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ORIGINAL ARTICLE

Evaluation of Transversus Abdominis Plane Block for Analgesia after Cesarean Section

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ABSTRACT

Background: This study is intended to evaluate the transversus abdominis plane (TAP) block for analgesia over the first 24 postoperative hours after lower segment cesarean section.

Materials and methods: Fifty female parturients of American society of Anesthesiologists (ASA) physical status II undergoing lower segment cesarean section were randomized to undergo a bilateral TAP block with ropivacaine (group 1 = 25) or to undergo a bilateral TAP block with 0.9% saline (group 2 = 25). In addition, all patients received standard analgesic injection tramadol 100 mg and im injection diclofenac 75 mg as required in the postoperative period. All patients received standard spinal anesthesia, and TAP block was performed at end of the surgery. Each patient was assessed after operation at each half an hours up to 24 hours after surgery in postoperative period.

Results: The mean visual analog scale (VAS) score of group 1 was statistically less than mean VAS score of group 2 ($p < 0.001$). The mean of total number analgesic requirement for first 24 hours postoperatively was significantly less in group 1 (1.68 ± 0.9) than group 2 (2.8 ± 0.33) respectively.

Conclusion: Transversus abdominis plane block holds considerable promise as part of a multimodal analgesic regimen for post cesarean delivery analgesia. Transversus abdominis plane block is easy to perform and provided reliable and effective analgesia.

Keywords: Analgesia, Lower segment cesarean section, Transversus abdominis plane block.

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INTRODUCTION

Analgesia after cesarean section is important. The transversus abdominis plane (TAP) block is a regional analgesic technique which block T6-L1 nerve branches and has an evolving role in postoperative analgesia for lower abdominal surgeries. Rafi first described the TAP block in 2001.[1] Bilateral TAP block provides postoperative analgesia for patients undergoing surgery involving a midline abdominal wall. Transversus abdominis plane block has subsequently been used as a component of multimodal analgesia for postoperative pain relief following various surgical procedures, such as large bowel resection,[2] open appendectomy,[3] retropubic prostatectomy,[4] nephrectomy,[5] hernia repair,[6] laparoscopic cholecystectomy[7,8] and cesarean section.[9]

AIMS AND OBJECTIVES

In this study, we evaluated the TAP block for analgesia over the first 24 postoperative hours after lower segment cesarean section.

MATERIALS AND METHODS

The present study was undertaken in indoor patients admitted in Netaji Subhash Chandra Bose Medical College, Jabalpur. After obtaining institutional ethics committee approval and informed consent, 50 parturients of American Society of Anesthesiologists (ASA) physical status II undergoing lower segment cesarean section were enrolled for study. A detailed preanesthetic check-up was carried out before the surgery. Patients with history of drug allergy and local anesthetics toxicity, bleeding diasthesis, infection at the site of block, peripheral neuropathy, BMI > 35 kg/m^2, pregnancy wt < 50 kg (to limit maximum ropivacaine to 3 mg/kg) or eclampsia and pre-eclampsia were excluded from the study.

For the study purpose, parturients were randomly allocated by envelope method into two groups of 25. Group 1 to 25 parturients received TAP block with 20 ml Ropivacaine 0.375% on each side. Group 2 to 25 parturients received TAP block with 20 ml saline 0.9% on each side (control).

In the operating room, all parturients received a standard spinal anesthesia consisting of 11 to 12.5 mg of hyperbaric bupivacaine 0.5%. The TAP block was

