ORIGINAL ARTICLE

Changes of Different Parameters during Transversus Abdominis Plane Block as Part of a Multimodal Analgesia at Different Time Interval in Total Abdominal Hysterectomy

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Abstract

Introduction: It is very crucial to see the changes of different parameters during transversus abdominis plane block as part of a multimodal analgesia at different time interval in total abdominal hysterectomy.The purpose of the present study was to observe the changes of different parameters during transversus abdominis plane block as part of a multimodal analgesia at different time interval in total abdominal hysterectomy.

Methods: This randomized control trial was conducted in Department of Anaesthesia, Analgesia, Palliative and Intensive Care Medicine of Dhaka Medical College and Hospital, Dhaka, Bangladesh from March 2016 to September 2018 for a period two years and six months. Women planned for an elective total abdominal hysterectomy under general anesthesia were selected as study population. Participants were selected and randomly divided into two groups designed as group I and group II. Patient of both group were given general anesthesia. Group I patient received 20 ml 0.25% bupivacaine and group II patient received 20 ml normal saline as placebo. Then dressing was done. The TAP block was performed after taking all aseptic precaution in the flank palpated between the 12th rib (Costal margin) and the iliac crest. After confirmation of correct position, 20 ml 0.25% bupivacaine was given to group I patient and 20 ml normal saline was given to group II patient within the fascial layer which was confirmed by ultrasound. The presence and severity of pain were assessed using a visual analogue pain scale (VAS). Measurement of Sedation by RASS score was done after given morphine.

Results: A total number of 40 patients were recruited for this study and were equally divided into two groups. Thus 20 patients were in the group I and the rest 20 patients were in group II. In 0 to 2 hour group I patient's VAS was less than 6 due to effect of TAP block but group II patients were score greater than 6 ($p<0.05$). Again 8-10 hour VAS was significantly higher in group I patient due to gradually reduce the effect of TAP block which was statistically significant ($p<0.05$). In rest of the time VAS was not statistically significant. In Richmond agitation and sedation score of the study patients, it was observed that majority 16(80.0%) patients had sedation sore 0 at (0h-8h) in group I and 5(25.0%) in group II ($p=0.002$). In next 8 hour (>8h-16h) in group I 8(40%) patient had sedation score 0 and 7(35.0%) in group II ($p=0.935$). The difference of sedation score 0 (0h-8h) was statistically significant between two groups($p<0.05$).

Conclusion: In conclusion a statistically significant changes is found in different parameters during transversus abdominis plane block as part of a multimodal analgesia at different time interval in total abdominal hysterectomy.

Keywords: Transversus abdominis plane block, Multimodal analgesia, Total abdominal hysterectomy

Journal of Green Life Med. Col. 2020; 5(1): 3-7

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Received: 19.11.2019 **Accepted:** 24.12.2019

Introduction:

Hysterectomy is the second most common operation in gynecology.[1]The pain following abdominal hysterectomy results in a delay in the ambulation, longer hospitalization and increased probability of deep vein thrombosis and dissatisfaction of patients. Multimodal analgesia is effective in handling post-operative pain and in attenuating the side effect of large doses of a single analgesic.[2] The existing alternative drugs that are routinely used as post-operative analgesia for these patients is regular intra-muscular/ intravenous/ PCA combined with other oral agents.

The transversus abdominis plane (TAP) block is a technique of regional anaesthesia that provides analgesia to the parietal peritoneum as well as the skin and muscles of the anterior abdominal wall.[3] There is afascial sheath between the internal oblique and transversus abdominis muscles and the nerves lie deep to this fascia. Ultrasound imaging assists accurate location of the transversus abdominis plane compared with a technique that relies on anatomical landmarks with acknowledged variability.[4]

TAP block done with 0.375% levobupivacaine 20ml (10ml injected each side) before surgical incision and post-operative pain was managed by NSAID and IV PCA morphine . They showed reduced visual analog scale pain scores on emergence and morphine requirements in the first 24 postoperative hours in patients of abdominal surgery under general anaesthesia.[5] The TAP block with 0.75% ropivacaine (1.5 mg/kg to a maximum dose of 150 mg bilaterally) compared with placebo reduced postoperative visual analog scale pain scores and total morphine requirements in the first 48 postoperative hours and also incidence of sedation was reduced in patients of cesarean delivery under neuraxial block.[6] This present study was undertaken to observe the changes of different parameters during transversus abdominis plane block as part of a multimodal analgesia at different time interval in total abdominal hysterectomy.

