Original Article

Comparison on the efficacy of analgesia using Transversus Abdominis Plane (TAP) block and Intravenous iclofenac after caesarean delivery under spinal anaesthesia

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Abstract:

Background: The Transversus Abdominis Plane(TAP) block is a regional field block that provides effective analgesia after lower abdominal surgeries as postoperative analgesia is a major component of perioperative care.

Objective: To evaluate the effectiveness of intravenous Diclofenac and Ttransversus Abdominis Plane (TAP) block analgesia following caesarean delivery (LUCS) under spinal anesthesia (SAB).

Methods: In this prospective, observational study, 40 healthy participants who underwent LUCS under SAB were included. Group A (n = 20) received a bilateral TAP block with Bupivacaine 0.5% (1.5 mg/kg), while Group B (n = 20) were given intravenous diclofenac sodium. Adverse consequences, the overall length of postoperative analgesia, pain rating scale scores, and patient satisfaction levels were also documented. P value less than 0.05 was considered to be significant.

Results: In comparison to Group B (8.20±0.90 h), Group A's total analgesic duration was longer (16.30±1.16 h) it was statistically highly significant. The total amount of analgesics needed in the first 24 hours after surgery was lower in Group A (104.19±28.3 mg) than that of Group B (165.14±32.6 mg) which was statistically significant. Mean pain rating scale scores in Group A were significantly lower than those of Group B at 6, 12 and 24 post-operative hours. Patients in Group A also reported higher levels of satisfaction than those of Group B, the difference was statistically highly significant.

Conclusion: Compared to intravenous diclofenac sodium, bilateral TAP block Bupivacaine following LUCS under SAB offers superior post-operative analgesia and better patient satisfaction.

Keywords: Transversus Abdominis Plane (TAP) block, Caesarean Delivery (LUCS), Spinal Anesthesia (SAB), Intravenous Diclofenac Sodium.

Introduction:

The procedure of a Caesarean birth (LUCS), which is frequently carried out under spinal anesthesia (SAB), is often followed by moderate to severe postoperative pain. Lack of sufficient analgesia can result in an extended hospital stay, an inefficient recovery, more consumption of medications and overall patient discontentment. In order to permit early rehabilitation and the mother's mobilization to be able early nursing & preventing thromboembolic event, effective management of pain is extremely important.[1]

After caesarean delivery (LUCS), a number of peripheral nerve blocks can be employed to relieve pain. The transversus abdominis plane (TAP) block is one of the most popular methods for regional analgesia. For many abdominal surgeries, it is a crucial part of the multimodal approach to post-operative analgesia.[2] An NSAID, diclofenac sodium possesses analgesic and anti-inflammatory characteristics. Since it works by preventing tissue prostaglandin synthesis in reaction to cellular damage and uterine contraction, it is beneficial for treating post-caesarean section pain.[3]

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This study compared the analgesic efficacy of transversus abdominis plane block with injectable diclofenac sodium as part of a multimodal analgesia regimen in caesarean section under spinal anaesthesia. Determining the mean length of postoperative analgesic period was our primary objective. Secondary goals included determining the total amount of analgesics given during the first 24 hours for post-operative analgesia, the amount of pain alleviation experienced at rest and when moving from a supine to a sitting position, patient satisfaction levels, and the observation of any adverse effects.

Materials and Methods:

After receiving approval from the Institutional Ethical Review Committee, this prospective, randomized study was carried out in the Department of Anesthesiology at the Dhaka National Medical College Hospital in Bangladesh from June 2021 to May 2022.

For the study, 40 female patients between the ages of 18 and 40 who were scheduled for both elective and urgent caesarean sections under spinal anesthesia were included. Patients with body weights <40kg or >90 kg, a history of drug allergies to study drugs (diclofenac sodium, Bupivacaine, metoclopramide), contraindications to regional anesthesia (bleeding diathesis, infection at the site of block, and peripheral neuropathy), severe medical conditions like severe pre-eclampsia and eclampsia, and patients with intraoperative complications like postpartum hemorrhage and severe fetal distress were excluded from the study.

