Original Research Article

Indian Journal of Anesthesia and Analgesia
2018; 5(5): 856-859
DOI: http://dx.doi.org/10.21088/ijaa.2349.8471.5518.26

Evaluation of Safety and Efficacy between 0.25% Bupivacaine and 0.375% Ropivacaine for Ultrasound-Guided Transversus Abdominis Plane Block in Lower Segment Caesarian Section Parturients

Jagadish Vaddineni[1], Anil Kumar Valluri[2], Kandukuru Krishna Chaithanya[3]

[1,2]Assistant Professor [3]Associate Professor, Anaesthesiology, Narayana Medical College, Nellore, Andhra Pradesh 524003, India.

Abstract

Objective: To assess the analgesic effect of bilateral ultrasound-guided transversus abdominis plane- block (TAP) with bupivacaine compared with ropivacaine among pregnant woman undergoing a cesarean section. *Methods:* In this study, 60 parturient scheduled for cesarean section randomly received either 20 ml of 0.25% bupivacaine (n=21) or ropivacaine 0.375 % (n=39) in the transversus abdominis plane on each side at the end of surgery. The clinical endpoints such as pain intensity, time to the first analgesic requirement, number of pain medication used and nausea, vomiting, were measured at 2, 8, 12, 24, and 48 h following TAP block. *Results:* Both 0.375% ropivacaine and 0.25% bupivacaine showed a significant reduction in pain intensity. However, there was no statistically significant difference between the groups in pain intensity. Time for first rescue analgesia was seen first in patients under bupivacaine group than ropivacaine group. There was no significant difference in a number of analgesic doses between both the groups. Side effects like nausea and vomiting were comparable. *Conclusion:* Both 0.375% ropivacaine and 0.25% bupivacaine were safe and efficient in TAP blocks in parturients undergoing caesarian section. Time for first rescue analgesia was shorter in bupivacaine group compared to ropivacaine group.

Keywords: Transabdominal Block; Caesarian Section; Pregnancy; Ropivacaine; Bupivacaine.

Introduction

Postoperative analgesia is essential for the patients to bear the surgical stress, to help in early ambulation and to prevent complications such lung atelectasis and deep vein thrombosis [1,2]. The opioid analgesics are most commonly used [2] as parenteral agents during postoperative pain relief. However, respiratory depression caused by opioids remains to be a particular feature [2]. There has been a continued concern among anaesthetists to provide adequate relief pain. Many investigators have used several opioid agents in the management of postoperative analgesia through various techniques, but the results varied due to differences in potency, efficacy, safety and ease of administration [3-5]. Benefits of active regional analgesic techniques include reduced pain intensity, decreased incidence of side effects from analgesics and improved patient comfort. Transversus abdominis plane (TAP) block is a relatively newer and a novel approach of injecting local anaesthesia into the plane between the internal oblique and transversus abdominis muscle for postoperative pain relief [6-8]. Use of local anaesthetic agents in TAP block is a simple and effective analgesic technique for surgical procedures where the parietal pain is a significant component of postoperative pain. TAP block has been used safely and efficiently in a variety of general, gynaecological, urological, plastic, and pediatric surgeries [9]. With this background, in our study, we have compared 20 ml of 0.25% bupivacaine and 0.375% ropivacaine for TAP block in parturient posted for elective caesarian section.

Corresponding Author: Anil Kumar Valluri, Assistant Professor, Department of Anaesthesiology, Narayana Medical College, Nellore, Andhra Pradesh 524003, India.
E-mail: aniljyoin@gmail.com

Received on 08.02.2018, **Accepted on** 09.03.2018

Materials and Methods

This quasi experimental open study was conducted at Narayana Medical College, Nellore. Study proposal was approved by institutional Ethics Committee. Written informed consent was obtained from all the study participants. 60 pregnant woman undergoing elective cesarean section and having American Society of Anesthesiologists physical status II were recruited. Parturient with any contraindication to spinal anaesthesia or who were unable to understand numeric rating scale (NRS) were excluded from the study. Preoperative medications were intravenous pantoprazole and fluids. The spinal anaesthesia was given with 2-2.2 ml of 0.5% heavy bupivacaine at L3-4 or L4-5 level in left lateral position. Intra-operatively, ondansetron 4 mg IV was used as antiemetic, if needed. At the end of surgery, patients received ultrasound guided TAP block with either 20 ml Bupivacaine 0.25% or 0.375% 20ml ropivacaine in the transversus abdominis plane on each side [9]. Postoperatively intravenous diclofenac 75 mg was used as rescue analgesic and 4 mg of intravenous ondansetron as antiemetic. The clinical endpoints such as pain intensity, nausea, vomiting, and time to first analgesic requirement and number of pain medication used were measured at 2 8, 12, 24, and 48 h following TAP. The intensity of pain was assessed on NRS (0 = no pain, and 10 = worst pain). Nausea and vomiting was assessed on a categorical scoring scale (0 = no symptoms, 1 = only nausea, 2 = nausea and/vomiting).