Methods:

Study Population and Settings: This was a prospective randomized control trial study. This study was conducted in Department of Anaesthesia, Analgesia, Palliative and Intensive Care Medicine of Dhaka Medical College and Hospital, Dhaka, Bangladesh. This study was carried out from March 2016 to September 2018 for a period two years and six months. All women booked for an elective total abdominal hysterectomy under general anesthesia were selected as study population. Women with the history of allergy to bupivacaine or morphine, history of opioid addiction, patients with coagulation disorders, infection at the needle insertion site or patient refuse to give informed consent to be part of the trial. Finally written informed consent were taken from them if they agreed to take part in the trial.

Randomization: A total 40 participants were selected and randomly divided into two groups designed as group I and group II by using fixed number sealed envelope technique. Each group contains 20 patients. This grouping was made by assigned anaesthesiologist and given the code number for every patient.

Intervention: Patient of both group were given general anesthesia. A routine general anesthesia was performed using the standard technique. After 3 minute pre-oxygenation fentanyl 2 microgram/kg and thiopental sodium 3 to 5 mg/kg were used for induction. For intubation vecuronium 0.1mg/kg was given. Anesthesia was maintained with halothane 0.6 MAC, N_2O 66%, O_2 33% and incremental dose of vecuronium 0.03 mg/kg when needed. After completion of operation and skin closure TAP block (with the help of USG guidance) was given to all patient. Group I patient received 20 ml 0.25% bupivacaine and group II patient received 20 ml normal saline as placebo. Then dressing was done. Finally 20patient was reversed after fulfilling the reversal criteria with neostigmine 50 microgram/kg & 20 microgram/kg atropine. The TAP block was performed after taking all aseptic precaution in the flank palpated between the 12th rib (Costal margin) and the iliac crest. The neuromuscular plane between the internal oblique muscle and the transversus abdominis muscle was identified with ultrasound guidance. Atraumatic blunt needle for peripheral nerve block (Sono Ned, 21G, 110mm length) was advanced by an ultrasound guided in-plane technique at the anterior axillary line. The first "pop" sensation should be felt as the needle reaches the fascial plane between the external oblique and internal oblique muscles. A second "pop" sensation should be felt as the needle enters in the plane between internal oblique muscle and transversus abdominis muscle. The exact location of the needle tip was confirmed via direct ultrasound visualization. After confirmation of the correct position of the needle and negative aspiration, 1 to 2 ml of normal saline was injected to identify position with water dissection. After confirmation of correct position, 20 ml 0.25% bupivacaine was given to group I patient and 20 ml normal saline was given to group II patient within the fascial layer which was confirmed by ultrasound. Study drug were prepared and labeled properly. In postoperative room all patients were receive Inj paracetamol 1gm IV stat and 6 hourly and

diclofenac sodium 50 mg P/R stat and 8 hourly. Time of first demand of analgesic morphine was then recorded. To all patients ondansetron 8mg IV was given along with 1st dose of Morphine.

Follow up and Outcomes Measures: The presence and severity of pain were assessed using a visual analogue pain scale (VAS) and continued it at 2 hour interval up to 24 hours and in between 2 hour whenever patient complains about pain. Morphine 0.15mg/kg intramuscular were given when patient complains pain according to VAS score 6 or above 6 (rest/Movement). Total morphine requirements were documented. Incidences of nausea & vomiting were also being recorded. Measurement of Sedation by RASS score was done after given morphine. VAS scoring and decision of given Morphine were done by a volunteer anesthesiologist who was expert enough about VAS score and was fully unaware of the study.

