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Effect of dexamethasone as an adjuvant to Ropivacaine on duration and quality of Analgesia in ultrasound-guided transversus Abdominis plane block in patients undergoing lower segment cesarean section.

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Abstract

Ultrasound guided transversus abdominis plane block is an efficacious abdominal field block. Aim of the study was to see the effect of dexamethasone as an adjuvant to Ropi vacaine on duration and quality of analgesia in TAP block for postoperative analgesia in patients undergoing LSCS. The transversus abdominis plane (TAP) block, a relatively new regional anaesthesia technique, first described by Rafi in 2001.

Methods: The patients were randomly divided into two groups of 20 patients each.

- Group R: Patients received TAP BLOCK on each side with 25 ml 0.375% Ropivacaine.
- Group D: Patients received TAP BLOCK on each side with 25 ml 0.375% Ropivacaine+1ml (4mg) Dexamethasone.

Primary objective was to compare time to first rescue analgesia and secondary objectives to compare the total amount of analgesia required in first 24 h postoperatively and visual analogue scale scores for somatic and visceral pain between the two groups. All patients were educated preoperatively about how to use and record the visual analogue scale (VAS) for both somatic and visceral pain. One 10cm scale was provided for reporting pain, zero being no pain and 10 being the worst imaginable pain.

Results: The mean Time to requirement of first rescue analgesia was 11.89 ± 1.82 hr in Group R, whereas in group D it was 16.7 ± 2.59 hr. $p<0.05$. There was significant difference between mean time to requirement of first rescue analgesia in both groups. The mean

consumption of analgesic was 2.26 ±0.56 dose tramadol in Group R and 1.1±0.30 dose tramadol in Group D. There was significant difference between mean analgesic consumption in both groups.

Conclusion: We conclude that Use of dexamethasone along with 0.375% ropivacaine prolongs the analgesic duration of TAP block in patients undergoing LSCS and also has added benefits of opioid sparing and anti-emetic effects, thereby results in better postoperative recovery and improved maternal satisfaction.

Keywords: TAP block, post operative pain, Dexamatha sone.

Introduction

Caesarean section delivery is the most common surgery performed in the obstetric department.[1] It presents unique set of problems and challenges to Anaesthetists as it requires optimal pain management due to variation in type and intensity of pain experienced by women during early postpartum period.[2]The CS rate varies from 10-15% as per WHO, In India it is17.2% .CS commonly induces moderate to severe pain for first 48hrs, ranked highest with undesirable clinical outcomes.[3] The Joint Commission on Accreditation of Healthcare Organization established standards for pain assessment and treatment in health care facilities with the goal to generate uniformly low pain scores of not more than 3 out of 10 at rest and with movement.[4] Pain assessment in obstetric patients depends on individual variability to sensitivity to pain, psychological factors like anxiety and somatization, age and genetics. When questioning parturient women, fears and pain during and after caesarean section is the greatest concern.[4] It is very crucial in obstetric patient as they have different surgical recovery needs. The ideal post-CS analgesic regimen should be efficacious without impacting the ability of mother to take care of the newborn, early breastfeeding, selection of drug which has minimal drug transfer through breast milk, require minimal monitoring and should be cost effective.[5]

If analgesia is inadequate, postoperative pain can contribute significantly to morbidity of patients, delays recovery, ability to return to daily functional activity and mother baby bonding. It is vital to provide adequate pain relief in postoperative period with selective drugs for the purpose of early mobilization, oral intake, removal of bladder catheter, recovery, prevention of risk of throm boem bolic phenomenon, shorten hospital stay, reduce hospital cost and increase patient satisfaction. Women are quite reluctant in taking analgesics because of fear of transfer of drug from breast milk to neonate. In the last decade, a novel approach to block the abdominal wall neural afferents via the “lumbar triangle of Petit” has been described by Rafi et al (2001) [6] known as transversus abdominis plane (TAP) block. By introducing the local anaesthetics into the transversus abdominis plane (TAP) via the triangle of Petit, it is possible to block the sensory nerves that innervate the entire anterior abdominal wall (T7 to L1). Amongst various techniques of TAP block, landmark technique seems to hold considerable promise for patients undergoing surgical procedures involving abdominal wall incisions. [7, 8, 9] However anatomical studies indicate that the depth and position of the ‘triangle of Petit’ varies widely in small surface area. Also, the external oblique muscle may overlap with and cover the latissimus dorsi in significant percentage of the population. Thus, reliable location of the triangle of Petit may be difficult [10] In addition, the variable depth of the TAP within the triangle of Petit may result in placement of the needle within the peritoneal cavity and potential damage to visceral organs like liver [11,12] Hebbard et al (2007) have subsequently described an ultrasound-guided (USG) approach to the TAP block. Real-time ultrasound provides reliable imaging of the

three muscular layers of the anterolateral abdominal wall and assessment of correct needle placement and local Anaesthetic injection thus potentially increasing the success rate and safety of the TAP block compared to the landmark technique. [13, 14, 15] So, we hypothesized that USG guided TAP block can provide safe and reliable block for adequate pain control after CS.