Statistical Analysis

Data analysis was performed after importing from Excel spreadsheet into the IBM SPSS Statistics software for Windows, Version 21.0. Armonk, NY: IBM Corp. Demographic variables were analysed using Chi-Square test. Repeated measurements such as pain intensity, by repeated measures ANOVA, followed by Dunn multiple comparison tests. Nominal and ordinal variables such as nausea and vomiting were assessed using Chi-square test and continuous variables using unpaired t-test. A probability value less than 0.05 was considered significant.

Results

On comparing the demographic parameters between bupivacaine and ropivacaine, we observed that they were similar in age, ASA status and history of previous cesarean sections except for some participants in each TAP group where more participants in ropivacaine group. There was no statistically significant difference regarding weight, height, physical status and type of surgical incision (Table 1).

Both bupivacaine and ropivacaine significantly ($p<0.05$) reduced pain after TAP in both the groups as compared to baseline (two hours after after TAP block). It can be seen from the Table that the pain intensity at various time points was statistically not significant.

Table 1: Comparing the clinical parameters between bupivacaine and ropivacaine group

Statistics		Ropivacaine (n=39)	Bupivacaine (n=21)	P value
Age (Yrs.)		27.59±2.80	27.76±3.08	0.89
ASA	II	39 (100%)	21 (100%)	-
Previous Cesarean Sections	No	20 (51.3%)	14 (66.7%)	0.27
	Yes	19 (48.7%)	7 (33.3%)	
Operation time (min)		37.44±4.51	38.52±5.03	0.39
Pain intensity at 2 hour		6.95±0.72	6.91±0.77	0.59
Pain intensity at 8 hours		3.51±1.10	3.14±1.24	0.56
Pain intensity at 12 hours		3.56±0.50	3.43±0.51	0.91
Pain intensity at 24 hours		5.03±0.84	4.71±0.78	0.86
Pain intensity at 48 hours		1.49±1.12	1.19±1.03	0.44
Time to first analgesic (hours)		7.13±1.42	6.29±1.10	0.02
Analgesic Doses	0	20 (51.28%)	7 (57.14%)	0.22
	1	13 (33.33%)	8 (28.57%)	
	2	6 (15.38%)	6 (28.57%)	
Nausea and	0	20 (51.28%)	13 (61.90%)	0.27
Vomiting	1	11 (28.21%)	6 (28.57%)	
	2	8 (20.51%)	2(9.52%)	
Anti-Emetic Doses	No	20 (51.28%)	13(61.90%)	0.24
	Yes	19 (48.72%)	8(39.10%)	

Time to use of the first analgesia observed in bupivacaine group 6.21±1.10 hours which was significantly ($p<0.02$) shorter than that of ropivacaine group 7.31±1.42 hours. We also observed that there was no significant difference either in the severity of nausea & vomiting or use of rescue medications, or antiemetics between the two groups.

Discussion

The benefit of adequate postoperative analgesia is optimistic and includes a reduction in the postoperative stress and morbidity. In particular types of surgeries, there is earlymobility and improved surgical outcomes. The local anesthetic agents in TAP block have demonstrated analgesic activity to the skin and musculature of the anterior abdominal wall in patients undergoing abdominal surgeries, such as extensive bowel resection, open/laparoscopic appendectomy, total abdominal hysterectomy, laparoscopic cholecystectomy, open prostatectomy, abdominoplastywith or without flank liposuction, inguinal hernia, iliac crest bone graft and particularly in parturients undergoing caesarean [7,10-15].

In our study, we used a posterior approach USG guided approach forTAP block [16].The USG probe was placed transverse to the abdominal wall which made the three muscle layers distinctly visible after which the probe was moved to the mid axillary line just above the iliac crest (i.e., overthe triangle of Petit). The needle was then advancedmedially by the in plane approach. The TAP has poor vascularity; moreover, hence the action is prolonged and not associated with any significant complications. The USG guided TAP block technique avoids complication which are common with the blind approach of TAP block [17].

A study, observed reduction in total morphine use after caesarean section when the parturients were given TAP block with 0.5%ropivacaine under ultrasound guidance [18]. Similarly, another study in caesarean delivery using 1.5 mg/kg ropivacaine also confirmed the reduction in the requirement for morphine [11]. Three similar studies using TAP block were conducted inpatients undergoing elective caesareansection under spinal anaesthesia with Bupivacaine, ropivacaine and levobupivacaine also showed areduction in theuse of analgesics [19-21].

Mention the Limitations

More frequent pain intesity measurements were not recorded to assess the peak analgesic effect of TAP block due to spinal anaesthesia.

Conclusion

TAP block is safe and effective as a component of a multimodal analgesic regimen, We conclude that 0.375% Ropivacaine provided prolonged analgesia compared to 0.25% bupivacaine though both are equally efficient in reducing the pain intensity.

