

# Local Anaesthetic Injection In To Both Angles of Rectus Sheath Incision for Post-Operative Pain Relief in Cesarean Delivery Have Any Benefit

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**Abstract:** Background: The use of CS for delivery is becoming more prevalent, and it is now one of the most common major operative procedures done worldwide. Prolonged pain reduces physical exercise and increases the risk of deep vein thrombosis and subsequent pulmonary embolism. Objectives: The purpose of this research was to see if a local anaesthetic "Bupivacaine" injection in both angles of the rectus sheath incision could decrease postoperative pain and opioid consumption after a caesarean section. Patients and methods: This study was conducted at obstetrics and gynecology department of Damanhur Medical National Institute from March 2023 to September 2023 and included 90 patients. 30 patients received saline infiltration in both angles of the rectus sheath incision, 30 patients received Bupivacaine infiltration in both angles of the rectus sheath incision, and 30 patients received both saline and Bupivacaine injections. Results: The research compared the three groups and discovered a significant difference in time for the first analgesic request, time interval before first ambulation, length of hospital stay, postoperative pain score, and postoperative nausea and vomiting, with group B having the best result. Conclusion: In patients getting general anesthesia, a local anesthetic "Bupivacaine" injection in both angles of the rectus sheath incision to block the ilioinguinal and iliohypogastric nerves bilaterally is an effective technique to reduce postoperative pain and analgesic consumption after caesarean section.

**Keywords:** Cesarean Delivery, Bupivacaine, Local Anesthetic Injection and Postoperative Pain.

## 1. INTRODUCTION

Cesarean section (CS) is one of the most common operations done in the obstetric ward with rapidly rising rate [1]. Postoperative pain is the greatest concern for women after caesarean delivery. Postoperative pain may be severe, lasting at least 48 to 72 hours, and may also lead to delayed patient ambulation prolongation of hospitalization and recovery, atelectasis, vascular thrombosis and ultimately patient dissatisfaction [2]. Compared to transversus abdominis plane (TAP) blocks, wound site local anaesthetic injection can offer comparable efficient postcesarean delivery analgesia [3]. The rationale behind the use of local anesthetic given during the operation is to stop pain from starting by blocking the usual response of nervous system to pain. Elimination of some of the superficial components of the pain after caesarean delivery could modulate the perception of deeper visceral pain [4]. For wound injection, many adjuncts (including diclofenac, ketolac, dexamethasone, and magnesium sulphate) have been investigated in conjunction with local anaesthetics. According to study findings, these adjuvants delivered directly to the injury site increase analgesia and lessen wound inflammation. To decide if systemic administration of these medications is superior to wound injection, safety data are needed [5]. Three distinct concentrations of bupivacaine are available: 0.25%, 0.5%, and 0.75%. Local infiltration (post-surgical analgesia), peripheral nerve blocks (dental or other minor surgical procedures), spinal anaesthesia (injected into the CSF to produce anaesthesia for orthopaedic surgery, abdominal surgery, or caesarean delivery), epidural anaesthesia/analgesia for labour pain, and a caudal block (anaesthesia and analgesia below the umbilicus, typically for paediatric surgery) are all methods of administration [6].

### Aim of the Study

The present study is designed to evaluate the efficacy, benefit, and safety of local anesthetic " " injection in both angles of the rectus sheath incision to reduce postoperative pain after caesarean section. We determined the effect from one sided block alone compared to bilateral block or bilateral placebo block.

## 2. MATERIAL AND METHODS

This is a prospective randomized controlled clinical trial; that will be carried out on a total sample of 90 women patients received elective caesarean sections. The study will be conducted between March 2023 and September 2023 at the obstetrics and gynecology department of Damanhur Medical National Institute.

**Inclusion criteria:** Elective cesarean section, Singleton pregnancy, full term pregnancy, first caesarean section, Age of patients  $\geq$  18 years.

**Exclusion criteria:** emergency cesarean section, Known or suspected sensitivity to local anesthesia and narcotics, Diabetes mellitus, hypertension or bleeding tendency, Progressive neurologic disease, Hypertension in pregnancy with proteinuria and other medical disorders with pregnancy.

