



Anaesthesiology

BILATERAL TRANSVERSE ABDOMINUS PLANE BLOCK USING ROPIVACAINE & BUPIVACAINE FOR LOWER SEGMENT CESAREAN SECTION UNDER SPINAL ANAESTHESIA*. (A PROSPECTIVE, RANDOMIZED, DOUBLE BLINDED, PLACEBO CONTROLLED STUDY FOR EVALUATING THE ANALGESIC EFFICACY OF 0.5%ROPIVACAINE VS 0.25% BUPIVACAINE)

Chandrika	MD, DM. Professor of Anaesthesia, Institute of Obstetrics and Gynecology
Poovannan*	MD, Assistant Professor of Anaesthesia, Institute of Obstetrics and Gynecology *Corresponding Author
Devikala	MD, Assistant Professor of Anaesthesia, Institute of Obstetrics and Gynecology

ABSTRACT

This study was conducted to compare the efficacy of ultrasound guided Transversus Abdominis Plane block using ropivacaine & bupivacaine for lower segment caesarean section under spinal anaesthesia for postoperative analgesia

KEYWORDS :

INTRODUCTION

Cesarean Section commonly induces moderate-to-severe pain for 48 hours. The analgesic regimen should provide safe, effective analgesia, with minimal side effects for the mother and baby.

Transverse abdominis plane (TAP) block is a recently introduced regional technique that blocks abdominal wall neural afferents between T6 and L1 and thus can relieve pain associated with an abdominal incision.

AIM AND OBJECTIVES OF THE STUDY

AIM

To compare post operative analgesia using Ropivacaine(0.5%) and Bupivacaine (0.25%) in bilateral transverse abdominis plane block after spinal anaesthesia for lower segment cesarean section.

MATERIALS AND METHODS

In this Prospective, Randomized, double Blinded, Placebo controlled Clinical study, 75 females in the age group 20-35 years, with BMI <30 kg/m², undergoing elective or emergency caesarean section, with normal renal and liver function were selected. Patients not consenting to the procedure, with cardiovascular, renal and hepatic diseases, with allergy to the used drugs or infection at the injection site were excluded. This was conducted after getting approval of institutional ethical committee and written informed consent of parents (or) guardians.

The patients were randomly divided into 3 groups of 25 each
Group -1(Transverse Abdominis Plane block with normal saline),
Group -2(Transverse abdominis plane block with 0.25% bupivacaine),
Group -3(Transverse abdominis plane block with 0.5% ropivacaine).

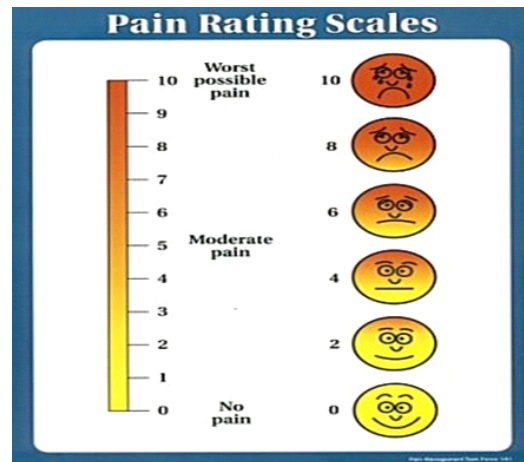
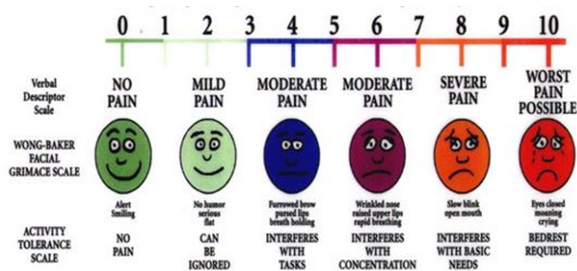
OUTCOMES MEASURED:

The duration of post operative analgesia of these drugs.

Post operative haemodynamics

Post operative visual analogue scale pain score

ASSESSMENT OF PAIN USING VISUAL ANALOGUE SCALE^{5,18}



STUDY METHOD:

All patients were assessed in our preanaesthetic clinic.

Inside the operation theatre, all basic monitors were connected (ECG, NIBP, SpO₂, temperature monitoring). Patient was given subarachnoid block under sterile aseptic precautions with 2ml of 0.5% HYPERBARIC BUPIVACAINE and after attaining a block height of T6, surgery proceeded and monitored intraoperatively.

At end of surgery, Transverse abdominis plane block was given bilaterally under ultrasound guidance with either saline, bupivacaine or ropivacaine.

PROCEDURE:

Patient in supine position, ultrasound probe placed transverse to the abdominal wall between lower costal margin and iliac crest.

