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Original Research Article

Analgesic Efficacy of Inj. Dexamethasone (8mg) with Inj. Levobupivacaine (0.25%) in Ultrasound-Guided Transverse Abdominis Plane (TAP) Block after Caesarean Delivery

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Abstract

For several lower abdominal surgeries, including caesarean sections post-operatively, ultrasound-guided Transverse Abdominis Block (TAPB) is a safe and effective analgesic technique. To find the most effective analgesic combination, various drug combinations have been tested. Levobupivacaine and adjuvants like dexamethasone added to local anesthetics in TAPB have been shown to lessen postoperative pain intensity during the postoperative period. Our study aimed to assess the efficacy of the addition of Inj. Dexamethasone (8mg) to Inj. Levobupivacaine (0.25%) in USG guided transverses abdominis plane block given in patients who underwent cesarean section. A total of 80 patients (40 per group) posted for elective and emergency caesarean delivery were included in the present study. Grouping of the patient was done by sealed envelope method & divided into two groups:1).

Group L: TAP block with 30 ml of Inj. Levobupivacaine 0.25% + 2cc Normal saline total of 32cc.[16 ml on each side],2).

Group LD: TAP block with 30 ml of Inj. Levobupivacaine 0.25% + Inj. Dexamethasone 8 mg (2ml) total of 32 ml. [16ml on each side] and the time to first rescue analgesia (Vas score > 4), the total amount of rescue analgesia required in the first 24 h postoperatively were recorded. We observed that the Time to first rescue analgesia was prolonged significantly in the group LD (19.9hrs ± 2.07) compared to group L (10.2hrs ± 2.21) ($p < 0.0001$). Visual analogue scale scores were significantly lower in group LD. The total consumption of Inj. Diclofenac Sodium in 24hrs was significantly lower in the group LD (95.6 ± 33.92) compared to group L(170.6mg ± 50.92) ($p<0.0001$). Thus in conclusion, In USG-guided TAPB, the addition of dexamethasone (8 mg) to

Levobupivacaine (0.25%) considerably lessens post-operative pain and extends the duration of postoperative analgesia, lowering the requirement for overall analgesics consumption.

Keywords: Transverse Abdominis Plane, Levobupivacaine, Dexamethasone, Caesarean Section.

Introduction

A major surgical operation like a caesarean section has significant post-operative pain that interferes with nursing and weakens the attachment between mother and child while also putting the woman at risk of thromboembolism owing to immobility. To encourage early ambulation, newborn care, and the avoidance of postoperative morbidity, comprehensive and efficient analgesia must be administered following surgery [1]. There are various ways to provide analgesia, for example, Non-steroidal anti-inflammatory medications (NSAIDs) might not be enough to alleviate post-c-section discomfort. Although systemic or neuraxial opioids are effective for managing post-operative pain, they have several side effects, including respiratory depression, nausea, vomiting, itching, and constipation [2]. Transversus abdominal plane (TAP) block is a field block that entails injecting local anaesthetic in a facial plane between the internal oblique and transversus abdominis muscle layer to anaesthetize the somatic nerves that originate from T6 to L1 spinal roots and supply the anterolateral abdominal wall [3]. Rafi AN originally identified the TAP block utilizing anatomical markers, specifically the Petit Lumbar Triangle [4]. P. Hebbard et al. introduced the TAP block's USG-guided technique. The USG probe was positioned over the triangle of Petit in the mid-axillary line, right above the iliac crest. An in-plane method was then used to advance the needle.