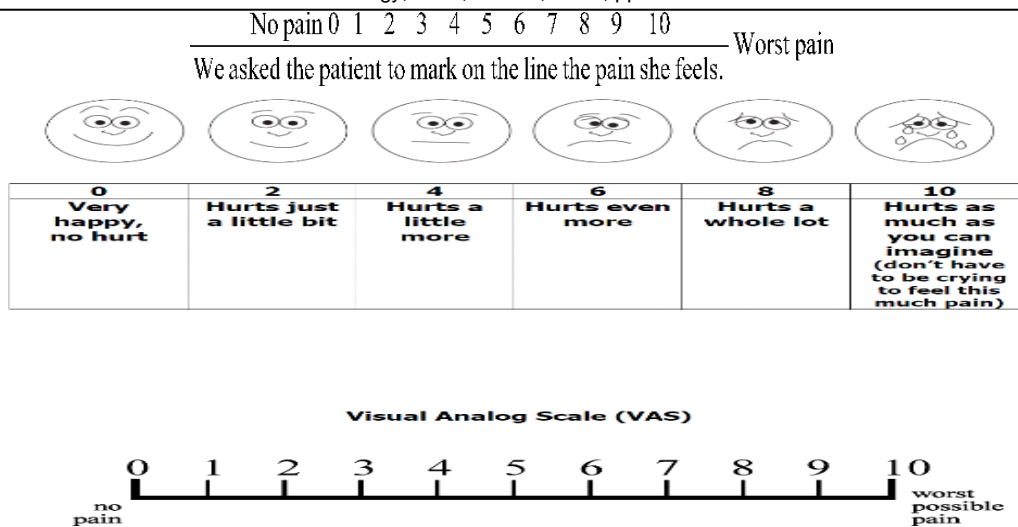
**Informed consent:** All the patients will give written informed consent after being counselled regarding the objectives and the procedure of the study.

The patients will be prospectively randomized equally into three groups (30 each in each group). Group A: 30 patients will receive normal saline injection (10 ml) in each angle of rectus sheath incision. Group B: 30 patients will receive local anesthetic (10 ml Bupivacaine 0.5%) in each angle of rectus sheath incision. Group C: 30 patients will receive local anesthetic (10 ml Bupivacaine 0.5%) in the right angle of rectus sheath and 10 ml normal saline in the left angle of rectus sheath.

The postoperative pain will be evaluated at 30 minutes, 2, 4, 6, 8 and 12 hours after operation by using the standard 10 cm visual analogue scale for pain scoring that will be explained to the patients during preoperative visit as a 100 millimeter horizontal line with verbal anchors at both ends. The patient will be asked to mark the line and the score is the distance in millimeters from the left side of the scale to the mark with words no pain at the left end and the worst pain possible at the right end. VAS ratings of greater than 70 mm are indicative of severe pain and 0-5 mm no pain, 5-44 mm mild pain and 45-74 mm moderate pain. These scales had the advantages of being simple and quick to use, allow for a wide choice of ratings and avoid imprecise descriptive terms [7].

Adverse effects of medications and other outcome parameters will be recorded including nausea, vomiting, and itching. Nausea and vomiting intensity will be measured using a simplified postoperative nausea-vomiting impact scale based on patients' assessment of the impact of their nausea on their postoperative recovery and the number of times they experienced vomiting. Vomiting intensity will be scored as number of vomits (0-2 or 3 if three or more vomits).

**Outcomes:** Pain assessment during rest and ambulation using: Visual analogue scale (pain score) after 30 minutes, 2 hours, 4 hours, 6 hours, 8 hours, 12 hours, 24 hours and 36 hours. Duration of postoperative analgesia (the time interval for first analgesic request). Incision length, Surgery time, Ambulation time and Hospital time. Side effects of the drugs given (nausea and vomiting). After collecting all the data, the data will be tabulated in a master chart and analyzed.