Statistical Analysis: Statistical analyses were carried out by using the Statistical Package for Social Sciences version 22.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Unpaired student t-test was used for continuous variables like age, weight, morphine requirement, frequency of morphine required and first analgesic demand. Chi-Square test was used to analyze the categorical variables like ASA class, occurrence of nausea & vomiting, VAS scale, RASS score. P values <0.05 was considered as statistically significant.

Results:

A total number of 40 patients were recruited for this study and were equally divided into two groups. Thus 20 patients were in the group I and the rest 20 patients were in group II. Then TAP block with 20 ml of 0.25% bupivacaine in group I and 20 ml normal saline in group II on each side was given before surgical dressing. Monitoring of pulse, blood pressure, time of first analgesic demand, frequency of morphine, VAS score, sedation score and total morphine consumption was observed in 24 hour post-operative period. The mean age of group I were 53.08 ±4.25 and group II were 51.5±4.97 , which was statistically non-significant (p= 0.286) (Table I).

Table-I

Demographic characteristic of the patients (Mean±SD)

Variables	Group I	Group II	P value
Age (in years)	53.08±4.25	51.5±4.97	0.286

Student t test was performed to see the level of significance.

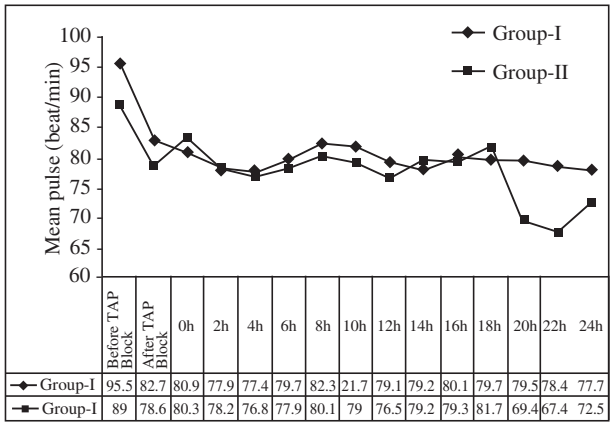

Fig.-1: *Comparison of mean Pulse (beat/min) at different time intervals*

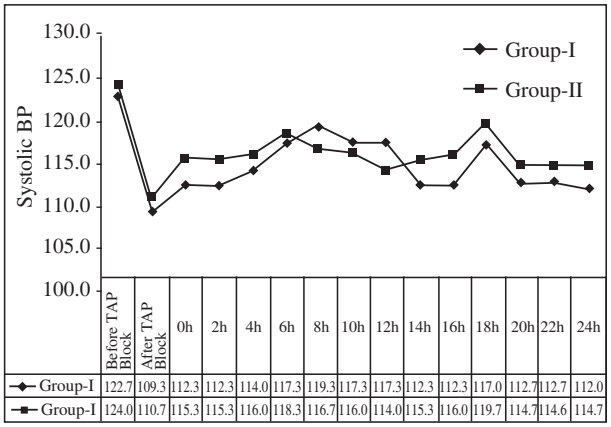

Fig.-2: *Comparison of mean Systolic BP at different time intervals*

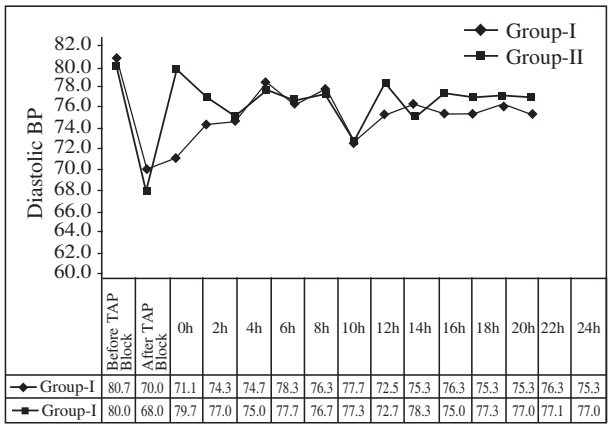

Fig.-3: *Comparison of mean Diastolic BP at different time intervals*

In 0 to 2 hour group I patient's VAS was less than 6 due to effect of TAP block but group II patients were score greater than 6, which was statistically significant. After 2 hour VAS score was not significant in between two group due

to group I patient had TAP block and group II patient had received opioid. Again 8-10 hour VAS was significantly higher in group I patient due to gradually reduce the effect of TAP block which was statistically significant. In rest of the time VAS was not statistically significant. *p* value reached from Chi-square test (Table II).

