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Effect of Adding Dexamethasone to Bupivacaine in TAP Block for Analgesia After Cesarean Section

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Original Article

Abstract

Background: *cesarean sections represent the main cause of chronic pain among women. Dexamethasone is suggested to be added as adjuvant to bupivacaine on TAP block to enhance quality and duration of analgesia with minimal side effects.*

Objective: *To evaluate the effect of adding dexamethasone to bupivacaine on the duration and quality of pain management in U/S-guided TAP block in patients undergoing lower segment cesarean sections.*

Patients and Method: *A randomized clinical trial study that conducted at Obstetric operating room of the Private Nursing Home Hospital / Medical City / Baghdad for a period of four months from 1st Jan. to 1st May 2021. It included 50 pregnant women scheduled for elective lower segment C/S under spinal anesthesia and randomly allocated to one of two groups: Group A included 25 pregnant women received 20 ml of bupivacaine 0.25% with dexamethasone 4 mg (1 ml) for each side and group B included 25 pregnant women received 20 ml of bupivacaine 0.25% with normal saline (1 ml) for each side. Vital signs, VAS, and time from the end of surgery to first time analgesia usage were recorded postoperatively after 2, 4, 8, 12, and 24 hrs.*

Results: *In this study, means of VAS score after 8 and 12 hrs. from operation was significantly higher among group B than that in group A. Duration needed for 1st analgesia was significantly higher in patients of group A and patients in group B needed more doses of tramadol than that in patients of group A.*

Conclusion: *Adding dexamethasone to bupivacaine in TAP block is safe and beneficial in potentiating its analgesic effect in magnitude and duration.*

Keywords: *TAP block, cesarean sections, pain, dexamethasone, bupivacaine, Iraq.*

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1. INTRODUCTION

Cesarean section (C/S) is an operative technique for fetus delivery through an abdominal and uterine incision. It can be a life-saving procedure for both the mother and the fetus and can prevent poor obstetric outcomes if adequately indicated (1). Globally, prevalence of C/S has been steadily increasing in the past several decades with a rate of 32.8% (2), and this is might be due to emergence of pregnancies with multiple gestations, gestational obesity, twin pregnancy, breech presentation, elevation of pregnancy complications, previous C/S, failure of progress in labor, increase in rate of labor induction and maternal request (3). It takes place at a time of considerable hormonal and emotional changes associated with pregnancy and arrival of the baby (4), which can negatively influence the postoperative pain (5). Researchers appoint that cesarean sections represent the main cause of chronic pain among women (6). Estimates show immediate postoperative pain incidence rates after lower segment C/S amounting to 77.4% and 100%, with the pain being of high intensity (7). Treating postoperative pain is important for decreasing hospitalization and related costs, reducing hospital acquired infections, providing early mobilization, improving mother to fetal bonding, decreasing thromboembolic events, and rising satisfaction of patient (8). Inadequate postoperative pain relief after C/S can negatively impact ambulation, breastfeeding, maternal bonding and may cause chronic pain syndromes and poor quality of life (9). Rafi in 2001 (10) is first described Transversus abdominis plane (TAP), a relatively new regional anesthesia technique block which anaesthetizes the parietal peritoneum and the skin and muscles of anterolateral abdominal wall, including lower thoracic (T7 - T12) and upper lumbar (L1 - L3) nerve roots. An injection of local anesthetic is made in the fascial plane between the internal oblique and transversus abdominis muscle at the anterior axillary line (11). The analgesic efficacy of the block has been established in several lower abdominal surgeries including lower segment C/S. Benefits include high analgesic effectiveness, long duration, technical simplicity, opioid sparing, and minimal side effects (12). Dexamethasone is highly potent, long-acting glucocorticoid with analgesic, antiemetic, and anti- inflammatory properties, and when used as adjuvant to bupivacaine on TAP block to enhance quality and duration of analgesia with minimal side effects and has an added advantage in decreasing postoperative nausea and vomiting (13). It is cheap, easily affordable, accessible, and safe (14). The aim of this study is

to evaluate the effect of adding dexamethasone to bupivacaine on the duration and quality of pain management in U/S-guided TAP block in patients undergoing lower segment C/S.

2. PATIENTS and METHODS

Study design, setting, and time:

This was a randomized clinical trial study that conducted at the Obstetric operating room of the Private Nursing Home Hospital / Medical City / Baghdad for a period of four months from 1st Jan. to 1st May. 2021.

Study Population and sample size:

The study included 50 pregnant women with American Society of Anesthesiologists (ASA) I or II scheduled for elective lower segment C/S under spinal anesthesia and randomly allocated to one of two groups:

• Group A: Included 25 pregnant women received 20 ml of bupivacaine 0.25% with dexamethasone 4 mg (1 ml) for each side.