**Figure (1):** Visual analogue scale

**Ethical aspects**

The study protocol will be approved by the Ethics Committee of GOTH1 research center. Written informed consent will be obtained from the patients or their legal representatives according to the patient’s condition before enrollment.

**3. STATISTICAL ANALYSIS**

IBM SPSS version 22.0 will be used to analyses computer-generated data. To express quantitative data, percentages and numbers will be employed. Before utilizing the median in nonparametric analysis or the interquartile range in parametric analysis, it will be required to perform Kolmogorov-Smirnov tests to ensure that the data will be normal. We used the (0.05) significance threshold to establish the significance of the findings. The Chi-Square test is used to compare two or more groups. The Monte Carlo test may be used to adjust for any number of cells with a count less than 5. Fischer Chi-Square adjustment will be applied to tables demonstrating non continuous data.

**4. RESULTS**

There was no significant difference between the three groups as regard age, gestational age, surgery time (Table 1). The time interval between the three groups for the first analgesic request was compared, and there was a substantial difference, with group A taking longer than groups B and C. Group A had the longest time gap and Group B had the shortest time interval (Table 2). The time interval between the three groups was compared, and there was a significant difference as group A is shorter than groups B and C, but no significant difference was discovered between groups B and C (Table 2).

The time interval between the three groups was compared, and there was a significant difference as group A is shorter than groups B and C, but no significant difference was discovered between groups B and C (Table 2). The mean duration of hospital stay was compared between the three groups, and there was a significant difference as group A was discharged earlier than groups B and C, and there was no significant difference found between groups B and C, even though our hospital regulation and recommendation for hospital stay for caesarean section in uncomplicated delivery is around 24-46 hours (Table 2).

Table (3) revealed that there was a notable difference between the three groups in terms of VAS in the right side from 2 to 12 hours, with group B significantly higher than groups A and C, and no significant difference by LSD between A and C. In terms of VAS 24 and VAS 36 hours, there was no significant variation between the three groups. Tables (5), (6), (7), (8), and (9) revealed a significant difference between the three groups in terms of VAS in the left side from 2 to 6 hours, with group B considerably lower than the A and C groups and no significant difference by LSD between A and C.

In VAS 8 hours, VAS 12 hours, VAS 24 hours, and VAS 36 hours, there was no significant variation between the three groups. There was significant difference between the 3 groups regarding PONV scale as group B exhibited lesser side effects (nausea and vomiting) than other groups (Table 10).

**Table (1): Comparison among the three studied groups in maternal ages, gestational weeks and operative time**

	Group A (30 patients)	Group B (30 patients)	Group C (30 patients)	p Value
Age Mean ± SD	29 ± 6.45	30 ± 2.8	28 ± 5.63	0.45(NS)
Gestational age (weeks) Mean ± SD	38 ± 1.97	40 ± 1.96	39 ± 1.93	0.24 (NS)
Surgery time (minutes) Mean ± SD	49.5 ± 6.17	44 ± 9.5	44 ± 7.5	0.2 (NS)

**Table (2): Comparison among the three studied groups in the time interval for the first analgesic request, time interval before first ambulation, hospital stay time and number of patients needed for analgesia**

	Group A (30 patients)	Group B (30 patients)	Group C (30 patients)	p Value
Time interval for first analgesic request (hours) Mean ± SD	4.9 ± 2.8	9.3±1.5	7.9 ± 2.6	0.03 (S)
Time interval before first ambulation (hours) Mean ± SD	8.5 ± 2.9	3.1±0.6	5.2 ± 3.9	0.01 (S)
Hospital stay time (hours) Mean ± SD	45 ± 7.1	24.9±0.1	40.2±7.9	0.01 (S)
Patients needed for analgesia No (%)	38 (75)	14 (29)	23 (49)	0.01 (S)

