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Local Anaesthetic Injection in to Both Angles of Rectus Sheath Incision for Postoperative Pain Relief in Cesarean Delivery Have Any Benefit?

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Abstract

Background: Use of CS for delivery is becoming more common, & it is now one of the most common major operative procedures done worldwide. Prolonged pain decreases physical activity & rises the risk of deep vein thrombosis & subsequent pulmonary embolism.

Aim and objectives: To determine the benefit and efficacy of injection of local anesthetic 'Bupivacaine' in both angles of the rectus sheath incision aiming to block ilioinguinal and iliohypogastric nerves bilaterally to reduce postoperative pain after caesarean section.

Subjects & methods: Research is prospective randomized double-blind controlled research, showed at Luxor general hospital, gynecology and obstetrics department, on 100 participants divided into 2 groups: (Group A): included 50 patients will receive local anesthetic (10 ml Bupivacaine 0.5%) in each angle of rectus sheath incision, (Group B): included 50 patients will receive local anesthetic (10 ml Bupivacaine 0.5%) in the right angle of rectus sheath and normal saline in the left angle of rectus sheath incision.

Result: The analgesic request time was statistically significant longer among group A than group B. The ambulation time was important shorter among group A than group B.

Conclusion: This study concluded that local anesthetic 'bupivacaine' injection in both angles of the rectus sheath incision to block ilioinguinal and iliohypogastric nerves bilaterally is an effective method to reduce postoperative pain & analgesic consumption after caesarean section in the studied cases receiving general anesthesia and also decrease postoperative nausea and vomiting side effects.

Keywords: Bupivacaine, Cesarean delivery, Local anesthetic injection, Postoperative pain

1. Introduction

Before addition of neuromuscular block, rectus sheath block was initially used for abdominal wall muscle relaxation throughout laparotomy.¹ It is now used to provide analgesia following umbilical or incisional hernia maintenance, as well as other midline surgical incisions.

Inadequately cured postoperative pain can significantly contribute to morbidity in surgical studied cases, delaying studied cases' recovery &

ability to return to daily functional activities. Early recovery is especially important for studied case who is expected to care for her newborn soon after surgery. Inadequately cured pain after caesarean section is linked to a greater incidence of chronic pain & posttraumatic stress syndrome, according to evidence from researches conducted in high-income settings.²

Caesarean section is most common obstetric procedure. One of most common concerns during & after caesarean delivery is postoperative pain.

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Caesarean section frequently causes moderate to severe pain that lasts for 48 h after surgery, & poor pain control in postoperative period can lead to failure to care for newborn immediately after delivery, chronic pain syndromes, & poor quality of life. Local anaesthetic wound infiltration during Caesarean section was linked to less morphine consumption & nausea, but not with lower pain scores.³

Childbirth is emotionally charged experience for both the mother & her family. Mother should bond with her new baby as soon as possible & begin breastfeeding, as this helps to contract uterus & speeds up process of uterine involution in postpartum period. Any intervention that improves pain relief can have positive influence on early breastfeeding. Prompt & adequate postoperative pain relief is thus important component of caesarean delivery, making period immediately following operation less uncomfortable & more emotionally rewarding. Postoperative pain after CS is typically treated with opioids in conjunction with other analgesics.⁴

Goal of this research is to define benefit and efficacy of injection of local anesthetic 'Bupivacaine' in both angles of the rectus sheath incision aiming to block ilioinguinal and iliohypogastric nerves bilaterally to reduce postoperative pain after caesarean section.

2. Patients & methods

Study is prospective randomized double-blind controlled research. This study was conducted at luxor general hospital, gynecology and obstetrics department.

This study was included 100 participants who will undergo elective caesarean section. The studied cases will be assigned randomly into 2 groups: **group A:** fifty studied cases will receive local anesthetic (10 ml Bupivacaine 0.5%) in each angle of rectus sheath incision, **group B:** 50 patients will receive local anesthetic (10 ml Bupivacaine 0.5%) in the right angle of rectus sheath and normal saline in the left angle of rectus sheath incision. Then compare between bilateral block and one side block.