Transverse abdominis plane was identified after visualising external oblique aponeurosis, internal oblique aponeurosis and transverse abdominis muscle and reached using 18G needle with bevel facing superiorly.

Correct placement of needle tip confirmed by injecting 2 – 3ml Bolus dose which cause hydrodissection and 20 ml of the test drug was administered. Procedure repeated on opposite side.

Post operatively patients were monitored in New Postoperative ward. Various parameters like HR, Blood pressure (both systolic and diastolic), SpO₂, Visual Analogue Scale (VAS) were observed for 48 hours post operatively. Incidences of side effects were also noted and the time for analgesic initiation was noted.

STATISTICAL ANALYSIS:

Data was analysed using SPSS (Statistical Package for Social Sciences) for windows version 22. Mean heart rates, systolic BP, Diastolic BP, Mean arterial BP, VAS scores between the three groups

were compared using ANOVA (analysis of variances) p value of <0.05 was taken as statistically significant.

OBSERVATION AND ANALYSIS

Table 1. Mean duration of analgesia (in hours)

	Mean duration of analgesia in Hours	Range	95% C.I	F Statistic	p value
Group 1 (Normal Saline)	1.49±0.54	0.5-2.5	1.2-1.7	141.096	<0.01*
Group 2 (0.25% Bupivacaine)	6.22±1.19	4- 8	5.72-6.71		
Group 3 (0.5% Ropivacaine)	20.6±7.13	7- 31	17.65-23.54		

The mean duration of analgesia in the control group was 1.49 hours, ranging from 0.5 to 0.25 hours, intervention group who received 0.25% Bupivacaine was 6.22 hours, ranging from 4 to 8 hours, in the group which received 0.5% Ropivacaine was 20.6 hours, ranging between 17.65 to 23.54 hours.

The mean duration of analgesia was compared between different intervention groups using ANOVA, the difference was found to be statistically significant.

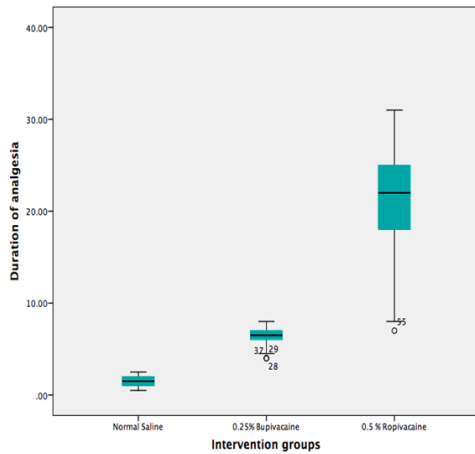
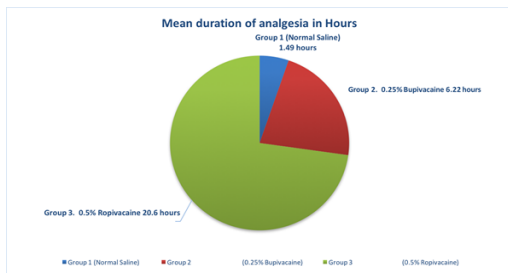


Figure 1. Mean Duration of Analgesia (in hours) in the Intervention groups



The above Figure shows that the mean duration of analgesia is more in Ropivacaine Group when compared to Bupivacaine Group and Saline Group.

Table 2. Mean Pain scores between intervention groups

Time duration	Intervention groups		
	Group 1 (Normal Saline)	Group 2 (0.25% Bupivacaine)	Group 3 (0.5% Ropivacaine)
15 min	0.96	0	0
30 min	2.2	0.2	0.04
1 hour	4.28	0.72	0.36
2 hours	6.16	1.52	0.84
4 hours	7	3	1.6
6 hours		4.18	2.64
12 hours		5.73	4.44
24 hours			5.68
36 hours			6.14
48 hours			7

In comparing mean pain scores using VAS across intervention groups, Group 3 which received Ropivacaine, reached the threshold VAS for analgesic injection after 36 hours. In the Bupivacaine group, it was 12 hours, while in the Control group it was just 2-4 hours.

Comparison of Mean VAS Scores between the three groups.

