

“A COMPARATIVE CLINICAL STUDY TO KNOW THE EFFICACY OF USG GUIDED BILATERAL TRANSVERSUS ABDOMINIS PLANE BLOCK WITH 0.25% BUPIVACAINE AND 0.25% BUPIVACAINE WITH 50µg FENTANYL FOR POSTOPERATIVE ANALGESIA FOLLOWING TOTAL ABDOMINAL HYSTERECTOMY UNDER GENERAL ANAESTHESIA”

Anaesthesiology

Surbhi Banjare Assistant Professor Dept. Of Anaesthesiology, CIMS Bilaspur.

Mayank Agrey Assistant Professor Dept. Of Anaesthesiology, CIMS Bilaspur.

Kamal Kishor Sahare Professor Dept. Of Anaesthesiology, Pt. JNLMMC Raipur.

Rakesh Nigam Professor Dept. Of Anaesthesiology, CIMS Bilaspur.

Jaya Lalwani Professor Dept. Of Anaesthesiology, Pt. JNLMMC Raipur.

Rashmi Thakur Associate Professor Dept. Of Anaesthesiology, Pt. JNLMMC Raipur.

Dr. Chandrahas Dhruw* Assistant Professor Dept. Of Radiotherapy, CIMS Bilaspur. *Corresponding Author

ABSTRACT

Background: The transversus abdominis plane (TAP) block is a novel approach for blocking the abdominal wall neural afferents. Different adjuvant drugs have been used to improve the quality and increase the duration of local anesthetics during various nerve block techniques. More recently ultrasound-guided TAP block has been described with promises of better localisation and deposition of the local anaesthetic with improved accuracy. **Objective:** To assess and compare the efficacy of ultrasound-guided transversus abdominis plane block with 0.25% bupivacaine and with 0.25% bupivacaine and 50µg fentanyl for postoperative analgesia in patients undergoing total abdominal hysterectomy under general anesthesia. **Methods:** This comparative clinical study is conducted in the Department of Anaesthesiology and Critical care, Pt. J. N. M. Medical College and Dr. Bhim Rao Ambedkar Memorial Hospital, Raipur (C.G.) from 01/04/2014 to 22/09/2015. 40 females aged 40-60 yrs undergoing elective total abdominal hysterectomy (TAH) under general anesthesia were included in this study. **Results:** The mean ($\pm$ sd) values of VAS score at rest in both the groups at different time intervals. At 0 hr, mean VAS score of both the groups was comparable to each other (group B = 0.15 ± 0.37 vs group F 0.20 ± 0.09 ; $p > 0.05$). At 2, 4, 8 and 12 hrs, mean VAS scores were significantly low in group F as compared to group B ($p < 0.05$). At 16, 20 and 24 hrs, the difference between mean VAS score was not statistically significant between the two groups. ($p > 0.05$), the mean ($\pm$ sd) values of VAS score on hip flexion in both the groups at different time intervals. At 0, 2, 4, 8 and 12 hrs, mean VAS scores were significantly low in group F as compared to group B ($p < 0.05$). At 16 and 20 hrs, the difference between mean VAS scores were not statistically significant between the two groups ($p > 0.05$). At 24 hr mean VAS score was low in group B (3.05 ± 0.89) as compared to group F (3.80 ± 1.28), the difference was statistically significant. ($p < 0.05$) **Conclusion:** Addition of small dose of fentanyl to bupivacaine for bilateral ultrasound-guided transversus abdominis plane (TAP) block improves analgesia and prolongs the time to first analgesic requirements and decreases the need for postoperative analgesics in patients undergoing total abdominal hysterectomy with no remarkable side effects. The technique is found to be safe and effective.

KEYWORDS

Transversus Abdominis Plane (TAP), Hysterectomy, Anesthesia, Post operative, Bupivacaine, Fentanyl