References

1. Schug S. The global year against acute pain. Anaesthesia and intensive care. 2011;39(1):11-5.
2. Liu SS, Wu CL. Effect of postoperative analgesia on major postoperative complications: a systematic update of the evidence. Anesthesia & Analgesia. 2007;104(3):689-702.
3. Rollason V, Samer C, Piguet V, Dayer P, Desmeules J. Pharmacogenetics of analgesics: toward the individualization of prescription. 2008.
4. Mhuircheartaigh RN, Moore R, McQuay H. Analysis of individual patient data from clinical trials: epidural morphine for postoperative pain. British journal of anaesthesia. 2009;103(6):874-81.
5. Yu N, Long X, Lujan-Hernandez JR, Succar J, Xin X, Wang X. Transversus abdominis-plane block versus local anesthetic wound infiltration in lower abdominal surgery: a systematic review and meta-analysis of randomized controlled trials. BMC anesthesiology. 2014;14(1):121.
6. Kuppuvelumani P, Jaradi H, Delilkan A. Abdominal nerve blockade for postoperative analgesia after caesarean section. Journal of Obstetrics and Gynaecology Research. 1993;19(2):165-9.
7. Rafi A. Abdominal field block: a new approach via the lumbar triangle. Anaesthesia. 2001;56(10):1024-6.
8. Aveline C, Le Hetet H, Le Roux A, Vautier P, Cognet F, Vinet E, et al. Comparison between ultrasound-guided transversus abdominis plane and conventional ilioinguinal/iliohypogastric nerve blocks for day-case open inguinal hernia repair. British journal of anaesthesia. 2010;106(3):380-6.
9. Albrecht E, Kirkham KR, Endersby RV, Chan VW, Jackson T, Okrainec A, et al. Ultrasound-guided transversus abdominis plane (TAP) block for laparoscopic gastric-bypass surgery: a prospective randomized controlled double-blinded trial. Obesity surgery. 2013;23(8):1309-14.
10. Bharti N, Kumar P, Bala I, Gupta V. The efficacy of a novel approach to transversus abdominis plane block for postoperative analgesia after colorectal surgery. Anesthesia & Analgesia. 2011;112(6):1504-8.
11. McDonnell JG, Curley G, Carney J, Benton A, Costello J, Maharaj CH, et al. The analgesic efficacy of

transversus abdominis plane block after cesarean delivery: a randomized controlled trial. Anesthesia & Analgesia. 2008;106(1):186-91.

12. Carney J, Finnerty O, Rauf J, Curley G, McDonnell JG, Laffey JG. Ipsilateral transversus abdominis plane block provides effective analgesia after appendectomy in children: a randomized controlled trial. Anesthesia & Analgesia. 2010;111(4):998-1003.
13. Carney J, McDonnell JG, Ochana A, Bhinder R, Laffey JG. The transversus abdominis plane block provides effective postoperative analgesia in patients undergoing total abdominal hysterectomy. Anesthesia & Analgesia. 2008;107(6):2056-60.
14. Chiono J, Bernard N, Bringuier S, Biboulet P, Choquet O, Morau D, et al. The ultrasound-guided transversus abdominis plane block for anterior iliac crest bone graft postoperative pain relief: a prospective descriptive study. Regional anesthesia and pain medicine. 2010;35(6):520-4.
15. Heil JW, Ilfeld BM, Loland VJ, Sandhu NS, Mariano ER. Ultrasound-guided transversus abdominis plane catheters and ambulatory perineural infusions for outpatient inguinal hernia repair. Regional anesthesia and pain medicine. 2010;35(6):556-8.
16. Hebbard P. Audit of 'rescue' analgesia using TAP block. Anaesthesia and intensive care. 2007;35(4):617-9.
17. Farooq M, Carey M. A case of liver trauma with a blunt regional anesthesia needle while performing transversus abdominis plane block. Regional anesthesia and pain medicine. 2008 May-Jun;33(3): 274-5. PubMed PMID: 18433683. Epub 2008/04/ 25. eng.
18. Belavy D, Cowlishaw P, Howes M, Phillips F. Ultrasound-guided transversus abdominis plane block for analgesia after Caesarean delivery. British journal of anaesthesia. 2009;103(5):726-30.
19. Srivastava U, Verma S, Singh TK, Gupta A, Saxsena A, Jagar KD, et al. Efficacy of trans abdominis plane block for post cesarean delivery analgesia: A double-blind, randomized trial. Saudi journal of anaesthesia. 2015;9(3):298.
20. Cansýz KH, Yedekçi AE, Þen H, Özkan S, Daðlý G. The effect of ultrasound guided transversus abdominis plane block for caesarean delivery on postoperative analgesic consumption. Gulhane Medical Journal. 2015;57(2).
21. Mankikar MG, Sardesai SP, Ghodki PS. Ultrasound-guided transversus abdominis plane block for post-operative analgesia in patients undergoing caesarean section. Indian journal of anaesthesia. 2016;60(4):253.