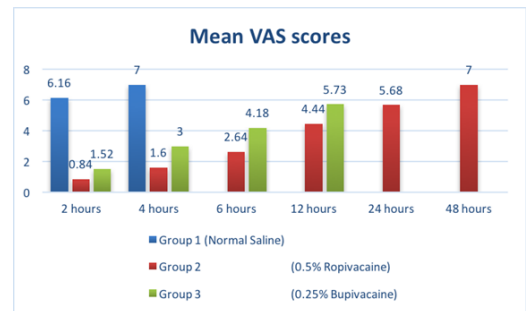
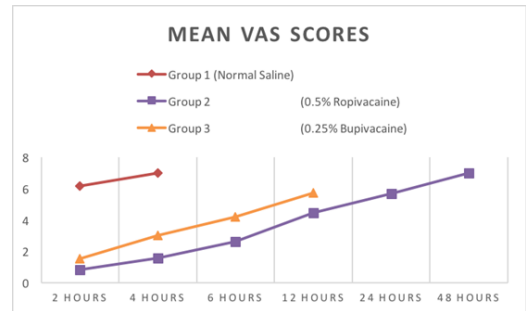


Table 3. Comparing mean VAS scores between intervention groups using ANOVA

	F Statistic	p value
VAS 15 min	61.714	<0.01*
VAS 30 min	60.693	<0.01*
VAS 1 hour	141.225	<0.01*
VAS 2 hours	438.226	<0.01*
VAS 4 hours	30.389	<0.01*
VAS 6 hours	14.06	<0.01*
VAS 12 hours	12.138	<0.01*

* - statistically significant

The mean pain scores as measured using Visual Analogue scale was compared across intervention groups, at 15 min, 30 min, 1 hour, 2 hours, 4 hours, 6 hours, and 12 hours. The difference was found to be statistically significant at each instance.

Table 4. Mean Heart rate of intervention groups

Mean Heart rate	Intervention groups		
	Group 1 (Normal Saline)	Group 2 (0.25% Bupivacaine)	Group 3 (0.5% Ropivacaine)
15 min	84.76	83.36	82.24
30 min	88.76	83.44	83.48
1 hour	94.56	84.44	82.88
2 hours	96.5	87.36	85.32
4 hours	91.5	91.6	89.16
6 hours		97.23	93.4
12 hours		98.45	96.96
24 hours			100.45
36 hours			105.75
48 hours			121

Table 5. Comparing mean HR between intervention groups using ANOVA

Heart rate	F Statistic	p value
Heart rate 15 min	0.412	0.664
Heart rate 30 min	2.512	0.088
Heart rate 1 hour	12.122	<0.01*
Heart rate 2 hours	11.178	<0.01*
Heart rate 4 hours	0.811	0.45
Heart rate 6 hours	2.71	0.107
Heart rate 12 hours	0.289	0.595

There was no significant variation overall in the Mean Heart rate across the three intervention groups.

Table 5. Mean Systolic BP of intervention groups

Mean systolic BP	Intervention groups		
	Group 1 (Normal Saline)	Group 2 (0.25% Bupivacaine)	Group 3 (0.5% Ropivacaine)
15 min	122.44	121.56	118.44
30 min	126.88	121.56	120.68
1 hour	133.24	122.6	123.72
2 hours	135	130.36	126.4
4 hours	137	134.16	129
6 hours		138.14	131.32
12 hours			134.16
24 hours			136.47
36 hours			138.43

Table 6. Mean Diastolic BP of intervention groups

Mean diastolic BP	Intervention groups		
	Group 1 (Normal Saline)	Group 3 (0.25% Bupivacaine)	Group 3 (0.5% Ropivacaine)
15 min	75.44	74.84	75.8
30 min	81.36	76.76	77.6
1 hour	86.24	78.83	79.72
2 hours	86.82	83.88	83.48
4 hours	91.5	87.32	85.6
6 hours		91.73	87.96
12 hours		92	89.92
24 hours			92.06
36 hours			93.71

Table 7. Mean arterial pressure between intervention groups

Mean arterial Pressure	Intervention groups		
	Group 1 (Normal Saline)	Group 2 (0.25% Bupivacaine)	Group 2 (0.5% Ropivacaine)
15 min	91.1	90.4	90.01
30 min	96.5	91.69	91.96
1 hour	101.9	94.01	94.38
2 hours	102.88	99.37	97.78
4 hours	106.66	102.93	100.06
6 hours		107.91	102.4
12 hours			104.66
24 hours			106.8
36 hours			108.6

Table 8. Comparing mean HR between 0.5% Ropivacaine & 0.25% Bupivacaine

Variable	Intervention groups	Mean	SD	Std. Error Mean	Mean diff.	Std. Error Diff.	p value	95% C.I	
								Upper bound	Lower bound
HR 1 hour	0.5% Ropivacaine	82.88	7.299	1.46	-1.56	2.024	0.445	-5.63	2.51
	0.25% bupivacaine	84.44	7.012	1.402					
HR 2 hours	0.5% Ropivacaine	85.32	6.731	1.346	-2.04	1.96	0.303	-5.981	1.901
	0.25% Bupivacaine	87.36	7.123	1.425					

The difference between the groups was not statistically significant. Hence in terms of hemodynamic stability, 0.5% Ropivacaine and 0.25% Bupivacaine do not differ significantly from each other.