INTRODUCTION

Total abdominal hysterectomy (TAH) is a commonly performed major abdominal surgical procedure in females of perimenopausal age group that results in substantial postoperative pain and discomfort.^[1] The principles of enhanced recovery after surgery (ERAS) include early resumption of oral intake, early initiation of mobilisation, avoidance of routine bowel preparation, nasogastric tubes and drains, and optimisation of post-operative analgesia. This aims to improve patient satisfaction, facilitate rehabilitation and accelerated recovery from surgery that allows early discharge from hospital. Inadequately treated post-operative pain is associated with several negative effects such as cardio-respiratory complications (tachycardia, dysrhythmias, increased systemic vascular resistance, myocardial ischaemia in susceptible patients, hypoventilation and atelectasis), CNS effects (cognitive impairment, insomnia, anxiety, feeling of helplessness), immobility leads to hypercoagulability, thromboembolic events and persistent gastrointestinal dysfunction which leads to prolonged hospital stay.^[2] In such patients, multimodal analgesic technique reduces morbidity, cost and hospital stay. The mainstay of analgesic modalities after abdominal surgery are systematically administered opiates and central neuraxial techniques. Systemic opioids and neuraxial opioids create the need for increased action and monitoring by staff, frequently requires complicated equipment in the form of monitors and pumps and cause additional undesirable side effects like respiratory depression, drowsiness, sedation, urinary retention, constipation, ileus, pruritus, nausea and vomiting etc.^[3] To avoid problems associated with systemic opioids and neuroaxial blocks, peripheral blocks have been introduced and practice to reduce pain originated from abdominal wall incision successfully.^[4] Transversus abdominis plane (TAP) block was first described by Rafi in 2001. It provides analgesia to the skin, muscles of anterior abdominal wall and parietal peritoneum. It is one of the latest techniques used to block the sensory afferent nerves of the anterior abdominal wall via a single

entry point through bilateral triangle of Petit, hence providing multidermatomal analgesia.^[5] TAP block prolongs the time to first analgesic request, reduces postoperative analgesic consumption and reduces opioid related side effects. More recently ultrasound-guided TAP block has been described with promises of better localisation and deposition of the local anaesthetic with improved accuracy.^[6]

METHODOLOGY

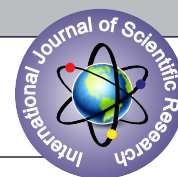
Method: This comparative clinical study is conducted in the Department of Anaesthesiology and Critical care, Pt. J. N. M. Medical College and Dr. Bhim Rao Ambedkar Memorial Hospital, Raipur (C.G.) from 01/04/2014 to 22/09/2015. 40 females aged 40-60 yrs undergoing elective total abdominal hysterectomy (TAH) under general anaesthesia were included in this study, after approval from institutional ethics committee, written and informed consent was obtained and use of ultrasound-guided TAP block for postoperative pain relief as well as the use of Visual analogue scale (VAS) graded from 0 cm (no pain) to 10 cm (maximum pain) was explained to all the patients.

All patients were assessed preoperatively the day before surgery including complete history, clinical examination and recording of vital parameters along with routine investigations.

All patients were randomly distributed into two groups B (bupivacaine group) and F (fentanyl group) by sealed envelope technique with 20 patients in each group. Patients of group B (bupivacaine group) received 0.25% bupivacaine 20 ml on each side and group F (fentanyl group) received 0.25% bupivacaine 20 ml and 50µg inj. fentanyl on each side.

RESULTS

This comparative clinical study is conducted in the Department of



Anaesthesiology and Critical care, Pt. J. N. M. Medical College and Dr. Bhim Rao Ambedkar Memorial Hospital, Raipur (C.G.) from 01/04/2014 to 22/09/2015.

The results are as follows:

Table1: Personal characteristics of study subjects.

Variables	Group B	Group F
Weight (in kg)	56.9 ± 1.138	57.35 ± 1.173
Height (in cm)	145.6 ± 3.84	144.7 ± 4.32
BMI (kg/m ²)	26.81 ± 1.655	27.31 ± 1.656

The mean (± sd) value of the weight of the patients. Mean weight of the patients in group B was 56.9 ± 1.138 kg and in group F it was 57.35 ± 1.173 kg. These values showed that patients in both the groups were comparable with respect to weight. ($p > 0.05$).

The mean (± sd) height of patients. Mean height of the patients in group B was 145.6 ± 3.84 cms and in group F it was 144.7 ± 4.32 cms. These values showed that patients in both the groups were comparable with respect to height. ($p = 0.4905$)

The mean (± sd) values of the BMI of the patients in group B (26.81 ± 1.655) and F (27.31 ± 1.656). These values show that the patients in both the groups were comparable with respect to BMI ($p > 0.05$).