2.1. Randomization

Patients will allocate randomly to 2 groups by computer-generated haphazard number list. The patient and investigator and supervisors will be blinded to all study medications and the content of the envelopes as saline or bupivacaine. The envelopes will divide to two groups 50 for each first

group each envelope will contain 4 bupivacain 0.5% ampoules, second group each envelope will contain 2 saline ampoules and 2 bupivacaine 0.5% ampoules.

2.2. Inclusion criteria

Age of patients between 20/30 years old, elective cesarean section, full term pregnancies, singleton pregnancies and first caesarean section.

2.3. Exclusion criteria

Patients who have any of the following: Sensitivity to local anesthesia and narcotics, diabetes mellitus and hypertension, neurologic disease, Substance abuse, emergency caesarean section, refuse to participate in the study, previous abdominal or pelvic operation, medical disorder with pregnancy like preeclampsia, hepatic or renal and any complication during surgery.

2.4. Patient information

The authors explained the details of the procedure, the aim of work, benefit and risk of the trial to all patients.

2.5. Patient consent

All patients will sign an informed consent and have the right to retreat the study.

2.6. Data collection

All participants will be subjected to the following: consent to this participation, complete history taking: Personal history, menstrual (accurate last menstrual dates, gestational age by Naegele rule), obstetric (regard parity, gravidity, previous caesarean section), present, past and family history.

2.7. Physical examination

General examination (body mass index, blood pressure and other signs), obstetric abdominal examination (fundal level, fetal presentation, fetal weight, amount of liquor and scars of previous operations).

2.8. Investigation

Ultrasound for gestational age confirmation, fetal presentation and exclusion placenta previa and

congenital anomalies, complete blood count, coagulation profile, renal & liver function examinations.

2.9. Procedures

All caesarean section will perform using pfannenstiel incision under general anesthesia, at the time of closure of anterior abdominal wall: **group A:** will receive 10 ml bupivacaine 0.5% instead of saline in each angle of rectus sheath, **group B:** will receive 10 ml saline in left angle and 10 ml bupivacaine 0.5% in right angle of rectus sheath. All patients were received: Fentanyl citrate 100 mcg intravenous intraoperative as part of general anaesthesia, diclofenac potassium 75 mg intramuscular every 12 h. The postoperative pain will be evaluated at half, two, four, six, eight, twelve, twenty four & thirty six hours after operation by using visual analogue scale for pain. Adverse effects of medications will record as vomiting, nausea and itching.

2.10. Outcomes

Pain assessment during rest and ambulation by visual analogue scale after 1/2, 2, 4, 6, 8, 12, 24 and 36 h, the time interval for first analgesic request. Incision length, surgery time, ambulation time, hospital time and side effects of the drugs given.

2.11. Statistical analysis

Collected data were computerised & statistically analysed with SPSS version 24 programme. All statistical comparisons were two-tailed & statistically significant. P value < 0.05 shows significant variation, whereas $P \geq 0.05$ shows non-significant variation.

3. Results

According to [Table 1](#) the mean maternal age among group A has been 24.76 ± 3.1 while among group B was 25.18 ± 2.9 . There was no statistically

Table 1. Comparing among 2 tested groups concerning maternal sociodemographic data.

Variables	Group A	Group B	Test value	P value
Maternal age				
Mean \pm SD	24.76 ± 3.1	25.18 ± 2.9	0.701	0.485 ^a
Residence				
Rural n (%)	32 (64.0)	35 (70.0)	0.407	0.671 ^b
Urban n (%)	18 (36.0)	15 (30.0)		
BMI				
Mean \pm SD	25.13 ± 2.4	25.42 ± 2.3	0.620	0.537 ^a

^a Student t -test.