The posterior approach is what is used to describe this [4]. Realtime ultrasound makes it easier to accurately put block needles and deposit local anaesthetics in real-time, which improves block quality and safety margins. [2,5,6] Levobupivacaine has become more common due to its safer pharmacological profile out of the various possibilities for local anaesthetics that can be used in TAP block [2,5,6]. Levobupivacaine's low cardiovascular and neurological toxicity led us to use it as a local anaesthetic in this study together with Dexamethasone as an adjuvant [7-11]. The effectiveness of adjuvants added to local anaesthetic medications in TAPB has been investigated [8-13]. When used as an adjuvant in peripheral nerve blocks, dexamethasone, a very effective, long-acting glucocorticoid with analgesic, antiemetic, and anti-inflammatory-characteristics, lengthens the duration of analgesia with few adverse effects [8,10,12]. Few studies have suggested that the combination of Dexamethasone (8 mg) and Levobupivacaine (0.25%) in the TAP block may alleviate the need for additional analgesia during the first 24 hours following surgery, minimize the intensity of pain, and prolong the need for the first analgesic during the postoperative period [6,11,14]. Thus, we have chosen USG guided Transversus abdominis plane (TAP) block under ultra-sound guidance to assess the efficacy of the addition of Inj. Dexamethasone (8mg) to Inj. Levobupivacaine (0.25%) in USG guided transversus abdominis plane block given in patients who underwent caesarean section.

Materials & Method

Between April 2020 and April 2021, the current study was conducted in the Department of Anesthesiology at the Government Medical College and S.S.G. Hospital in Vadodara. The Hospital Ethics Council for Human Research-

PG Research (IECHR-PGR) accepted the study protocol for this prospective, randomized, double-blind clinical investigation, and our study's CTRI number is CTRI/2020/04/024687. In order to evaluate the analgesic impact between two groups by 2 hours with a standard deviation of 3 hours @ 95% confidence interval and 80% power, a total of 80 patients (40 in each group) were included in the study. The 16-patient pilot study is used to calculate the assumption. (Using version 20.113 of the statistics programme Med Calculus). The study included singleton, full-term pregnant women with an ASA Physical status of I or II who were scheduled for elective LSCS under spinal anaesthesia. patients who reject the study protocol or who are unable to understand it, Individuals with severe PIH, contraindications to spinal anaesthesia, hypersensitivity to the local anaesthetic agent, individuals with impaired renal and hepatic function, uncontrolled diabetes, severe cardiovascular and respiratory disease, infection, trauma, scars or sinuses at the location of the block, and patients with allergies to diclofenac injection were excluded from the study. All the regular investigations were evaluated following a thorough pre-anesthesia checkup that included a history assessment, general examination, systemic examination, and evaluation of the airway and spine. Following extensive explanations of the study, the method, and the VAS score, we obtained the patient's signed and informed consent for anaesthesia before administering a TAP block. By using the sealed envelope approach, all 80 patients were randomly divided into one of two groups (40 each).

1) Group L: To receive a TAP block containing 30 ml of Inj. Levobupivacaine 0.25% + 2cc Normal saline total of 32ml.(16 ml per side).

2) Group LD: To receive a TAP block containing 30 ml of Inj. Levobupivacaine 0.25% + Inj. Dexamethasone 8 mg (2ml) total of 32 ml. (16 ml per side).

All the essentials, including a machine for anaesthesia, resuscitation medications, airway instruments, and a suction machine, were examined. Before induction, all patients acquired good venous access with an 18G IV cannula and were preloaded with 10ml/kg of ringer's lactate solution. A multipara monitor was attached, and the patient was positioned supine with a left lateral tilt on the operating table. Electrocardiography (ECG), heart rate, SpO_2, and non-invasive blood pressure (NIBP) were all monitored and recorded as baseline values.

Before induction, all patients received an intravenous injection of ondansetron (0.08 mg/kg) and an injection of ranitidine (0.5–1 mg/kg).

All patients received spinal anaesthesia with a 23G spinal needle in the left lateral position and 2 ml of 0.5% heavy bupivacaine under strict aseptic and antiseptic conditions. All patients were transported to the USG room for a TAP block after the surgery. After transferring the patient into the procedure room, the noninvasive blood pressure (NIBP), electrocardiogram (ECG), heart rate, and Spo2 before TAP block baseline parameters were all observed and recorded. The patient was positioned with one arm on the side that would be lifted and blocked. The linear array ultrasonic probe (8 to 14 Hz frequency) was positioned in the mid-axillary line between the costal border and the iliac crest while taking all necessary aseptic and antiseptic precautions. (Image 1) up to the transverse abdominis from superficial to deep and the external and internal obliques were visible. (Image 2).