Table 2: Mean VAS Score at Rest

Time (hrs)	VAS Score at Rest						p-value
	Group B			Group F			
	Mean	SD	SEM	Mean	SD	SEM	
0	0.1500	0.3663	0.08192	0.2000	0.4104	0.0918	0.6867
2	0.9000	0.5525	0.1235	0.2000	0.4104	0.092	0.0001
4	1.350	0.5871	0.1313	0.5500	0.6048	0.1352	0.0001
8	2.200	0.9515	0.2128	1.150	0.7452	0.1666	0.0004
12	2.350	1.040	0.2325	1.700	0.8645	0.1933	0.0380
16	2.100	1.119	0.2503	2.100	0.9679	0.2164	1
20	1.950	0.7592	0.1698	2.350	1.268	0.2835	0.2336
24	2.050	0.9445	0.2112	2.300	1.261	0.2819	0.4822

The mean (± sd) values of VAS score at rest in both the groups at different time intervals. At 0 hr, mean VAS score of both the groups was comparable to each other (group B = 0.15±0.37 vs group F 0.20±0.09; $p > 0.05$). At 2, 4, 8 and 12 hrs, mean VAS scores were significantly low in group F as compared to group B ($p < 0.05$). At 16, 20 and 24 hrs, the difference between mean VAS score was not statistically significant between the two groups. ($p > 0.05$) (Graph- 1)

Graph 1: Mean VAS Score at Rest

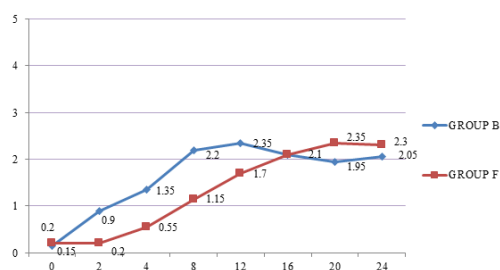


Table 3: Distribution of VAS score at rest [Early Postoperative Period (0-8 hr)]

VAS score	No. of Observations		p-value
	Group B	Group F	
0	21	45	0.0003
1-2	53	34	
3-4	6	1	
5-6	0	0	
7-8	0	0	
9-10	0	0	
Total observations	80	80	

The distribution of VAS scores at rest in early postoperative period in both the groups. Out of 80 observations in each group, at 21 and 45 times patients did not complain of any pain in group B and F respectively. Patients complained of mild pain at 53 and 34 times and discomforting pain at 6 and 1 times in group B and F respectively.

Patients never complained of horrible or excruciating pain. The difference was statistically significant ($p < 0.05$) for all set of observations. (Graph-2)

Graph 2: Distribution of VAS score at rest

Early Postoperative Period (0-8 hr)

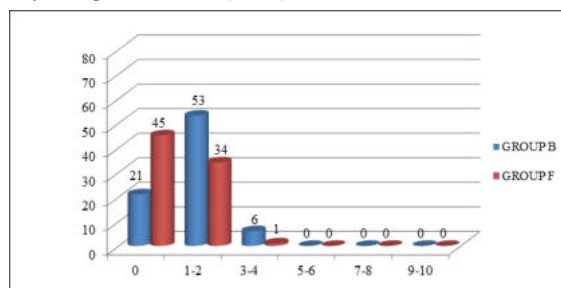


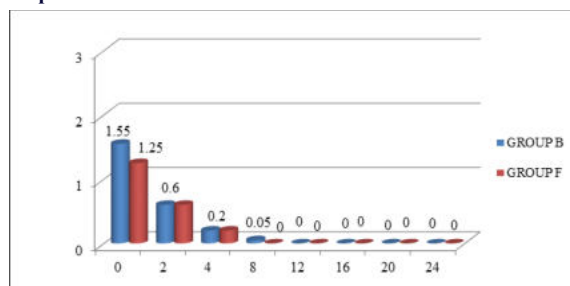
Table 4: Mean 24 hrs Sedation Score

MEAN 24 hrs SEDATION SCORE

Time (hrs)	Sedation Score						p-value
	Group B			Group F			
	Mean	SD	SEM	Mean	SD	SEM	
0	1.550	0.686	0.153	1.250	0.639	0.143	0.161
2	0.600	0.681	0.152	0.600	0.681	0.152	1
4	0.200	0.410	0.092	0.200	0.410	0.092	1
8	0.05	0.224	0.050	0	0	0	0.3299
12	0	0	0	0	0	0	-
16	0	0	0	0	0	0	-
20	0	0	0	0	0	0	-
24	0	0	0	0	0	0	-

This shows mean (± sd) sedation score between the two groups. The comparison of sedation score between the two groups was not statistically significant at any point of time ($p > 0.05$). Mean sedation score decreased over time in both the groups. (Graph 3)

Graph 3: Mean 24 hrs Sedation Score



DISCUSSION

Our study subjects were all females undergoing elective total abdominal hysterectomy under general anaesthesia. We chose 40- 60 yrs age group patients. Maximum number of patients, 21 were in the age group of 40-50 yrs (11 in group B; 10 in group F) and 19 patients were in the age group of 50-60 yrs (9 in group B; 10 in group F). The difference was not statistically significant between the two groups with respect to the age of the patients ($p > 0.05$).