Patients were randomly assigned into two groups, with 20 patients each in Group A (TAP block) and Group B (intravenous diclofenac sodium), following the receipt of informed written consent. Computer-generated random number sequences in a 1:1 ratio were used for the randomization process. Before the procedure, a comprehensive preoperative assessment was conducted. Prior to surgery, all patients received a detailed explanation of the numerical rating scale (NRS) score and were given instructions on how to use it to assess post-operative pain. Esomeprazole 40 mg intravenously (IV) and Metoclopramide 10 mg intravenously (IV) were administered as aspiration prophylaxis to all patients undergoing Caesarean Delivery (LUCS) while they were kept nil by mouth (NPO) for 6 hours.

After receiving the patients in the operating room,the electrocardiography (ECG) leads, non-invasive blood pressure (NIBP) cuff, and pulse oximeter probe (SPO_2) were attached, and the baseline values were noted. Spinal anesthesia (SAB) was carried out at the L3-L4 intervertebral space using hyperbaric Bupivacaine (0.5%) 1.8-2.0 ml with 25 mg fentanyl after taking proper aseptic measures. According to the randomized group assignment determined at the start of the study, postoperative analgesia was given following the surgery. Patients assigned to Group B received 75 g of intravenous diclofenac sodium after the delivery of the baby.

Patients in Group A in supine position a blunt needle is inserted perpendicular to the skin just cranial to the iliac crest and just anterior to the edge of the latissimus dorsi muscle. A resistance is felt as the external oblique aponeurosis is encountered, followed by a “give” as it is pierced and a second “give” as the needle passes through the internal oblique aponeurosis. After aspiration, 20 ml solution of 0.5% Bupivacaine is injected.

After 30 minutes of observation, the patients were sent to the post-operative care unit. Every 2, 4, 6, 12 and 24 hours, a research assistant who was blind to the allocation graded the intensity of the pain of the patients, while at rest and while moving. Numerical pain rating scale (NRS) score was used to measure pain (0=having no pain and 10 = having the worst amount of agony). Rescue analgesia in the form of injectable diclofenac 1 mg/kg was administered to patients upon request or when their NRS was more than 4. The quantity of analgesic drugs needed 48 hours after surgery was also noted.

A 4-point ordinal scale was used to assess the level of sedation in patients: (1 = for being fully awake and attentive, 2 = for being awake but drowsy and reacting to verbal cues, 3 = for being arousal and responding to physical stimuli, and 4 = for not being arousal and not responding to physical stimuli). Using a 4-point scale, post-operative nausea and vomiting was graded as follows: (0 = none, 1 = nausea, 2 = retching/dry vomiting, and 3 = vomiting). On a scale of 1 to 4, patients were asked to rate their level of satisfaction with postoperative pain management (1 = being highly satisfied, 2 = being satisfied, 3 = being unhappy, and 4 = being extremely dissatisfied). Additionally, associated side effects were noticed. All patients had their postoperative hemodynamic conditions monitored regularly and the readings were recorded.

The mean and standard deviation (SD) of the data were computed after they had been gathered, tabulated, and analyzed using Statistical Package for the Social Sciences (SPSS) version 20. The Student's t-test was used for comparing demographic data. The unpaired Student's t-test was utilized for investigating additional measurements such as analgesia duration, the overall amount of rescue analgesics needed, NRS score, and hemodynamic indicators. P value < 0.05 considered as significant.

Results

A total of 40 participants were involved in the study. Among them, 20 patients were randomly assigned to get a TAP block during the study, and the remaining 20 received intravenous diclofenac sodium. The group getting TAP block is more satisfied and efficacy of analgesia is higher than the group getting IV diclofenac sodium.

Table-I: Demographic variables in both groups revealed no significant differences between two groups.

Characteristics	Mean±SD		P-value
	Group A	Group B	
Age (years)	22.16±3.11	21.98±2.73	0.846
BMI (kg/m^2)	20.49±2.86	20.14±2.59	0.687
Duration of surgery (mins)	45.63±4.26	46.85±3.78	0.344

BMI=Body mass index; SD=Standard deviation

Table-ll: Post-operative pain score (Numerical rating scale) at rest and at movement

The numerical rating scale of pain severity at rest and during movement was not significantly different at 2 and 4 post-operative hours, however it was significantly lower (P < 0.05) in group A than group B at 6, 12 and 24 post-operative hours.