Aims and objectives

Aim of the study was to see the effect of dexamethasone as an adjuvant to ropivacaine on duration and quality of analgesia in TAP block for postoperative analgesia in patients undergoing LSCS.

In terms of,

1. Ease of performance.
2. Measure the Quality of analgesia.
3. Measure the Duration of analgesia.
4. Total requirement of opioid in 24 hr.

Materials and methods

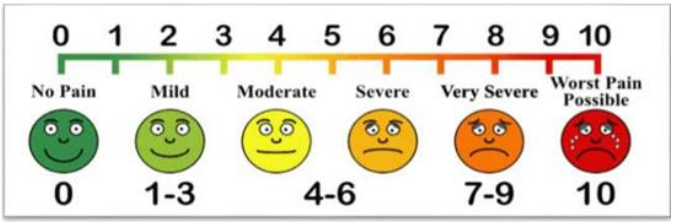
This prospective randomised, single - blinded, com parative study was conducted after approval from the local ethical committee. 40 patients aged 20 years or older with ASA-I undergoing elective LSCS under spinal anaesthesia was included in the study. Observational study was carried out in 40 patients of age group 20-45 years, of ASA-I undergoing LSCS under spinal anaesthesia. The patients were divided into two groups of 20 patients each.

- Group R: Patients received TAP BLOCK on each side with 25 ml 0.375% Ropi vacaine.
- Group D: Patients received TAP BLOCK on each side with 25 ml 0.375% Ropivacaine + (4mg) 1ml Dexa metha sone.

Method of Randomization

Patients were randomly allocated by computer - gene rated numbers into two groups (n=20). TAP block was given bilaterally in all patients. Group R received 25 ml of 0.375% ropivacaine with 1ml of normal saline on each side and group D received 25 ml of 0.375% ropivacaine with dexamethasone 4 mg (1 ml) each side. Patients were explained about the study being undertaken, and informed written consent to participate was taken. Patients did not know about the group allocation at any time of the study. Demographic record and patinent information (age, weight, height, body mass index [BMI], ASA grade, diabetes and cardiovascular disease) were obtained from all the patients. All patients were educated preoperatively about how to use and record the visual analogue scale (VAS) for both somatic and visceral pain. One 10cm scale was provided for reporting pain, zero being no pain and 10 being the worst imaginable pain.

Figure 1: Visual Analogue scale (VAS).



Procedure

Upon arrival in the ot, baseline heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), and oxygen saturation (SpO2) were recorded and monitored throughout the surgery. Peripheral vascular access was established using 18-gauge intravenous cannula. All patients were administered 10 ml / kg of crystalloid fluid (Ringer lactate) before administering spinal anaesthesia. Under strict asepsis, spinal ana esthesia was administered in sitting position, using 2.4 ml of 0.5% bupivacaine heavy at the level of L3-4 using a 23G “Quincke’s” spinal needle. Sensory block level was checked every 2 min using pin prick method and the surgery was commenced once an adequate block level (T6) had reached. At the end of surgical closure of the

wound, TAP block was given bilaterally under full aseptic precautions. Needle entry site was identified between the iliac crest and the costal margin in the anterior axillary line.

A 38 mm linear probe was placed transversely on the skin after taking all aseptic and antiseptic measures. Simplex Stim 22G, 80 mm needle was inserted under ultrasound guidance in an in-plane technique to position the tip of the needle between the internal oblique and transversus abdominis [Figure1].

One ml of sterile water was injected prior to LA injection to confirm the correct position of the needle tip. Distribution of LA was observed on ultrasound as a hypoechoic enlargement between the fascial planes as a real-time image [Figure2].

All patients in both the groups received 1 gm paracetamol intravenously at the end of block, as a part of multimodal analgesia. HR, SBP, DBP, SpO2, VAS score were recorded at 1st,2nd,3rd,4th, 8th, 12th, and 24th postoperative hours. Rescue analgesia of 50 mg tramadol in 100 ml normal saline over 20 min was given either on patient's request or if VAS was >3. In case of reported nausea within 24hr,

ondansetron 4 mg intravenously was given. Patients were assessed for and data recorded as time to first rescue analgesia- described as time interval between the end of block performance and first demand by patient for rescue analgesia, total amount of rescue analgesia required- described as total dose of tramadol required in 24 hr since the end of block performance.