• Group B: Included 25 pregnant women received 20 ml of bupivacaine 0.25% with normal saline (1 ml) for each side.

Randomization was done as each patient assigned with a number, then patients with odd numbers were assigned as group A (25 patients) and patients with even numbers were assigned as group B (25 patients). Patients allergic to diclofenac, tramadol, paracetamol, or LA, diabetic, gestational diabetes, infection at the site of TAP block, BMI > 30 kg/m2, preeclampsia, eclampsia, hemodynamically unstable, use of other adjuvants, chronic pain, history of bleeding disorder, use of anticoagulants, any concomitant surgery other than lower segment C/S, and those who refused to participate were excluded from this study. Patients were explained about the study in detail, and informed written consent was taken to participate. Patients' anonymity and confidentiality of their medical records are maintained.

Data collection:

The information collected included socio-demographic characteristics (Age, BMI level, past medical history). Pain was assessed using the visual analogue scale (VAS) (using a 0 to 10 scale) with 0 having no pain and 10 having experienced the worst pain. Preoperatively, all patients were educated about how to use and record the VAS for pain. The pain intensity was rated as no pain (VAS: 0), mild (VAS: 1–3), moderate (VAS: 4–6), and severe (VAS: 7–10).

Procedure:

Prior to the induction of spinal anesthesia, two wide bore I.V cannulas were placed and preload with I.V fluid of 1000 ml ringer solution was administered for all patients. They were putted in a sitting position, and 2.5 ml of hyperbaric bupivacaine 0.5% was injected through a 25-gauge spinal needle (Quincke's needle) at L3-L4 or L4-L5 intervertebral interspace through midline approach under all aseptic condition to achieve the level of insensibility at T4-T5 dermatomes. The fluid replacement was maintained by ringer solution. Patients were placed in a left tilt position to avoid aortocaval compression and Oxygen Five L/min was administered via face mask. Blood pressure, heart rate, and SPO2 were monitored with an automated cuff blood pressure monitor until the end of operation. At the end of surgical closure of the skin, TAP block was given bilaterally under full aseptic precautions. Linear probe of U/S was applied on the flank (Posterior approach) using special needle for TAP block introduced through the skin and subcutaneous tissue and external and internal oblique muscle till the fascia above the transversus abdominus muscle and injection of 20 ml of bupivacaine 0.25% with dexamethasone 4 mg (1 ml) for each side in group A and injection of 20 ml of bupivacaine 0.25% with normal saline (1 ml) for each side in group B. Patients in both groups were received paracetamol and diclofenac ampule at discharge from the theatre.

Follow up:

MAP, heart rate, respiratory rate, SPO2, and VAS were recorded postoperatively after 2, 4, 8, 12, and 24 hrs. Time from the end of surgery to first time analgesia usage was recorded. If VAS > 4 or requested by the patient, rescue analgesia of 50 mg tramadol in 100 ml normal saline over 20 min was given which can be repeated in not less than four hours. Total amount of rescue analgesia needed since the end of block performance was also documented.

Statistical analysis:

The data analyzed using Statistical Package for Social Sciences (SPSS) version 26. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Independent t-test was used to compare the continuous variables accordingly. A level of P – value less than 0.05 was considered significant.

3. RESULTS

In this study, patients' age was ranging from 18 to 40 years with a mean of 29.3 years and standard deviation (SD) of ± 5.5 years. No significant differences (P ≥ 0.05) in age, BMI and GA, baseline vital signs and duration of surgery between study groups, as shown in (**Table 1**). Means of VAS score after 8 and 12 hrs. from operation was significantly higher among group B than that in group A (4.81 versus 2.76, P= 0.001; and 5.72 versus 3.22, P= 0.001 respectively). There was no significant difference (P ≥ 0.05) between study group in means of VAS score 2,4, and 24 hrs. after operation as shown in (**Table 2**). Duration needed for 1st analgesia was significantly higher in patients of group A (20.12 versus 13.22 hrs. , P= 0.001); and patients in group B needed more doses of tramadol than that in patients of group A (93.72 versus 42.51 mg, P= 0.001), as shown in (**Table 3**).