DISCUSSION

Transverse Abdominis Plane Block has a major role in abdominal surgeries as an analgesic regimen but it is not fully defined. In our study we demonstrate its probable efficacy in patients undergoing lower segment caesarean section in terms of reducing pain scores and opioid usage for the first 48 hours.

The results showed that there is no significant difference in the heart rate, blood pressure in the two groups of women who received 0.25% Bupivacaine and 0.5% Ropivacaine

CONCLUSION

It can be concluded that ultrasound-guided TAP blocks in the manner we have described resulted in reduced systemic opioid consumption. Also we conclude that 0.5% Ropivacaine provided longer duration of analgesia than 0.25% Bupivacaine when used in TAPB.

REFERENCES:

BOOKS:

1. Basic and Clinical pharmacology, 11th edition, Bertram G. Katzung, MD, PhD
2. Chesnut's Obstetric Anaesthesia, Principles and Practice, 4th edition
3. Goodman & Gilman's The Pharmacological Basis Of Therapeutics - 11th Ed. (2006)
4. Miller's Anaesthesia, 8th edition.

JOURNALS:

5. Bhattacharjee S1 Analgesic efficacy of TAP block in providing effective perioperative analgesia in patients undergoing total abdominal hysterectomy: A randomized controlled trial.
6. Covino BG. Pharmacology of local anaesthetic agents
7. Dr Paul TAP Block,
8. Dr.Rao V Kadam USG guided continuous TAP block for abdominal surgeries
9. D. Belavy USG guided TAP block for analgesia after Caesarean delivery
10. F. W. Abdallah TAP block for postoperative analgesia after Caesarean delivery performed under spinal anaesthesia? A systematic review and meta-analysis.
11. Gaurav Kuthiala, Geeta Chaudhary ;Ropivacaine: A review of its pharmacology and clinical use
12. Himat vaghadia et al A multicenter trial of Ropivacaine 7.5mg/ml vs Bupivacaine 5mg/ml for Supraclavicular brachial plexus anaesthesia
13. Hyun Jun Shin, A Atim et al, The efficacy of USG guided TAP block in patients undergoing hysterectomy
14. John G. McDonnell et al The Analgesic Efficacy of TAP Block After Cesarean Delivery: A Randomized Controlled Trial
15. Jumana M. Baaj et al Efficacy Of USG guided TAP Block For Post-Cesarean Section Delivery Analgesia--A Double-Blind, Placebo- Controlled, Randomized Study
16. Karim Mukhtar TAP Block, Volume 12,
17. Lai J, Porreca F, Hunter JC, Gold MS. Voltage-gated sodium channels and hyperalgesia
18. Mark J. Young. Clinical Implications of the TAP Block in Adults .
19. McClellan KJ & Faulds D (2000): Ropivacaine. An update of its use in regional anaesthesia
20. McClure IH. Ropivacaine
21. Mugita Met al; Effectiveness of USG guided TAP block and rectus sheath block in pain control and recovery after gynecological transumbilical single-incision laparoscopic surgery.
22. N. Rafi, "Abdominal field block: a new approach via the lumbar triangle,"
23. Neha Fuladi "Comparative Study of Bupivacaine 0.25% versus Ropivacaine 0.5% in TAP Block for Postoperative Analgesia in Lower Abdominal Surgeries: A Randomised Controlled Trial
24. Patel SA et al TAP block for postoperative analgesia after cesarean delivery.
25. Pather S, et al The role of TAP blocks in women undergoing total laparoscopic hysterectomy: a retrospective review 13.
26. P. Hebbard, Y. Fujiwara, Y. Shibata, and C. Roysse, "USG-guided TAP block," Anaesthesia
27. P N Jain, Priya Ranganathan, Ultrasound In Anaesthesia
28. Robert A. Sofferman Physics and Principles of Ultrasound.
29. R. S. Atkinson, G. B. Rushman, and J. A. Lee, A Synopsis of Anaesthesia
30. Ryoko Kawahara et al The analgesic efficacy of ultrasound-guided transverses abdominis plane block with mid-axillary approach after gynecologic laparoscopic surgery: A randomized controlled trial
31. Scott DB, Lee A, Fagan D, et al. Acute toxicity of ropivacaine compared with that of bupivacaine
32. Shradha Sinha et al Comparison of USG guided TAP block with bupivacaine and ropivacaine as adjuncts for postoperative analgesia in laparoscopic cholecystectomies
33. Stoelting RK. Local Anaesthetics.
34. Terry T. Tan et al A randomised trial of the analgesic efficacy of USG guided TAP block after caesarean delivery under general anaesthesia
35. Tucker GT. Pharmacokinetics of local anaesthetics
36. Uma Srivastava et al - Efficacy of TAP block for post cesarean delivery analgesia