Image 1

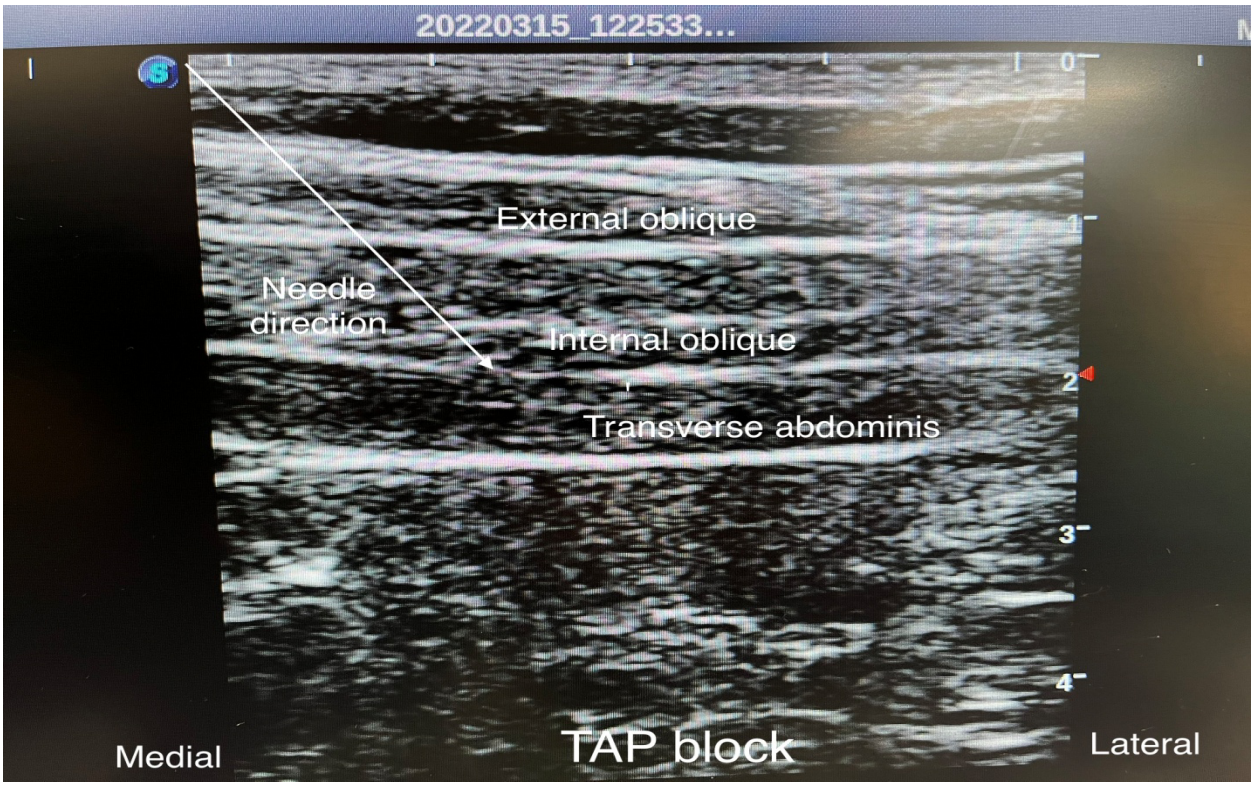


Image 2

The needle will be introduced inplane via the adipose tissue, the external and internal oblique muscles, and the anteromedial side of the probe. The transversus abdominis plane's superficial region will receive the needle's tip. (Image 2). The required drug, which will be visible as a lens-

shaped hypoechoic area between the internal oblique and transverse abdominis muscle, was administered after the TAP plane was determined. (4) (Image 3).