The primary objective was to compare the time to first rescue analgesia between the two groups. The secondary objectives were to compare the total amount of rescue analgesia required in first 24 hr postoperatively, VAS scores and incidence of nausea and vomiting between the two groups.

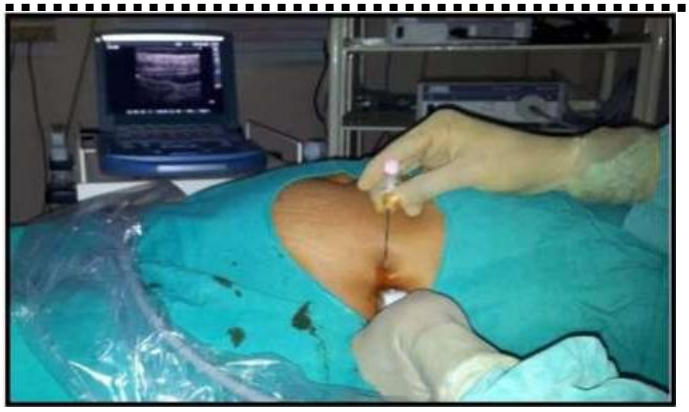


Figure 1: Ultrasound guided TAP block technique

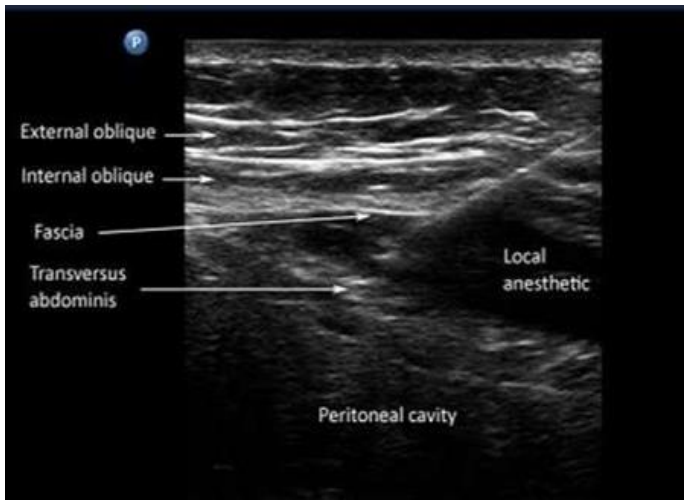


Figure 2: Correct local Anaesthetic deposition in the transversus abdominis plane

Results and discussion

In present study, we have compared 0.375% Ropivacaine with 0.375% Ropivacaine + (4mg) 1ml Dexamethasone by ultrasound guided transversus abdominis plane block in LSCS for postoperative analgesia.

Table 1: Demographic data and Baseline vitals

	Group D (n=20) Mean (SD)	Group R (n=20) Mean (SD)	p-value
Age	31.55(5.64)	29.55(4.29)	0.21
Weight	67.75(7.62)	1.87(8.36)	0.92
Baseline HR	75.4(4.15)	93.9(20.82)	0.0004
Baseline BP	89.4(3.67)	91.2(6.95)	0.31
Baseline SBP	116.9(7.03)	123.35(14.38)	0.07
Baseline DBP	75.7(3.79)	76.8(7.55)	0.56
Baseline SPO2	99.15(1.18)	99(1.26)	0.69

P<0.05, statistically significant

Table 2: Time to first rescue analgesia and total dose consumption in 24 hr

	Group D (n=20) Mean (SD)	Group R (n=20) Mean (SD)	p-value
Time to first rescue analgesia/Time for 1st dose(hour)	16.7(2.59)	11.89(1.82)	<0.001
Total dose in 24 hours	1.1(0.30)	2.26(0.56)	<0.001

Graph 1: Boxplot depicting time to first rescue analgesia among both groups.