Table-II

Monitoring of VAS at different time interval

VAS Score	Group I	Group II	P value
0 hour to 2hours			
<6	20(100.0%)	5(25.0%)	0.001
≥6	0(0.0%)	15(75.0%)	
4 hours to 6 hours			
<6	16(80.0%)	15(75.0%)	0.705
≥6	4(20.0%)	5(25.0%)	
8 hours to 10 hours			
<6	6(30.0%)	18(90.0%)	0.001
≥6	14(70.0%)	2(10.0%)	
12 hours to 14 hours			
<6	9(45.0%)	9(45.0%)	1.00
≥6	11(55.0%)	11(55.0%)	
16 hoursto 18 hours			
<6	13(65.0%)	17(85.0%)	0.144
≥6	7(35.0%)	3(15.0%)	
20 hours to 22 hours			
<6	20(100.0%)	20(100.0%)	1.00
≥6	0(0.0%)	0(0.0%)	
24 hours			
<6	20(100.0%)	20(100.0%)	1.00
≥6	0(0.0%)	0(0.0%)	

Regarding Richmond agitation and sedation score of the study patients, it was observedthat majority 16(80.0%) patients had sedation sore 0 at (0h-8h) in group I and5(25.0%) in group II. Here *p* value was 0.002 which was <0.05 that is significant. Innext 8 hour (>8h-16h) in group I 8(40%) patient had sedation score 0 and 7(35.0%) ingroup II. Here *p* value was 0.935 which was not significant. Rest of hour 8(40%)patient had sedation score 0 in group I and group II, which was not statisticallysignificant. The difference of sedation score 0 (0h-8h) was statistically significant($p<0.05$) between two groups (Table III).

Table-III

Richmond Agitation and Sedation Score at Different Time Interval

Richmond agitation & SS	Group I	Group II	P value
0 hour to 8hours			
-1	2(10.0%)	8(45.0%)	0.002
0	16(80.0%)	5(25.0%)	
1	2(10.0%)	7(20.0%)	
>8 hours to 16 hours			
-1	7(35.0%)	8(40.0%)	0.935
0	8(40.0%)	7(35.0%)	
1	5(25.0%)	5(25.0%)	
16 hours to 24 hours			
-1	10(50.0%)	9(45.0%)	0.881
0	8(40.0%)	8(40.0%)	
1	2(10.0%)	3(15.0%)	

SS=sedation score

Discussion:

Patients for elective total abdominal hysterectomy under general anesthesia were recruited into this prospective, randomized, controlled study. TAP block was done with 20 ml of 0.25% bupivacaine in trial group and 20 ml normal saline in control group on each side as a part of multimodal analgesia to the anterior abdominal wall.

In this study the different parameters are changes after the application of drugs. In 0 to 2 hour group I patient's VAS was less than 6 due to effect of TAP block but group II patients were score greater than 6, which was statistically significant. After 2 hour VAS score was not significant in between two group due to group I patient had TAP block and group II patient had received opioid. Again 8-10 hour VAS was significantly higher in group I patient due to gradually reduce the effect of TAP block which was statistically significant. In rest of the time VAS was not statistically significant. From this study VAS was used to assess the analgesic demand which was significantly lower in first 2 hour in group I patient than group II. It was due to analgesic effect of TAP block. Belavy et al[7] reported that patient satisfaction with pain relief was significantly higher in TAP block group but there was no significant difference in VAS pain score. Carney et al[3]reported that post-operative VAS pain score at rest or movement were reduced after TAP block at most but not at all time. McDonnell et al[6]also showed that in pain scores were also reduced who received TAP block in the immediate post-operative period and 2, 4, 6 hour postoperatively.