^b Chi square exam.

Table 2. Comparing among two tested groups concerning VAS.

VAS	Group A Mean \pm SD	Group B Mean \pm SD	t value	P value
30 min	0.24 ± 0.43	0.28 ± 0.45	0.452	0.652
1 h	1.08 ± 0.57	1.08 ± 0.57	0.000	1.000
2 h	1.9 ± 0.79	1.8 ± 0.78	0.000	1.000
4 h	3.26 ± 0.69	3.32 ± 0.68	0.436	0.664
6 h	4.18 ± 0.72	4.38 ± 0.60	1.507	0.135
8 h	5.04 ± 0.67	5.08 ± 0.67	0.300	0.765
12 h	6.02 ± 0.55	5.8 ± 0.67	9.350	$<0.001^a$
24 h	6.62 ± 0.73	5.85 ± 0.61	15.229	$<0.001^a$
36 h	7.44 ± 0.81	5.94 ± 0.79	9.344	$<0.001^a$

Student t exam.

^a P is significant at <0.05 .

important variation among 2 studied groups concerning maternal years old. Regarding residence there was 64% rural & 36% urban between group A while 70% rural and 30% urban among group B. There was no important variation among 2 tested groups concerning residence. Mean BMI among group A was 25.13 ± 2.4 whereas among group B was 25.42 ± 2.3 . There was no variation among 2 tested groups concerning BMI ([Table 2](#)).

In [Table 3](#) there was statistically important higher among group A than group B regarding VAS after twelve hours, VAS after twenty four hours and VAS after 36 h. There was no statistically important variation among two tested groups concerning VAS score at other points of time ([Table 3](#)).

As shown in [Table 4](#) the hospital stay duration was statistically significantly lower among group A than group B while there was no important variation among 2 tested groups concerning surgery time ([Table 4](#)).

Table 3. Comparing among 2 tested groups concerning surgery time and hospital stay duration.

Variables	Group A	Group B	t value	P value
Surgery time (min)				
Mean \pm SD	45.3 ± 3.4	45.1 ± 3.6	0.286	0.776
Hospital stay (hours)				
Mean \pm SD	24.2 ± 3.1	40.7 ± 4.3	21.981	$<0.001^a$

Student t exam.

^a P is significant at <0.05 .

Table 4. Comparing among two tested groups concerning analgesic request and ambulation time.

Variables	Group A	Group B	t value	P value
Analgesic request (hours)				
Mean \pm SD	7.4 ± 0.92	4.4 ± 0.88	16.786	$<0.001^a$
Ambulation time (hours)				
Mean \pm SD	5.6 ± 1.5	7.9 ± 0.80	10.017	$<0.001^a$

Student t exam.

^a P is significant at <0.05 .

Table 5. Comparing among two tested groups concerning PONV score.

PONV	Group A n (%)	Group B n (%)	Test value	P value
0	5 (10)	2 (4)	17.740	<0.001 ^a
1	40 (80)	27 (54)		
2	5 (10)	10 (20)		
3	0 (0)	11 (22)		

PONV, Postoperative Nausea and Vomiting.

Fisher exact test.

^a P is significant at <0.05.

In Table 5 the analgesic request time was statistically significant longer among group A than group B. The ambulation time was statistically important shorter among group A than group B (Table 5).

According to Table 9 the PONV was statistically significantly lower among group A than group B.