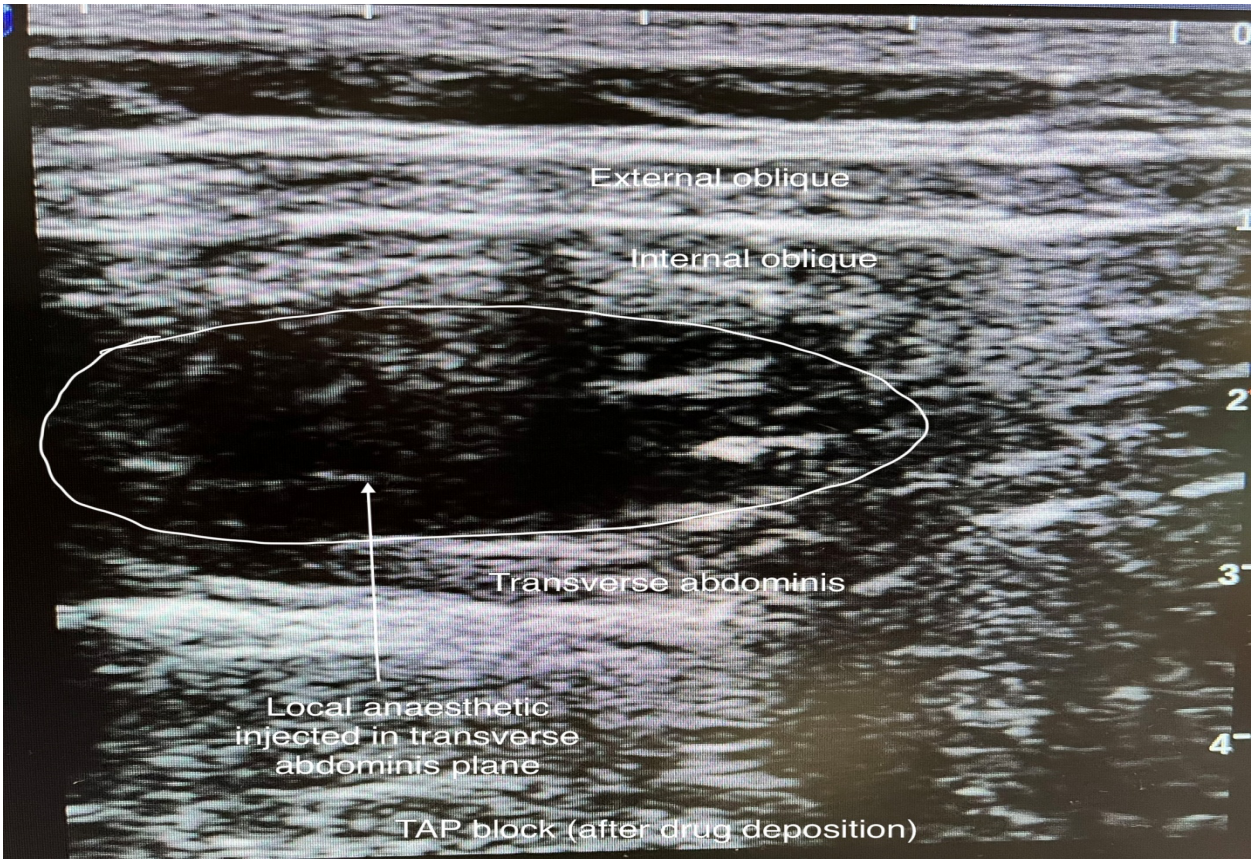


Image 3

Both groups were observed for the VAS score at 2, 4, 6, 8, 12, 18, and 24 hours postoperatively. Time to the first analgesic required when VAS score >4 is defined as the time from the end of the USG-guided TAP block up to the requirement of the first rescue analgesic dose post-operatively; the rescue analgesia was given in the form of Inj. Diclofenac aq. 75 mg I.V. when VAS score >4. The cumulative requirement of analgesic over the first 24 hours; The hemodynamic parameter in both groups. [pulse rate (PR), systolic blood pressure (SBP), diastolic blood pressure (DBP), oxygen saturation (SPO2)] at Baseline (just after being shifted to the USG room), During the procedure, At 15,30,45, and 60minute & at 2, 4, 6, 8, 12, 18, 24 hour. We also observed complications like bradycardia, hypotension, tachycardia, Local anaesthetic toxicity, and accidental intra-peritoneal and intravascular injection.