performed at the end of surgery by following technique. A 22-gauge 50 mm blunted regional anesthesia needle attached to a syringe filled with the study solution was taken. A loss of resistance technique was used to locate the TAP. This was possible because the fascial extensions of the abdominal wall muscles within the floor of the triangle of Petit create an easily appreciated increased resistance to needle advancement. With the patient in a supine position and the investigator standing on the contralateral side, the iliac crest was palpated from anterior to posterior direction until the latissimus dorsi muscle insertion was appreciated. The triangle of Petit was palpated between the anterior border of latissimus dorsi, the posterior border of the external oblique and the iliac crest. The skin over the triangle of Petit was pierced with the needle held at right angles to the coronal plane. The needle stabilized and advanced at right angles to the skin in a coronal plane until resistance was encountered. Advancement of the needle resulted in a loss of resistance, or 'pop' sensation, as the needle entered the plane between the external and internal oblique fascial layers. Further, gentle advancement result in the appreciation of a second increased resistance as the needle traverses the fascial extension of internal oblique. A second pop indicate entry into the transversus abdominis fascial plane. After careful aspiration to exclude vascular puncture, a test dose of 1 ml was injected. After a negative test dose, 20 ml of study solution was injected on each side, while observing closely for signs of toxicity. The TAP block was performed on the opposite side by same technique. A standard postoperative analgesic regimen, consisting of IM diclofenac 75 mg and inj. tramadol 100 mg commenced in both groups and patients were shifted to recovery room.

Parturients were evaluated for the presence and severity of pain. These evaluations were performed at each half an hour upto 24 hours after TAP blockade. All patients were asked to give scores for their pain at each time point. Pain severity was measured by using a visual analog scale (VAS) 10 cm unmarked line in which 0 cm means no pain and 10 cm means worst pain imaginable, first described by Bond MR and Pilowsky.[19] Additional analgesics is given on request in form of IM diclofenac 75 mg along with 100 mg tramadol in drip to be given over one hour as infusion when VAS ≥ 4. The study was ended 24 hours after TAP blockade.

The observation of this study was VAS scores, time to first analgesic request, total number of diclofenac and tramadol consumed by both the groups.

RESULTS

Fifty patients were recruited for the trial and data from all of them were analyzed. The two groups were comparable in terms of baseline demographic parameters (age and body weight). A summary of base line characteristics of the patients has been furnished in Tables 1 and 2.

Table 1 shows the age distribution in each group. Most of the parturients belong to age group of 20 to 25 years.

Table 2 shows the weight distribution in each group. Most of the parturients belong to weight range of 56 to 60 kg.

Table 3 shows mean VAS score at 6.5, 11.5, 20.5, 24 hours postoperatively in both groups. The mean VAS score of group 1 was statistically less than mean VAS score of group 2 at 6.5, 11.5, 20.5, 24 hours respectively (Graph 1). Visual analog scale score in both groups was significantly different at 6.5, 11.5, 20.5 and 24 hours ($p < 0.001$).

Table 4 shows mean time to first analgesic request in both groups. The mean time to first analgesic request was significantly prolonged in group 1 than group 2. On statistical analysis, the difference in mean time to first analgesic request between groups 1 and 2 was found to be highly significant. ($p < 0.0001$).

Table 5 shows mean of total number of analgesic requirement in terms of total number of doses. The mean of total number analgesic requirement for first 24 hours postoperatively was significantly less in group 1(1.68 ± 0.9) than group 2 (2.8 ± 0.33) respectively (Graph 3).

On statistical analysis, the difference between groups 1 and 2 was found to be highly significant ($p < 0.0001$) (Graph 2).

Table 1: Age distribution

	No. of parturients		
Age (years)	*Group 1*	*Group 2*	*Total*
20–25	18	17	35
26–30	7	8	15
Total	25	25	50
Mean ± SD	24.76 ± 2.18	25 ± 2.32	

p = 0.70

Table 2: Weight distribution

	No. of parturients		
Weight (kg)	*Group 1*	*Group 2*	*Total*
50–55	7	10	17
56–60	18	15	33
Total	25	25	50
Mean ± SD	56.24 ± 1.78	55.52 ± 1.58	

p = 0.137

Table 3: Mean VAS score at different time interval

Time (hrs)	*Group 1*	*Group 2*		
	Mean VAS score ± SD		*p-value*	*Significance*
6.5	0.24 ± 0.66	2.64 ± 1.25	<0.001	S
11.5	0.32 ± 0.9	2 ± 0.4	<0.001	S
20.5	0	2.2 ± 2.5	<0.001	S
24	0.76 ± 1	2.52 ± 1.26	<0.001	S