4. Discussion

Cesarean section is one of most common major surgical procedures. In 2012, twenty three million CS procedures were done globally. Despite few advantages to CS, like lower risk of birth injuries (e.g., asphyxia, shoulder dystocia, fractures), it can cause moderate to severe postoperative pain. This pain must be taken seriously & handled as soon as possible as it can delay recovery, interfere with daily activities, & have effect on the maternal psychological well-being. Inadequate cure may also cause pain to become persistent & chronic. Optimizing analgesic regimens is crucial aspect of pain management & can be cost-effective way to enhance postoperative results & studied case satisfaction.⁵

Most serious postoperative pain problems involve respiratory dysfunction, which results in shallow & rapid breathing &, as result, pulmonary atelectasis, cardiovascular problems & increased risk of ischemic heart & myocardial infarction, increased risk of deep vein thrombosis & pulmonary embolism as result of postoperative immobility, gastrointestinal problems like nausea, vomiting, & ileus, urinary system problems like urination problems, & psychological problems like stress & anxiety & finally, length of hospitalization.⁶

While opioids are commonly used to relieve postoperative pain after CS, opioid-related side effects like nausea, vomiting, sedation, itching, & risk of delayed maternal respiratory depression can cause other issues for new mothers, like delayed breastfeeding initiation & impaired mother-infant bonding, all of which decrease overall studied case satisfaction. Numerous researchers have investigated safety & efficacy of interventions for postoperative CS pain management, claiming that various local anaesthetic methods, as transversus

abdominis plane block, ilioinguinal & iliohypogastric nerve block, quadratus lumborum blocks, transversalis fascia plane block, erector spinae block, & wound infiltration, are effective in decreasing pain scores & opioid requirements. Given limited potential side effects of these local analgesic methods, they are regularly recommended.³

Preoperative ilioinguinal & iliohypogastric nerve blocks have been broadly used to provide analgesia for children & adults undergoing surgery for inguinal hernia repair, as well as postoperative analgesia in parturients after Caesarean Section. Beneficial effects of II-IH nerve block on postoperative pain after Caesarean Section have been well recorded as preventive method, however efficacy when done after surgical procedure remains unknown.⁷

Favoured method for pain relief after caesarean section is bilateral ilioinguinal block & iliohypogastric block. It is thought to be beneficial after caesarean section due to the unwanted effects of analgesics that move into breast milk. Awake & alert mothers need postoperative analgesia for adequate pain relief in order to establish early bonding among mother & newborn.⁸

The main goal of research was to define benefit and efficacy of injection of local anesthetic 'Bupivacaine' in both angles of the rectus sheath incision aiming to block ilioinguinal and iliohypogastric nerves bilaterally to reduce postoperative pain after caesarean section.

This prospective randomized double-blind controlled research conducted at luxor general hospital, gynecology and obstetrics department. The study was included 100 participants who will undergo elective caesarean section, then randomized to 2 groups: Group A: fifty studied cases will get local anesthetic (10 ml Bupivacaine 0.5%) in each angle of rectus sheath incision. Group B: 50 patients will receive local anesthetic (10 ml Bupivacaine 0.5%) in the right angle of rectus sheath and normal saline in the left angle of rectus sheath incision.

Main findings of research were as follows: based on demographic data of tested groups, we discovered that mean maternal years old between group A was 24.76 ± 3.1 & 25.18 ± 2.9 . In terms of maternal years old, there was no statistically important variation among 2 groups studied. In terms of residence, group A had sixty four percent rural & thirty six percent urban residents, whereas group B had seventy percent rural & thirty percent urban residents. In terms of residence, there was no statistically important variation among 2 groups studied. The mean BMI in group A was 25.13 ± 2.4 , although it

was 25.42 ± 2.3 in group B. There was no important variation in BMI among 2 groups studied.

In agreement with research the study by El Rasheedy *et al.*,⁹ evaluated new analgesic method for post-cesarean section pain through local bupivacaine injection, they enrolled 150 patients, 50 patients received saline infiltration in both angle of the rectus sheath Incision, 50 received Bupivacaine infiltration in both angles of the rectus sheath incision and 50 patients received saline injection in the left angle and Bupivacaine injection in the right angle. There was no important variation among two tested groups concerning age.