Observation and Results

It was a Prospective Randomized control double-blind study of 80 patients of ASA I or II undergoing elective and emergency caesarean section under spinal anaesthesia. We observed that both the groups were comparable concerning age, weight, height, and ASA physical status ($p > 0.05$; statistically insignificant (Table 1). The mean VAS score in both groups was 0 at 2 and 4 hours. It was statistically insignificant. Subsequently, in group LD, the VAS score was < 4 at 6,8,12,18 hours after the TAP block. No rescue analgesia is required. In group L, VAS score > 4 at 12, 18, and 24 hours. Moreover, at all-time intervals except for the 2nd and 4th hour, the

VAS score was significantly higher in group L as compared to group LD. (Table 2)The time for the first rescue analgesic dose was significantly prolonged in group LD than in group L. It was 19.94±2.07 hr in group LD and 10.28±2.21 hr in group L. ($p < 0.001$) (Table 3). The mean cumulative requirement of diclofenac Aq. was significantly higher in group L as compared to group LD. The total dose of diclofenac required by patients in group LD in 24 hrs was 95.63 ± 33.92 mg, while in group L it was 170.62 ± 50.91 mg. ($p< 0.001$) (Table 4). On intragroup as well as intergroup comparison, there was no statistically significant difference in the mean pulse rate, SBP, DBP, and SpO_2 between the two groups. ($p>0.05$) None of the patients in Group LD as well as Group L experienced any complications.

Table 1: Demographic Data

Parameter	Group LD	Group L	Intergroup p- value
Number of patients	40	40	>0.05
Age (years) (Mean±SD)	25.86±4.22	25.02±3.24	>0.05
Weight (kg) (Mean±SD)	55.91±6.51	52.86±6.15	>0.05
Height(cm) (Mean ± SD)	154.31±3.47	154.28±3.51	>0.05
ASA I	13 (32.50%)	24 (60.00%)	>0.05
ASAII	27 (67.50%)	16 (40.00%)	>0.05

Table 2: Vas Scores

TIME	Group LD	Group L	P -value
2hr	0	0	>0.05
4hr	0	0	>0.05
6hr	0	2	>0.05
8hr	2.0	3.275±0.5	<0.001
12hr	2.45±0.50	4.025±0.73	<0.001
18hr	3.35±0.76	5.225±0.89	<0.001
24hr	4.35±0.48	6.375±0.83	<0.001

Table 3: Time To First Rescue Analgesia (In An Hour) (Mean ± Sd)

Group LD	Group L	p- value
19.94±2.07	10.28±2.21	<0.001

Table 4: Cumulative Diclofenac Aq. Requirement After 24 Hours (In Mg) (Mean ± Sd)

Group LD	Group L	p- value
95.63 ± 33.92	170.62 ± 50.91	<0.001

Data Analysis

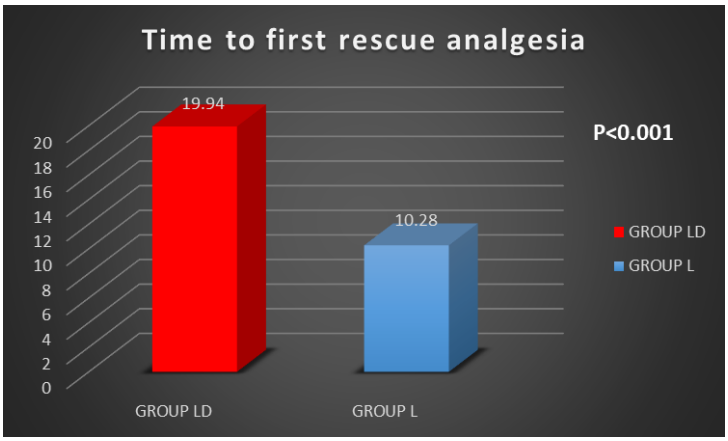
Both clinical data and data from the multipara monitor were gathered. Chi-square analysis was used to examine qualitative data. Using med calc software(version 20.113), all quantitative data were examined using a student "t" test and displayed as mean + SD.