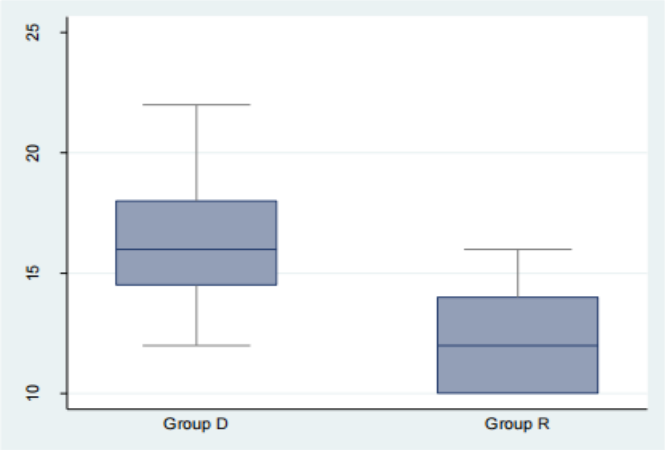


Table 3: Comparision of VAS score

Group	VAS	Minimum	Maximum	Mean	Std. Deviation
D	1 Hr.	2	4	2.50	0.61
	2 Hr.	2	3	2.45	0.51
	3 Hr.	2	3	2.45	0.51
	4 Hr.	3	4	3.45	0.51
	8 Hr.	3	4	3.65	0.49
	12 Hr.	3	4	3.70	0.47
	24 Hr.	4	5	4.65	0.49
R	1 Hr.	2	5	3.53	0.70
	2 Hr.	3	4	3.47	0.51
	3 Hr.	3	4	3.37	0.50
	4 Hr.	2	4	3.16	0.50
	8 Hr.	3	4	3.32	0.48
	12 Hr.	4	6	4.74	0.73
	24 Hr.	2	5	3.53	0.84

P<0.05, statistically significant

	Group D		Group R		p-value
VAS	Mean	Std. Deviation	Mean	Std. Deviation	
1 Hr.	2.50	0.61	3.53	0.70	<0.001
2 Hr.	2.45	0.51	3.47	0.51	<0.001
3 Hr.	2.45	0.51	3.37	0.50	<0.001
4 Hr.	3.45	0.51	3.16	0.50	0.07
8 Hr.	3.65	0.49	3.32	0.48	0.03
12 Hr.	3.70	0.47	4.74	0.73	<0.001
24 Hr.	4.65	0.49	3.53	0.84	<0.001

P<0.05, statistically significant

Graph 2: VAS scores at 1, 2, 3, 4, 8, 12, and 24 hr postoperatively

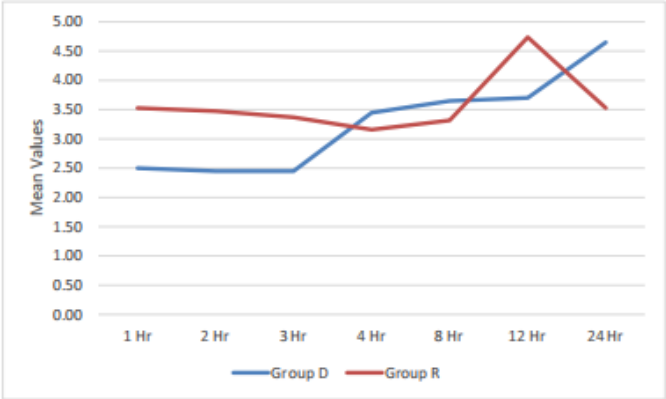


Table 4: Comparision of HR

Group	HR	Minimum	Maximum	Mean	Std. Deviation
D	Baseline	68.00	84.00	75.40	4.16
	1 Hr.	68.00	82.00	74.50	4.30
	2 Hr.	68.00	84.00	75.40	4.16
	3 Hr.	68.00	82.00	74.50	4.30
	4 Hr.	70.00	84.00	77.00	3.52
	8 Hr.	70.00	82.00	77.40	2.76
	12 Hr.	76.00	80.00	78.40	1.23
	24 Hr.	78.00	80.00	79.30	0.98
R	Baseline	74.00	153.00	93.90	20.83
	1 Hr.	68.00	106.00	78.40	8.82
	2 Hr.	68.00	104.00	78.60	8.18
	3 Hr.	70.00	94.00	78.30	5.81
	4 Hr.	70.00	92.00	76.20	5.65
	8 Hr.	70.00	92.00	77.90	5.33
	12 Hr.	76.00	153.00	93.00	20.41
	24 Hr.	72.00	110.00	84.80	11.27

P<0.05, statistically significant

The mean time to requirement of first rescue analgesia was 11.89 ± 1.82 hr in Group R, where as in group D it was 16.7 ± 2.59 hr. p < 0.05. There was significant difference between mean time to requirement of first rescue analgesia in both groups. The mean consumption of analgesic was 2.26 ± 0.56 dose tramadol in Group R and 1.1 ± 0.30 dose tramadol in Group D. There was significant difference between mean analgesic con Sumption in both groups.