S: Significant

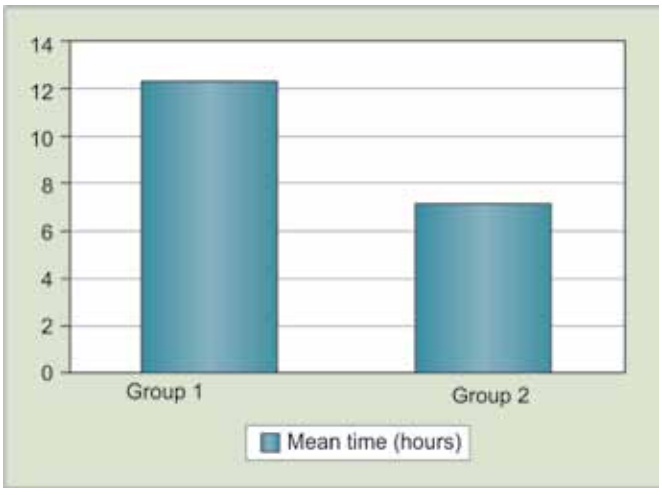
Table 4: Mean time to first analgesic request (hours)

Groups mean time	*Group 1*	*Group 2*
Mean time (hours)	12.36	7.14
SD	±2.57	±0.46

Table 5: Mean of total number of analgesic requirement

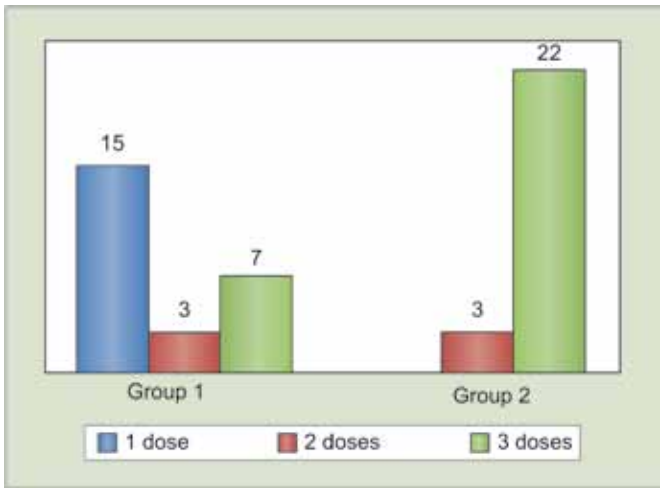
Injection diclofenac 75 mg IM and IV tramadol 100 mg	*Group 1*	*%*	*Group 2*	*%*
1 dose	15	60	0	0
2 doses	3	12	3	12
3 doses	7	28	22	88
Mean ± SD	1.68 ± 0.9		2.8 ± 0.33	

Graph 1: Comparative mean VAS score



Graph 2: Mean time to first analgesic request (hours)

Statistical analysis was done by using the software statistical package for the social science (SPSS) 20. Demographic data were analyzed using student's t-test and fisher's exact test. Repeated measurements (pain scores) were analyzed by paired comparisons at each time interval using the t-test. The levels of significance of the results were considered at 0.05 levels, i.e. $p < 0.05$ was considered as significant.



Graph 3: Number of analgesic requirement in patients

DISCUSSION

The mean age (years) of the parturients in groups 1 and 2 were 24.76 ± 2.18 and 25 ± 2.32 respectively. The mean age of both groups was comparable ($p > 0.05$). The mean weight (kg) of parturients in groups 1 and 2 were 56.24 ± 1.78 and 55.52 ± 1.58 respectively. The mean weight of both groups was comparable ($p > 0.05$). Thus, all two groups were comparable demographically.