Discussion

Caesarean birth exhibits moderate to severe post-operative pain and discomfort, which can be expected; failing to treat it appropriately may affect breastfeeding and the ability of the mother to bond with her child. To promote early ambulation, neonatal care, and the avoidance of postoperative morbidity, it is crucial to provide good postoperative analgesia. [1] It's possible that nonsteroidal anti-inflammatory medicines alone are

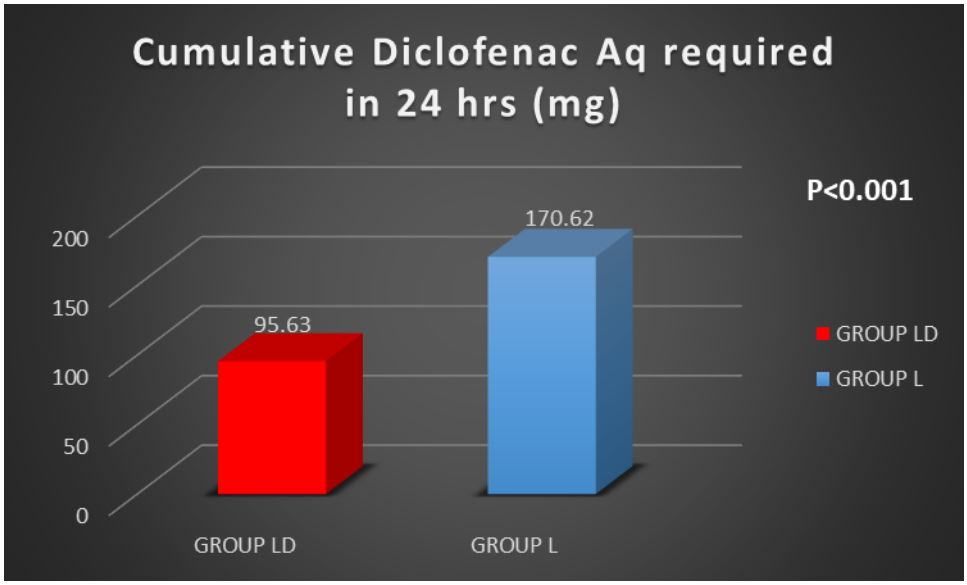
ineffective for treating post-c-section discomfort. Epidural analgesia is a useful substitute for relieving postoperative pain. However, the gravid uterus makes it more likely that vascular and dural punctures may occur and also makes it challenging to locate the area. Long-lasting analgesia cannot be achieved by injecting local anaesthetic at the site of the incision. [1] Although they have a number of negative effects, systemic or neuraxial opioids are useful for relieving post-operative pain. [2], Opioids are associated with side effects such as drowsiness, nausea, vomiting, constipation, and respiratory depression. [15] Techniques for regional analgesia as well as multimodal analgesia have become commonplace. [1] The selection of analgesic combinations should take into account both their side effect profiles as well as their analgesic efficacy. [5] Following Rafi's groundbreaking work from 2001, McDonnel et al. proposed that TAP block is a promising method for supplying postoperative analgesia following abdominal incision. Following that, the ultrasonography (USG)- guided method to the TAP block was described by P. Hebberd et al. in 2007. [1,3,4,8,16] Other authors' prospective randomized trials had shown the TAP block's effectiveness as an analgesic in a variety of surgical procedures, including hernia repair, abdominal operations, hysterectomy, prostatectomy, caesarean section, laparoscopic cholecystectomy, and nephrectomy. [5,11,15-18] In order to prevent problems that are more likely to occur with the blind approach, such as serious consequences including intestinal puncture, nerve injury, etc., we adopted the USG-guided procedure. The margin of safety is increased and the likelihood of failure is decreased because it also provides a real-time image of the needle tip and pertinent anatomical structures. [2,17] When used as an adjuvant in peripheral nerve blocks, dexamethasone, a very strong, long-acting glucocorticoid with analgesic, antiemetic, and anti-inflammatory characteristics, elongates the duration of analgesia with few adverse effects. [8–12] Because of its safer pharmacological profile, levobupivacaine has been employed in clinical anaesthesia practice more frequently in recent years. Levobupivacaine's minimal cardiovascular and neurological toxicity has allowed us to use it in this study as a local anaesthetic together with Dexamethasone as an adjuvant. [7,19,20] A bilateral ultrasound-guided TAP plane block using ropivacaine