This study showed that sedation score of the study patients were reduced in first 0-8 hour in group I patient. But rest of the time there was no difference with respect to sedation in between two group. McDonnell et al[6]reported that sedation score was reduced in 4 and 6 hour postoperatively. Mrunalini et al[8] and Jadon et al[9] showed that there was no difference with respect to sedation in between two groups. This difference may be due to using different tools to evaluate sedation.

The Richmond agitation and sedation score of the study patients are recorded. It has been observedthat majority 16(80.0%) patients have sedation sore 0 at (0h-8h) in group I and5(25.0%) in group II. Here p-value is 0.002 which is<0.05 that is significant. Innext 8 hour (>8h-16h) in group I 8(40%) patient had sedation score 0 and 7(35.0%) ingroup II. Here pvalue was 0.935 which was not significant. Rest of hour 8(40%)patient had sedation score 0 in group I and group II, which was not statisticallysignificant. The difference of sedation score 0 (0h-8h) was statistically significant($p<0.05$) between two groups. Ra et al[10] also published a randomized controlled trial on the analgesic effect of TAP block after laparoscopic cholecystectomies. They showed that intraoperative use of remifentanil, postoperative pain scores and the postoperative demand for rescue analgesia are significantly reduced in the group that received a TAP bock with Levobupivacaine after induction of anaesthesia. In the above mentioned randomized control studies, the investigators have made use of placebo injections instead of local anesthetics in the control group.

Conclusion:

In conclusion a statistically significant changes is found in different parameters during transversus abdominis plane block as part of amultimodal analgesia at different time interval in total abdominal hysterectomy.VAS is significantly higher in group I patient due to gradually reduce the effect of TAP block which is statistically significant. Further multicenter study should be conducted to see the real scenario.

Conflict of interest: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding agency: The author(s) received no financial support for the research, authorship, and/or publication of this article.

References:

1. Scott Urigel CRNA MS. AANA Journal Course: Update for Nurse Anesthetists: Transversus Abdominis Plane (TAP) Blocks. AANA journal. 2014 Feb 1;82(1):73
2. Atim A, Bilgin F, Kilickaya O, Purtuloglu T, Alanbay I, Orhan ME, Kurt E. The efficacy of ultrasound-guided transversus abdominis plane block in patients undergoing hysterectomy. Anaesthesia and intensive care. 2011 Jul;39(4):630-4
3. 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 Dec 1;107(6):2056-60
4. Mukhtar KA, Singh S. Transversus abdominis plane block for laparoscopic surgery. British Journal of Anaesthesia. 2009 Jan 1;102(1):143-4
5. Siddiqui MR, Sajid MS, Uncles DR, Cheek L, Baig MK. A meta-analysis on the clinical effectiveness of transversus abdominis plane block. Journal of Clinical Anesthesia. 2011 Feb 1;23(1):7-14
6. 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. Anesthesia & Analgesia. 2007 Jan 1;104(1):193-7
7. Belavy D, Cowlishaw PJ, Howes M, Phillips F. Ultrasound-guided transversus abdominis plane block for analgesia after Caesarean delivery. British Journal of Anaesthesia. 2009 Aug 22;103(5):726-30
8. Mrunalini P, Raju NV, Nath VN, Saheb SM. Efficacy of transversus abdominis plane block in patients undergoing emergency laparotomies. Anesthesia, essays and researches. 2014;8(3):377-82
9. Jadon A, Jain P, Chakraborty S, Motaka M, Parida SS, Sinha N, Agrawal A, Pati AK. Role of ultrasound guided transversus abdominis plane block as a component of multimodal analgesic regimen for lower segment caesarean section: a randomized double blind clinical study. BMC anesthesiology. 2018 Dec;18(1):53.
10. Ra YS, Kim CH, Lee GY, Han JI. The analgesic effect of the ultrasound-guided transverse abdominis plane block after laparoscopic cholecystectomy. Korean journal of anesthesiology. 2010 Apr;58(4):362