Table 1. Comparison between study groups by general characteristics

Variable	Group A		Group B		P. value
	Mean	SD	Mean	SD	
Age (Years)	29.91	5.1	28.7	5.8	0.438
BMI Level (kg/m^2)	28.33	3.7	27.65	4.1	0.541
Gestational age (Weeks)	38.7	1.6	39.1	1.1	0.311
Baseline MAP (mmHg)	95.2	3.93	96.4	2.84	0.182
Baseline heart rate (Beats/mint.)	88.3	8.2	86.8	8.1	0.5
Baseline SPO_2 (%)	97.12	1.25	97.32	1.36	0.532
Duration of C/S (Mints.)	50.44	9.2	48.31	8.3	0.395

Table 2. Comparison between study groups by postoperative VAS score for pain

Time	VAS score for pain				P. value
	Group A		Group B		
	Mean	SD	Mean	SD	
2 hrs. postoperatively	0.88	0.2	1.01	0.3	0.08
4 hrs. postoperatively	1.21	0.9	1.79	1.2	0.06
8 hrs. postoperatively	2.76	1.1	4.81	1	0.001
12 hrs. postoperatively	3.22	1.6	5.72	1.4	0.001
24 hrs. postoperatively	3.41	1.1	4.12	1.6	0.077

Table 3. Comparison between study groups by time to first analgesia usage and tramadol needed

Variable	Group A		Group B		P. value
	Mean	SD	Mean	SD	
Time to first analgesia usage (hrs.)	20.12	5.1	13.22	4.2	0.001
Tramadol needed (mg)	42.51	22.3	93.72	36.3	0.001

4. DISCUSSION

TAP block is used in abdominal surgery for postoperative analgesia. It can reduce pain scores, opioid consumption, and incidence of opioid-related complications (15). Generally, single-shot injection of local anesthetics can apply an analgesic duration of 4-12 hours (16). The analgesic efficacy of dexamethasone added to local anesthetics in TAP block has been explored recently, but the results are inconsistent (17). In this study, 50 patients enrolled, 25 women received bupivacaine 0.25% with dexamethasone (Group A), other 25 received bupivacaine 0.25% with normal saline (Group B), in which means of VAS score in group B was significantly higher after 8 and 12 hrs. (P= 0.001; and P= 0.001 respectively), while no significant difference in means of VAS score 2,4, and 24 hrs. after operation ($P \geq 0.05$). Similarly, Akkaya et al study found that pain scores were lower in the dexamethasone group for superficial pain ($P<0.05$) (17). Also, Abdalla et al study found that dexamethasone-bupivacaine in TAP block had

significantly lower postoperative VAS scores than bupivacaine in patients undergoing lower abdominal surgery (P<0.05) (18). On the other hand, Deshpande et al study observed a different result, as VAS pain scores were significantly lower at 4, 6, and 12 h in dexamethasone group (P < 0.05) (19), while, Gupta et al study, reported that VAS scores for both somatic and visceral pain were significantly lower in dexamethasone group at 8 h, 12 h, and 24 h postoperatively (P<0.05) (12). The difference observed among studies, can owing to the effect of spinal anesthesia given, which is expected to provide pain relief for up to 4 hours per se., in addition to dose of local anesthetics used, level of spinal anesthesia and procedure performed. The current results revealed that in group A, duration for 1st analgesia was significantly higher (P= 0.001); and group B needed more doses of tramadol (P= 0.001). The current results are consistent with previous studies, as found in Gupta et al study, when time to 1st rescue analgesia was significantly high in dexamethasone group (P < 0.001) and tramadol consumed in 24 h was significantly lower (P < 0.001), which was similar to Deshpande et al study, as reported that significantly longer time for 1st analgesia (P<0.001) with lesser tramadol requirement in first 24 hours in dexamethasone group (P<0.001) (19). On the other hand, Akkaya et al study found that time before the administration of the first additional analgesic dose was prolonged significantly in the dexamethasone group (p = 0.004) and total consumption of tramadol was significantly lower in the dexamethasone group (p = 0.001) (17).

In fact, TAP block is a safe and effective modality for postoperative analgesia as a part of multimodal approach to anesthesia and enhanced recovery in patients undergoing abdominal surgery, with the advent of ultrasound-guidance, it has a higher success rate, and rare incidence of complications (20). The use of ultrasound enables better visualization of the abdominal structure, real-time visualization of the needle, and spread of LA, thereby decreasing the chance of block failure and increasing the accuracy of block (12). Mechanism by which steroid has an analgesic effect is not well understood. Corticosteroid shows analgesia via their anti-inflammatory or immunosuppressive effects. Furthermore, analgesic action might be due to modulation of nuclear transcription. Additionally, they may potentiate the action of local anesthetic through modulation of the function of the K+ channels in excitable cells (21).

5. CONCLUSIONS

In conclusion, adding dexamethasone to bupivacaine in TAP block is safe and beneficial in potentiating its analgesic effect in magnitude and duration.

Ethical Clearance:

Ethical issues were taken from the research ethics committee. Informed consent was obtained from each participant. Data collection was in accordance with the World Medical Association (WMA) declaration of Helsinki for the Ethical Principles for Medical Research Involving Human Subjects, 2013 and all information and privacy of participants were kept confidentially.

Conflict of interest: Authors declared none

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