Also, research by Nigatu *et al.*,⁷ They enrolled eighty participants, thirty nine in Group B (received II-IH nerve block with 0.25% bupivacaine) & forty one in Group C (received no block) to investigate analgesic efficacy of Bilateral Ilioinguinal & Iliohypogastric Nerve Block for Post Cesarean Delivery Under Spinal Anaesthesia. 2 groups were not statistically different concerning demographic variables (age, sex & BMI).

Moreover, the study by Wagh,⁸ research, Efficacy of Bupivacaine versus Ropivacaine for Bilateral Ilioinguinal & Iliohypogastric Nerve Block for Postoperative Pain after Cesarean Section, enrolled sixty studied cases split into 2 groups. Mean years old of studied cases in Group A was 26.63 ± 4.12 years & 25 ± 3.03 years in Group B. Demographic profiles of studied cases (years old, weight, & ASA status) were comparable in both groups with no statistically important variation (P value > 0.05) & appear to have no influence on research's result.

Regarding obstetric history of the studied groups, we revealed that the mean gravidity among group A was 3.46 ± 1.6 while among group B was 3.56 ± 1.8 . According to parity the mean among group A was 1.76 ± 1.5 while among group B was 1.94 ± 1.5 . Among group A there was 56% had previous CS while among group B there was 60% had previous CS. Also, there was 30% had previous abortion among group A while 34% had previous abortion among group B. There was no statistically important variation among two tested groups concerning gravidity, parity, previous history of CS and previous history of abortion. As well there was no statistically important variation among 2 tested groups concerning gestational age & fetal presentation.

Also, mean systolic blood pressure has been 119 ± 10.5 among group A and 119.6 ± 10.1 among group B. The mean diastolic blood pressure was 68 ± 6.4 among group A and 67.8 ± 6.2 among group B. The mean among group A was 85.2 ± 4.1 and 85 ± 4.2 among group B and there was no statistically important variation among 2 tested groups

concerning systolic blood pressure, diastolic blood pressure & pulse. As well there was no statistically important variation among 2 tested groups concerning Hb & platelet count.

Comparing among 2 tested groups concerning VAS discovered that there was significantly higher among group A than group B regarding VAS after twelve hours, VAS after twenty four hours and VAS after 36 h. There was no statistically important variation among 2 studied groups concerning VAS score at time earlier than 12 h.

In agreement with results research by El Rasheedy *et al.*,⁹ revealed that at 12 h post operatively VAS score has statistically important variation among studied groups, and at thirty min there was no statistically important variation among studied groups concerning VAS score. While in contrast with outcomes there was statistically important variation among tested groups concerning VAS score at two, four, six & eight hours.

While, research by Nigatu *et al.*,⁷ NRS pain severity scores of II-IH block group & control group were similar immediately after studied case was transferred to ward. This could be attributed to analgesic impacts of spinal anaesthesia lasting longer. Although, pain severity in II-IH block group & control group were different at four hour & eight hour at rest, it was not clinically significant. Result was supported by the research carried out by Sakalli *et al.*,¹⁰ At 6 h, 8 h, 12 h, 16 h, & 24 h, intervention group's mean VAS was significantly lower than control group's. Even so, there was no variation in mean VAS score at zero h & 2 h in their research. This could be because process was done under GA, & block may take some time to generate analgesia.

In contrast with our results the study by Wagh,⁸ reported lower values of VAS score in comparison with our results, also they reported that there was no statistically important variation among tested groups concerning VAS score at zero, 0.5, 1, 1.5, 2, 3, 4, 5, 6 and 12 h while there was statistically important variation among tested groups concerning VAS score 7 & 8.

Furthermore, a randomized control trial was performed by Krishnegowda *et al.*,¹¹ They discovered that more than eighty percent (forty studied cases) of studied cases in control group had vas score of more than four at 4 h postoperatively, whereas no studied case in ILIH nerve block group had vas score of more than four at 4 h postoperatively. They also discovered that ILIH nerve block group had significantly lower VAS scores at four, six, & twelve hours postoperatively (P values < 0.001 , 0.010 , & 0.011) when compared to control group. At 4 h

postoperatively, ILIH nerve block group had significantly lower VAS scores (P value < 0.001) than local infiltration group. At 12 h after surgery, 11 studied cases in ILIH nerve block group had VAS score of less than four.