In our study, pain was assessed by VAS score and additional analgesic on request was given when VAS score ≥ 4. The mean VAS score was less in group 1 than group 2. Mean VAS score was found to be highly significant ($p < 0.05$). This finding of our study correlate well with the study conducted by McDonnell et al[9] who observed that postoperative mean VAS score was less in TAP block with ropivacaine compared with placebo in cesarean section ($p < 0.05$). This observation was also supported by study done by Carney et al[10] who again found that mean VAS score was less in TAP block with ropivacaine compared with placebo in total abdominal hysterectomy ($p < 0.05$). Similarly, this observation was also supported by study done by Niraj et al[11] who again analyzed the mean VAS scores and found it to be less with bupivacaine as compared to placebo in patients undergoing open appendicectomy ($p < 0.001$). Similarly, this observation was also supported by study done by Belavy et al[12] who again analyzed the mean VAS scores and found it to be less with ropivacaine as compared to placebo in patients undergoing cesarean section ($p < 0.05$).[13] This observation was incongruent with the study done by Costello et al (2009) who evaluated the efficacy of the TAP block for post cesarean delivery pain and Griffiths JD et al (2010) who evaluated the efficacy of TAP block for analgesia in patient undergoing midline laparotomy for gynecological malignancy.[13,14] They found that there was no significant difference when TAP block

with local anesthetics and control group as compared in terms of mean VAS score. Recently, Sharma et al[15] also found that TAP block by landmark technique improves VAS score in first 24 hours in patients undergoing major abdominal surgery.

In our study, the mean of total no of analgesic requirement for first 24 hours was significantly lower in group 1 (1.68 ± 0.9) than group 2 (2.8 ± 0.33) respectively. On statistical analysis, the difference between groups 1 and 2 was found to be highly significant ($p < 0.0001$). This finding was in corroboration with study conducted by McDonnell JG et al (2007) and Carney J et al (2008) where they found that mean of total analgesic requirement was significantly reduced by TAP block using local anesthetics when compared with placebo ($p < 0.001$).[10,11] Similarly, Niraj et al (2009)[21] also found that mean of total analgesic requirement was significantly reduced by TAP block using local anesthetics when compared with placebo ($p < 0.001$). This observation was incongruent with studies done by Costello et al (2009)[13] and Griffiths et al (2010)[14] where they found that there was no significant difference in terms of total analgesic consumption with local anesthetics and placebo group. Petersen et al[17] in 2013 found that TAP block does not provide superior analgesia in comparison to placebo after inguinal hernia repair. A previous Cochrane review[17] and a meta-analysis[18] in 2012 failed to demonstrate the beneficial effect of TAP block on postoperative pain scores.

In our study, the mean time to first analgesic request was significantly prolonged in groups 1 than 2. On statistical analysis, the difference in mean time to first analgesic request between groups 1 and 2 was found to be highly significant ($p < 0.0001$). This finding was in corroboration with study conducted by McDonnell JG et al (2007) and Carney J et al (2008) as they found that mean time to first analgesic request was significantly shortened in TAP block using local anesthetics when compared with placebo ($p < 0.001$).[11] This observation was incongruent with studies done by Costello et al[13] and Griffiths et al[14] (2010) as they found that there was no significant difference between TAP block with local anesthetics group and placebo group in terms of mean time to first analgesic request.

CONCLUSION

From our study, it can be concluded that: (1) Pain score were significantly less in group 1 than group 2. This is important to facilitate early ambulation, infant care (including breastfeeding, maternal-infant bonding) with minimum side effect for mother and child, (2) transversus abdominis plane block reduces total analgesic requirement over first 24 hours postoperatively which thereby increases the patient comfort and reduces the side effect of conventional parenteral analgesics, (3) transversus abdominis plane block holds considerable promise as part of a multimodal analgesic regimen for post cesarean delivery analgesia. Transversus abdominis plane block is easy to perform and provided reliable and effective analgesia.

Limitations of our study: (1) The study was limited to assessment of postoperative analgesia up to the first 24 postoperative hours, (2) The study was not large enough to assess safety. There is a risk of inadvertent peritoneal rupture but risk of peritoneal rupture is low if block is performed as described in method, (3) We did not perform dose response study to determine if a lower dose of ropivacaine would lead to the same results.