**Table (3): Comparison among 3 studied group as regard to VAS right side**

	Group A (30 patients)	Group B (30 patients)	Group C (30 patients)	p Value
VAS 30 minutes Mean ± SD	0.19 ± 0.5	0.21 ± 0.41	0.21 ± 0.41	1 (NS)
VAS 2 hours right side Mean± SD	5.9 ± 1.8	1.4 ± 1.2	1.6 ± 1.3	0.01 (S)
VAS 4 hours right side Mean± SD	6.1 ± 1.6	1.49 ± 1.29	1.4 ± 1.1	0.01 (S)
VAS 6 hours right side Mean ± SD	5.9 ± 0.9	2.4 ± 1.9	2.1 ± 0.9	0.01 (S)
VAS 8 hours right side Mean ± SD	6.4 ± 1.3	5.1 ± 2.2	4.6 ± 1.2	0.01 (S)
VAS 12 hours rightside Mean ± SD	6.3 ± 0.8	5.4 ± 0.8	5.1 ± 0.8	0.003 (S)

**Table (4): Comparison between VAS 30 minutes left side in the three groups**

Groups	VAS 30 minutes left side		ANOVA test
	Mean ± SD	Range	p-value
Group A (30 patients)	0.19 ± 0.5	0-1	0.9 (NS)
Group B (30 patients)	0.21 ± 0.41	0-1	
Group C (30 patients)	0.22 ± 0.42	0-1	

**Table (5): Comparison between VAS 2 hours left side in the three groups**

Groups	VAS 2 hours		ANOVA test
	Mean ± SD	Range	p-value
Group A (30 patients)	6 ± 1.4	4-8	0.02(S)
Group B (30 patients)	1.5 ± 1.2	0-4	
Group C (30 patients)	5.5 ± 1.4	4-8	

**Table (6): Comparison between VAS 4 hours left side in the three groups**

Groups	VAS 4 hours		ANOVA test
	Mean ± SD	Range	p-value
Group A (30 patients)	6.1 ± 1.2	4-8	0.01(S)
Group B (30 patients)	1.52 ± 1.3	0-4	
Group C (30 patients)	5.8 ± 1.2	4-8	

**Table (7): Comparison between VAS 6 hours left side in the three groups**

Groups	VAS 6 hours		ANOVA test
	Mean ± SD	Range	p-value
Group A (30 patients)	6.2 ± 0.8	5-8	0.01(S)
Group B (30 patients)	2.4 ± 1.8	0-5	
Group C (30 patients)	6.4 ± 1.7	5-9	

**Table (8): Comparison between VAS 8 hours left side in the three groups**

Groups	VAS 8 hours		ANOVA test
	Mean ± SD	Range	p-value
Group A (30 patients)	6.3 ± 1.2	5-8	0.1 (NS)
Group B (30 patients)	4.9 ± 2.3	3-8	
Group C (30 patients)	6.5 ± 1.5	5-8	

**Table (9): Comparison between VAS 12 hours left side in the three groups**

Groups	VAS 12 hours		ANOVA test
	Mean ± SD	Range	p-value
Group A (30 patients)	5.9 ± 0.8	5-7	0.2 (NS)
Group B (30 patients)	5.4 ± 0.6	4-6	
Group C (30 patients)	5.8 ± 1.4	4-8	

**Table (10): Comparison between the three groups as regard Postoperative Nausea and Vomiting (PONV) scale**

			Groups			Chi-square test	
			Group A (30patients)	Group B (30patients)	Group C (30patients)	Value	p-value
PONV scale	0	No	0	4	0	21.5	0.01(S)
		%	0	8	0		
	1	No	45	46	46		
		%	91	92	92		
	3	No	4	0	4		
		%	9	0	8		
Total		No	30	30	30		
		%	100	100	100		

### 5. DISCUSSION

Caesarean section is a frequent surgical procedure with rising rates [8]. Women who have had a caesarean birth are most concerned about postoperative pain [9]. Postoperative pain may be severe, lasting at least 48 to 72 hours, and may result in delayed patient ambulation, hospitalization and recovery lengthening, atelectasis, vascular thrombosis, and finally patient dissatisfaction. In many instances, pain relief and patient satisfaction are still insufficient [10]. Postoperative discomfort after a Caesarean section with the Pfannenstiel incision has both a somatic and a visceral component. The ilioinguinal and iliohypogastric nerves, which innervate the L1-L2 dermatome distribution, conduct the somatic pain produced at the incision site [11].