or normal saline was performed by Maitreyi Gajanan Mankikar et al. in 2016. (15 ml on each side). [2] After the procedure, either a bilateral TAP block with 20 ml of 0.25% Bupivacaine was administered by Uma Shrivastava et al. in 2015 or none at all. [18] In our trial, the preferred local anaesthetic was injections of 0.25 percent levobupivacaine, and the adjuvant was injections of dexamethasone. Dexamethasone has a very good analgesic function, while Levobupivacaine has a longer duration of action and less tissue toxicity [7,12] The volume used in our study was 32ml [2,18]. By using the envelope method, the study population was randomly split into two groups. Group L had a TAP block with a total of 32ml of 30 ml of Inj. Levobupivacaine 0.25% + 2ml Normal Saline [16 ml on each side] and Group LD received a TAP block containing a total of 32 ml of 30 ml Inj. Levobupivacaine 0.25% + 2 ml Inj. Dexamethasone 8 mg. As a conventional post-operative rescue analgesic, we utilized Inj. Diclofenac aqueous 75mg [16ml on each side] at the end of the caesarean delivery. [18] Both groups were comparable with each other concerning age, weight, height, and ASA physical status. Postoperatively, the mean VAS score in both groups was 0 at 2 and 4 hours. It was statistically insignificant. Subsequently, in group LD, the VAS score was < 4 at 6, 8, 12, and 18 hours after the TAP block. No rescue analgesia was required. In group L, the VAS score was > 4 at 12, 18, and 24 hours, Moreover, at all-time intervals except for the 2nd and 4th hour, the VAS score was significantly higher in group L as

compared to group LD. In group LD, patients required the first rescue analgesia dose at 19.94+2.07 hr. after the TAP block and in group L, patients required the first rescue analgesia dose at 10.28+ 2.21 hr. So, there was a highly significant difference and prolonged duration of analgesia in group LD compared to group L. (GRAPH 1).



Graph 1: Time to first rescue analgesa

Inj. Diclofenac Aq. 75mg iv was given as rescue analgesia when VAS > 4 or patients demand during 24 hours of the post-block period. In our study total consumption of Diclofenac was 95.63 + 33.92 mg in group LD whereas it was 170.62 + 50.91 mg in highly significant group L (p< 0.001). (GRAPH 2).



Graph 2: Cumulative Diclofenac Aq required in 24 hrs (mg)

Both groups were comparable with each other concerning mean pulse rate, mean systolic BP, and mean diastolic BP. On intergroup comparison, there was no statistical significance in the mean pulse rate in group LD compared to group L at 24 hours post-block assessment. We did not find any perioperative complication in bo either group.

Conclusion

In USG-guided TAPB, the addition of dexamethasone (8mg) to levobupivacaine (0.25%) considerably lessens post-operative

pain and extends the duration of postoperative analgesia, lowering the requirement for overall analgesics consumption.

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