REFERENCES

1. Rafi AN. Abdominal field block: a new approach via the lumbar triangle. Anaesthesia 2001;56:1024-1026.
2. McDonnell JG, O'Donnell B, Curley G, Heffernan A, Power C, Laffey JG. The analgesic efficacy of transversus abdominis plane block after abdominal surgery: a prospective randomized controlled trial. Anesth Analg 2007;104:193-197.
3. 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. Anesth Analg 2010;111: 998-1003.
4. O'Donnell BD, McDonnell JG, McShane AJ. The transversus abdominis plane (TAP) block in open retropubic prostatectomy. Reg Anesth Pain Med 2006;31:91.
5. Hosgood SA, Thiyagarajan UM, Nicholson HF, Jeyapalan I, Nicholson ML. Randomized clinical trial of transversus abdominis plane block versus placebo control in live-donor nephrectomy. Transplantation 2012;94:520-525.
6. 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. Br J Anaesth 2011;106:380-386.
7. El-Dawlatly AA, Turkistani A, Kettner SC, Machata AM, Delvi MB, Thallaj A, et al. Ultrasound-guided transversus abdominis plane block: description of a new technique and comparison with conventional systemic analgesia during laparoscopic cholecystectomy. Br J Anaesth 2009;102:763-767.
8. Petersen PL, Stjernholm P, Kristiansen VB, Torup H, Hansen EG, Mitchell AU, et al. The beneficial effect of transversus abdominis plane block after laparoscopic cholecystectomy in day-case surgery: a randomized clinical trial. Anesth Analg 2012;115:527-533.
9. 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. Anesth Analg 2008;106:186-191.
10. 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. Anaesth Analg 2008;107:2056-2060.

11. Niraj G, Searle A, Mathews M, et al. Analgesic efficacy of ultrasound-guided transversus abdominis plane block in patients undergoing open appendicectomy. Br J Anaesth 2009;103:601-605.
12. Belavy D, Cowlishaw PJ, Howes M, Phillips F. Ultrasound-guided transversus abdominis plane block for analgesia after caesarean delivery. Br J Anaesth 2009;103:726-730.
13. Costello JF, Moore AR, Wieczorek PM, Macarthur AJ, Balki M, Carvalho JC. The transversus abdominis plane block, when used as part of a multimodal regimen inclusive of intrathecal morphine, does not improve analgesia after caesarean delivery. Reg Anesth Pain Med 2009;34:586-589.
14. Griffiths JD, Middle JV, Barron FA, Grant SJ, Popham PA, Royse CF. Transversus abdominis plane block does not provide additional benefit to multimodal analgesia in gynaecological cancer surgery. Anaesth Analg 2010;111:797-801.
15. Sharma P, Chand T, Saxena A, Bansal R, Mittal A, Shrivastava U. Evaluation of postoperative analgesic efficacy of transversus abdominis plane block after abdominal surgery: a comparative study. J Nat Sci Biol Med 2013;4:177-180.
16. Petersen PL, Mathiesen O, Stjernholm P, Kristiansen VB, Torup H, Hansen EG, et al. The effect of transversus abdominis plane block or local anaesthetic infiltration in inguinal hernia repair: a randomised clinical trial. Eur J Anaesthesiol 2013;30:415-421.
17. Charlton S, Cyna AM, Middleton P, Griffiths JD. Perioperative transversus abdominis plane (TAP) blocks for analgesia after abdominal surgery. Cochrane Database Syst Rev 2010;12: CD007705.
18. Johns N, O'Neill S, Ventham NT, Barron F, Brady RR, Daniel T. Clinical effectiveness of transversus abdominis plane (TAP) block in abdominal surgery: a systematic review and meta-analysis. Colorectal Dis 2012;14:e635-e642.
19. Bond MR, Pilowsky I. Subjective assessment of pain and its relationship to the administration of analgesics in patients with advanced cancer. J Psychosom Res 1966;10:203-208.