The ilioinguinal nerve emerges from the lateral border of the psoas major just below the iliohypogastric nerve, passes obliquely across the quadratus lumborum and iliacus, perforates the transverse muscle above the iliac crest, and communicates with the iliohypogastric nerve between the transverse and internal oblique muscles [12]. More than 90% of the population reported pain at the level of the cut, with 70% reporting pain at the lateral ends of the incisional scar [13].

In patients having lower abdominal and inguinal surgeries, including caesarean delivery, the ilioinguinal and iliohypogastric (IIIH) block can be used as part of a multimodal analgesic regimen for postoperative pain [14]. Local anesthetic drugs are increasingly used in the treatment of surgical pain due to their analgesic properties and absence of opioid-induced adverse effects. The rationale for using local anesthetic during the operation is to prevent pain from beginning by blocking the nervous system's normal reaction to pain. The removal of some of the superficial components of pain following a caesarean birth could influence the impression of deeper visceral pain.

Previous research suggests that infiltrating local anesthesia into the wound during caesarean delivery is successful in reducing postoperative narcotic requirements [15]. Local anesthetic containing bupivacaine amide. Bupivacaine is three to four times more powerful than lidocaine or mepivacaine and eight times more potent than procaine [16]. The purpose of this research was to determine the efficacy of injecting local anesthetic "Bupivacaine &" in both angles of the rectus sheath incision to block the ilioinguinal and iliohypogastric nerves bilaterally in patients getting general anesthesia to reduce postoperative pain after caesarean section.

In the current research, 90 women were recruited and assessed for eligibility, and completed the study. Group A received normal saline injection in each angle of the rectus sheath incision, Group B received local anaesthetic in each angle of the rectus sheath incision, and Group C received 10ml saline in the right angle of the rectus sheath incision and 10ml bupivacaine in the left angle of the rectus sheath incision. In terms of demographic data, there was no significant variation between the three groups (age, BMI, gestational age and parity). Furthermore, there was no significant variation in surgery time or incisional length between the three groups.

The current research discovered a significant difference between three groups in terms of the time interval

between the first analgesic request. As group A demonstrated a mean time interval of 5.9 hours for the first analgesic request (the smallest time interval), group B demonstrated a mean time interval of 9 hours (the longest time interval), and group C demonstrated a mean time interval of 8 hours. As a result, bilateral ilio-inguinal ilio-hypogastric nerve block postponed analgesic use by 3 hours.

This was supported by a study conducted by **Nguyen et al. [17]**, which found that surgical incision infiltration with ropivacaine 7.5 mg/mL greatly prolongs the pain-free interval after Caesarean section by 2 hours and 26 minutes and reduces the rescue analgesic demand by 30%. Another study, conducted by **Fajardo et al. [18]**, for the evaluation of local infiltration with bupivacaine for pain management after partial bilateral salpingectomy, found that bupivacaine application is effective in reducing the need for analgesics one hour after surgery and reduces the use of opioids.

We also discovered that local Bupivacaine injection was linked with significant analgesic demand or not analgesic demand in group A (74%), 30% in group B, and 48% in group C. This was supported by **Nadhima and Zahra [19]**, who demonstrated that preoperative analgesia with 20m1 of 0.5% Bupivacaine infiltrated before skin closure reduced postoperative analgesia request with Pethidine in patients undergoing planned LSCS via Pfannenstiel incision. Furthermore, **Bamigboye and Hofmeyr [20]** demonstrated that local anesthetic infiltration and abdominal nerve blocks as adjuncts to regional and general anesthesia are beneficial in CS by reducing opioid intake.

Furthermore, **Charlton et al. [20]** discovered only three eligible RCTS to include in their analysis. Only one of these demonstrated that rectus sheath blocks reduced postoperative morphine requirements in subjects. The studies were small and varied in terms of block localization technique, block timing 'single shot' vs. continuous infusion, and type, concentration, and volume of local anesthetic used.

