 degrees of left uterine displacement breathing oxygen via face mask.

An ultrasound-guided TAP block was performed at the end of surgery, skin was prepared with 2% chlorhexidine solution and a high-frequency (11-6 MHz) linear ultrasound probe (2.5 cm footprint) (Chison ECO3, Chison Inc.) was used. The injectate syringes were prepared under aseptic technique. Ultrasound probe was positioned in mid-axillary line half way between costal margin and iliac crest. The satisfactory image was aimed to visualize the subcutaneous fat, external oblique muscle, internal oblique muscle, transversus abdominis muscle, peritoneum, and intraperitoneal cavity.

A 100 mm long 20G short bevel needle (Stimuplex A B/BRAUN Melsungen AG, Germany) was inserted in plane to the probe of the ultrasound anteriorly to lie between internal oblique muscle and transversus abdominis muscle, a total of 20 ml study solution was injected in each side (left and right). Successful injection was obtained when an echoluescent lens-shape appeared between the two muscles

In all patients (the three groups) paracetamol i.v infusion (1000 mg / 8 hours) and Magnesium sulfate is the medication of choice for the prevention of eclamptic seizures.

Oral calcium channel blocker was given to all patients. And i.v infusion Glyceryl Trinitrate if systole >160 mmgh or diastole >110 mmgh

Statistical method

The data are collected, tabulated and statistically analyzed using statistical package of social science (SPSS) version 23. The quantitative data expressed as mean ± SD and minimum and maximum of range. The quantitative data are analyzed using One Way ANOVA test between the three groups followed by post hoc Tukey analysis between each two groups. The significant level was taken at P value < 0.05

Results

Table 1: Demographic data in different groups

	Group S	Group B	Group N	P value		
Age				0.916		
Range	(19-32)	(19-29)	(21-29)	**S vs B**	**S vs N**	**B vs N**
Mean ± SD	24.6±3.8	24.7±2.6	24.9±2.5	0.999	0.923	0.939
Weight				0.059		
Range	(50-80)	(55-75)	(56-73)	**S vs B**	**S vs N**	**B vs N**
Mean ± SD	67.2±7.4	63.7±5.4	64.3±4.9	0.066	0.152	0.920
Height				0.155		
Range	(155-170)	(155-170)	(155-189)	**S vs B**	**S vs N**	**B vs N**
Mean ± SD	164±4	163.2±4.1	165.6±6.2	0.799	0.412	0.140
Operative time	(45-60)	(45-55)	(45-55)	0.144		
Range				**S vs B**	**S vs N**	**B vs N**
Mean ± SD	49±4.8	47.5±3.4	49.5±3.8	0.327	0.882	0.141

There were no significant differences between groups as regarding age, weight, height and duration of operation, as shown in ***table 1***

Table (2): Effect of TAP block and intrathecal nalbuphine on time analgesia, effective analgesia time and total analgesic requirement in patient with cesarean section.

	Group S	Group B	Group N	P value		
Time of analgesia				**<0.001***		
(minutes)	(70-95)	(100-180)	(200-280)	**S vs B**	**S vs N**	**B vs N**
Mean ± SD	81.3±8.8	142.7±18.9	242.3±24.4	**<0.001***	**<0.001***	**<0.001***
The time of the first analgesic dose (minutes)				**<0.001***		
	(90-130)			**S vs B**	**S vs N**	**B vs N**
Range	107.7±11	(180-235)	(250-370)	**<0.001***	**<0.001***	**<0.001***
Mean ± SD		215.3±15.9	320.3±30.2			
Total nalbuphine dose requirement in 24 hours (mg)				**<0.001***		
Range	(16-20)	(8-12)	(4-6)	**S vs B**	**S vs N**	**B vs N**
Mean ± SD	18.3±2	8.7±1.3	4.5±0.9	**<0.001***	**<0.001***	**<0.001***

***is a significant difference at p value < 0.05**

As regards analgesic time and first analgesic request time there was a significant increase in group N compared with other two groups and in group B compared with group S. While there was a significant decrease in total analgesic dose in group N compared with other two groups and in group B compared with group S.

Conclusion: intrathecal nulbuphine and TAP block produce a significant prolongation in postoperative analgesic time and decrease postoperative analgesic consumption. However intrathecal nulbuphine showed significant advantages over TAP block.

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