Time interval (h)	NRS on rest (Mean±SD)		
	Group A	Group B	*P-Value*
2	2.39±0.56	2.77±0.94	0.128^{ns}
4	2.98±0.81	3.27±0.64	0.216^{ns}
6	4.49±1.06	5.32±1.45	0.045^{s}
12	5.11±1.23	6.04±1.45	0.034^{s}
24	4.73±1.08	5.42±1.03	0.045^{s}

Time interval (h)	NRS on movement (Mean±SD)		
	Group A	Group B	*P-value*
2	2.42±0.85	2.71±0.94	0.312^{ns}
4	3.05±0.54	3.47±0.89	0.079^{ns}
6	4.14±0.63	5.13±1.34	0.004^{s}
12	5.20±0.97	5.96±1.04	0.021^{s}
24	4.83±0.62	5.79±1.08	0.001^{s}

S= Significant
NS= Not Significant

Table-lll: Study parameters in the two groups

In comparison to Group B, Group A's mean time to administer the first dosage of rescue analgesia was shown to be significantly longer (P<0.001). Group A's total analgesic duration was significantly longer (P<0.001) than Group B's. The mean dose of total analgesics consumed in the first 24 hours following surgery was significantly lower in Group A than in Group B (P<0.001). Patient satisfaction in Group A was significantly higher (P<0.001) than that of Group B.

Observations	Mean±SD		p-value
	Group A	Group B	
First analgesia request after LUCS (mins)	256.30±75.42	86.20±24.15	<0.001^{S}
Total duration of analgesia (hrs)	16.30±1.16	8.20±0.90	<0.001^{S}
Rescue analgesic (diclofenac) consumption over 24h (mg)	104.19±28.3	165.14±32.6	<0.001^{S}
Patient satisfaction score	2.8±0.3	1.3±0.7	<0.001^{S}

S=Significant

Discussion

At present, the Transversus Abdominis Plane (TAP) block is frequently utilized to provide postoperative multimodal analgesia for various types of abdominal surgeries. Numerous research has shown that the effectiveness of TAP block as multimodal analgesia reduced postoperative analgesic consumption and complications.[4-6] According to recommendations based on scientific evidence, NSAIDs have become crucial for managing acute post-operative pain. Numerous studies additionally illustrate the advantages of intravenous diclofenac administration during cesarean deliveries.[7] This study was designed to compare the effects of regional analgesia technique employing TAP block with a non-opioid parenteral analgesic diclofenac aqueous in patients undergoing caesarean section in order to determine the most effective method of analgesia.

In comparison to patients who received intravenous diclofenac following surgery, our study found that patients who underwent TAP block had lower NRS scores at rest and during movement in the post-operative period. The outcomes of Jadon et al.[8] and Kahsay et al.[9] were also similar to this. The current study also demonstrated that, when compared to the

control group receiving intravenous diclofenac sodium, bilateral injection of 20 ml of Bupivacaine 0.75% as part of the multimodal analgesic regimen of TAP block resulted in decreased postoperative pain severity, significantly decreased rescue analgesic consumption, and a significantly prolonged time for the first analgesic request in the first 24 postoperative hours. The findings were similar to the study performed by Kanta et al[3]. Compared to those who received intravenous diclofenac in this research, the majority of the patients in the TAP block were extremely satisfied with their level of pain reduction. In a similar research by Belavy et al.[10] also found that TAP block improved patient satisfaction.

The sample size of our experiment was insufficient to evaluate the safety of TAP block, which constitutes a limitation of our investigation. Another limitation was, only elective cesarean sections were the subjects of this research. Patients who undergo emergency cesarean sections encounter outcomes which differ from those shown in our study.

Conclusion: An ideal method of pain relief after LUCS should be cost effective & safe for both mother and baby. From that study in can be concluded that, TAP block significantly improved post-operative analgesia in women undergoing LUCS.

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