**Crosbie et al. [21]** compared the rectus sheath block to either a placebo or standard treatment. Overall, the findings are mixed, but "single shot" rectus sheath blocks appear to be more effective than continuous or intermittent postoperative infusions in reducing postoperative pain scores and opioid requirements, though no "head-to-head" studies have been reported.

The current research discovered a significant difference in time interval before first ambulation between three groups, with the meantime interval for first ambulation being 8.4 hours in group A (the longest), 3 hours in group B (the shortest), and 8 hours in group C. As a result, bilateral ilio-inguinal ilio-hypogastric nerve blocks improve early ambulation.

**Crosbie et al. [22]**. found that rectus sheath block offers effective post-operative analgesia in abdominal surgery, allowing for early mobilization. Furthermore, this study demonstrated that Bupivacaine infiltration in the angle of the rectus sheath incision significantly reduces postoperative pain scores, as the mean VAS was significantly decreased in the right side from 2 hours to 12 hours postoperatively in groups B and C compared to A, while there was no significant difference between the three groups in VAS in the right side at 24 hr & 36 hr.

From 2 to 6 hours, group B had substantially lower VAS scores than groups A and C on the left side. There was no substantial difference between the three groups at 8 hours, 12 hours, 24 hours, or 36 hours. As a result, this research concluded that Bupivacaine infiltration in the rectus sheath was effective in reducing postoperative pain. **Anees [23]** . examined whether local skin infiltration with 0.5% bupivacaine was effective in controlling post-CS somatic pain.

In terms of hospital stay duration, this research demonstrated the efficacy of ilioinguinal iliohypogastric block in reducing hospital stay and allowing for an earlier return to normal activities, as group B was discharged 24 hours earlier (mean) than groups A and C. (mean 34 hours). A modern approach to an established Technique" demonstrated that the surgical rectus sheath block appears to provide effective postoperative analgesia for patients undergoing major gynecological surgery, and that patients who received the surgical rectus sheath block were able to leave the hospital significantly sooner than those who received standard subcutaneous local

anesthetic into the wound.

**Cervini et al. [24]** reported that patients who had received CS were pain-free enough to breastfeed their children. This demonstrates an early return to normal activities, which is a positive impact that was also mirrored in the current series. This suggests that bupivacaine infiltration is a simple, safe, and effective way of relieving post-operative pain, particularly for day case surgery. In this research, the ilioinguinal iliohypogastric block group (group B) had fewer side effects (nausea and vomiting) from the opioid used when compared to groups A&C.

According to **Amin and Tahir [25]**, direct local wound infiltration of Bupivacaine gave excellent pain relief after CS and reduced the need for parenteral narcotic analgesia with no significant side effects. In this research, bupivacaine was injected intraoperatively into the angle of rectus sheath incision without the use of ultrasound guidance, with the goal of blocking the ilioinguinal-iliohypogastric nerves as they crossed the angle of rectus sheath. We did not use the trial in the previous caesarean section in this research because fibrosis or entrapment of the ilioinguinal-iliohypogastric nerve could result from the previous delivery.

## **CONCLUSION**

According to the findings of this study, a local anesthetic "bupivacaine" injection in both angles of the rectus sheath incision to block the ilioinguinal and iliohypogastric nerves bilaterally is an effective method of reducing postoperative pain and analgesic consumption after caesarean section in patients receiving general anesthesia. More trials are required, including women who have had a previous caesarean section or a low transverse incision. Additional trials with emergency caesarean sections could be explored. Trials in patients with medical conditions may also be proposed.

## **Declarations**

### **Consent for Publication**

Not applicable.

### **Availability of Data and Materials**

All data and materials are fully presented in the manuscript.

### **Competing Interests**

The authors declare that they have no competing interests.

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### **Author Contributions**

Dr Ahmed will write the protocol, and Dr Tamer will collect specimens, follow up on the cases, take the history, and fulfill inclusion and exclusion criteria. And we will analyze the results together.



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