Research discovered that hospital stay duration was lower among group A than group B while there was no statistically important variation among 2 studied groups concerning surgery time.

In agreement with outcomes the research by El Rasheedy *et al.*,⁹ revealed that there was no statistically important variation among tested groups concerning hospital stay time, while there was no statistically important variation among tested groups concerning surgical time.

As well our results were supported by the study by Nigatu *et al.*,⁷ who described that there was no statistically significant variation among tested groups regarding surgical time.

Outcomes were further supported by research by Sakalli *et al.*,¹⁰ who described that there was no statistically important variation among tested groups concerning surgical duration and previous abdominal surgery.

Also, Abiy *et al.*,¹² compared bilateral ilioinguinal-iliohypogastric nerve blocks to transverses abdominis nerve blocks for postoperative pain management in parturients undergoing elective caesarean section; they enrolled cases with no significant difference regarding age, BMI, Previous C-section, Heart rate, blood pressure and surgical time.

Our results also revealed that the analgesic request time was statistically significant longer among group A than group B. The ambulation time has been important shorter among group A than group B.

In agreement with results research by El Rasheedy *et al.*,⁹ revealed that there was statistically important variation among tested groups concerning analgesic request time and ambulation time. They also found that local Bupivacaine injection associated with significant in need of analgesic or not analgesic demand by group A was 74%, 30% by group B and 48% by group C.

This was agreed with Al-Hakim and Alidreesi,¹³ who showed that in studied cases undergoing elective LSCS via Pfannenstiel incision, preoperative analgesia with 20 ml of 0.5% Bupivacaine infiltrated before skin closure reduced postoperative analgesia request with Pethidine. Also, Bamigboye and Hofmeyr,¹⁴ Local anaesthetic infiltration & abdominal nerve blocks as adjuncts to regional analgesia & general anaesthesia reduced opioid consumption in CS studied cases.

Outcomes were supported by research by Nigatu *et al.*,⁷ who described that there was statistically important variation among tested groups concerning duration elapsed before first request of opioid analgesia & total tramadol consumption.

Outcomes were further supported by research by Krishnegowda *et al.*,¹¹ who described that there was high important variation among tested groups concerning duration of analgesia & analgesic consumption.

Present results revealed that the postoperative nausea and vomiting (PONV) has been lower among group A than group B.

In agreement with our results research by El Rasheedy *et al.*,⁹ discovered that there was important variation among tested groups concerning PONV scale as group B showed lesser side effects (nausea & vomiting) than other groups.

A study by Amin and Tahir,¹⁵ direct local wound infiltration of Bupivacaine provided good pain relief after CS & decreased need for parenteral narcotic analgesia with no significant side effects.

In contrast with our results research by Abiy *et al.*,¹² discovered that there was no statistically important variation among tested groups concerning Side effects, they also revealed that transverses abdominis nerve block group has higher prevalence of side effects than ilioinguinal-iliohypogastric nerve block group.

Side effects of these drugs are generally dose dependent; high plasma concentrations caused by unwanted drug entry into vessel; decreased studied case tolerance; persona incompatibility & extreme sensitivity. Meanwhile, rate of unwanted problems is also affected by injection place.¹⁶

4.1. Conclusion

This study concluded that local anesthetic 'bupivacaine' injection in both angles of the rectus sheath incision to block ilioinguinal and iliohypogastric nerves bilaterally is an effective method to reduce postoperative pain & analgesic consumption after caesarean section in studied cases receiving general anesthesia and also decrease the postoperative nausea and vomiting side effects.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article.

Conflict of interest

There are no conflicts of interest.

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