Discussion

Recent studies by Hebbard et al [13,14] (posterior TAP block), T. M. Tran et al (cadaveric study) [15], A. ED a

wlathy et el (Lap cholecystectomy) [12], Niraj et al (open appendicectomy) [16], Belavy et al (caesarean section delivery) [17], D.J Sande man et al (Lap appendicectomy) [18] have all proved that "In plane" USG guidance ensures the exact position of LA between the IOAM and TAM, resulting in improve safety and efficacy. With the help of ultrasonography, we could easily identify all 3 muscle layers of abdomen, TAP, position of the needle, spread of local Anaesthetic in the TAP plane without any complication (Fig.2). Cons ide ring intraoperative spillage or leaking of the local analgesic from the TAP plane, and to prolong the analgesic effect we decided to give TAP block post operatively. Dexa metha sone has been used as an adjuvant to LA in peripheral nerve blocks since long, but com prehensive research of lite rature revealed no study where dexamethasone has been used to augment the analgesic efficacy of TAP block with 0.375% ropivacaine in patients undergoing LSCS. Hence, our study was planned to evaluate if the addition of dexa metha sone to ropivacaine improves analgesic quality and duration of TAP block. Dexa metha sone exerts its analgesic action by inhibiting trans mission and neural dis charge in nociceptive C fibres. Ak kaya A et al [19] was observed similarly that time to request additional analgesics was signifi cantly higher index a metha sone group than levobupivacaine group (13 ± 7.8 h vs. 6.1 ± 4.8 h, P value < 0.001) when dexa metha sone was added to levobupivacaine in ultras ound-guided TAP block. Cummings et al [20] found that dexa metha sone prolonged analgesia in interscalene block using Ropi vacaine [11.8 (9.7-13.8) vs. 22.2 (18.0-28.6) h] and bupivacaine [14.8 (11.8-18.1) vs. 22.4 (20.5-29.3) h] and also established that dexa metha sone prolonged analgesia more with Ropi vacaine than with bupivacaine. So, in our study we found that time to first rescue analgesia was significantly lower in group R (11.89 ±1.82 h) than group D (16.7 ± 2.59h) (P value < 0.001). A study also found that total post operative dose of tramadol require ment was higher in group R (2.26± 0.56) than group D (1.1 ±0.30), (P<0.001). De Oliveira GS Jr et al [21] found that the post operative opioid consumption was reduced in the perineural dexamethasone group as compared to control. In our study differences in VAS scores of both the groups were in significant at time points of 1 hr, 2 hr, and 4 hr postoperatively. This was probably owing to the effect of spinal anaesthesia given in both the groups, which is expected to provide pain relief for up to 4 hr. VAS scores were significantly higher in group R than group D at 8 hr, 12 hr, and 24 hr post operatively, thus suggesting that addition of dexamethasone to ropivacaine in TAP block significantly reduced pain from both somatic and visceral components. Similarly, Abdalla W et al [22] found that dexa metha sone – bupi vacaine in TAP block had signifi cantly lower postoperative pain scores than bupivacaine in patients undergoing radical cystectomy. Huynh TM et al [23] found that dexa metha sone has significantly decreased the incidence of PONV. There was no episode of vomiting observed in patients of either group. Postoperative analgesia provided by TAP block in both the groups could also account for the decreased incidence of vomiting in both the groups. No block or drug related side effects such as trauma to surrounding viscera, haematoma and LA toxicity were reported in both the groups. This suggests that 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 and safety of block. In our study we found that no block or drug related side effects such as trauma to surrounding viscera, haematoma and LA toxicity were reported in both the groups. The study was not without limitations. The analgesic efficacy of TAP block has

been demonstrated for up to 48 hr in previous studies, whereas in this study patients were assessed for 24 hr. The time to regression of spinal anaesthesia is different in different individuals that could have added to the analgesic efficacy of TAP block in the first four hours postoperatively. Some potential complications of dexamethasone such as delayed wound healing,

Hyper glycaemia, and adrenal suppression were not evaluated. However,

previous studies have demonstrated that a single small dose of dexamethasone is not associated with significant side effects. It has been realised that in future studies monitoring of pain scores must be at more frequent intervals after 8 hr postoperatively for better assessment of postoperative pain.

Conclusion

We conclude that Use of dexamethasone along with ropivacaine prolongs the analgesic duration of TAP block in patients undergoing LSCS and also has added benefits of opioid sparing and anti-emetic effects, thereby results in better postoperative recovery and improved maternal satisfaction.

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