VASS SCORE:

The Visual analogue scale (VAS) is commonly used as the outcome measure for such studies. It is usually presented as a 10 cm horizontal line on which the patient's pain intensity is represented by a point between the extremes of "no pain at all" and "worst pain imaginable." Its simplicity, reliability, and validity, as well as its ratio scale properties, make VAS the optimal tool for describing pain severity or intensity.

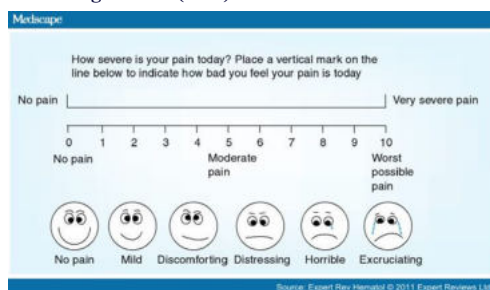
In our study, group F patients received bilateral ultrasound-guided TAP blocks with 0.25% bupivacaine 20ml and 50µg fentanyl on each side at the end of surgery. We could find no previous studies in which fentanyl has been used as an adjuvant in TAP block. However Nishikawa K. et al (2000)^[7] evaluated the effects of fentanyl added to lidocaine for

axillary brachial plexus block, **Moharari R.S. et al (2010)**^[8] designed a study for elective shoulder, arm and forearm surgeries under an interscalene brachial plexus block with addition of fentanyl to lidocaine solution and **Chavan S. G. et al (2011)**^[9] studied the effect of addition of fentanyl to local anaesthetic in brachial plexus block on the duration of analgesia. They concluded an increased success rate and significantly prolonged duration of sensory blockade by addition of fentanyl. **McDonnell J.G. et al (2007)**^[10] in their study observed that when 20ml of 0.375% levobupivacaine was injected into the transversus abdominis neuro-fascial plane via blind technique (the bilateral lumbar triangle of Petit) reduced VAS pain score on emergence (1 ± 1.4 vs 6.6 ± 2.8) ($p < 0.05$). Postoperative pain scores were reduced at all time points assessed after TAP block, both at rest and on movement as compare to control group. Their results are similar to our study, variation being due to use of blind technique in their study and use of USG-guided technique in ours. Also they used standard postoperative analgesic regimen. **Carney J. et al (2008)**^[11] and **McDonnell J.G. et al (2008)**^[12] in their studies observed that 1.5 mg/kg ropivacaine 0.75% (to a maximal dose of 150 mg) in bilateral TAP block significantly reduced postoperative VAS pain score at rest and on movement (knee flexion) as compared to placebo block using saline 0.9% on each side. VAS pain score was reduced both at rest and on hip flexion in our study like the study of **Carney J. et al (2008)**^[11] and **McDonnell J.G. et al (2008)**^[10] but both these authors used ropivacaine 0.75% where as we used bupivacaine 0.25%.

Sedation score decreased throughout the study period. Mean ($\pm$ sd) sedation score in early postoperative period (0-8 hr) at 0, 2, 4 and 8 hrs was 1.55 ± 0.69 , 0.6 ± 0.68 , 0.2 ± 0.41 and 0.05 ± 0.22 in group B and 1.25 ± 0.64 , 0.6 ± 0.68 , 0.2 ± 0.4 and 0.0 ± 0.0 in group F respectively. The difference was not statistically significant ($p > 0.05$). As postoperative period is a stressful period this mild to moderate sedative effect can be beneficial to patients. Such sedation relieves surgery related anxiety, provides the much needed comfort for post-operative patients. **Ammar A.S. et al (2012)**^[13] in their study observed that somnolence was less in dexamethasone group as compared to control group but it was not statistically significant. The results are similar to our study.

Annexure

1. Visual analogue Scale (VAS) score



2. A. Ultrasound image showing path of needle. B. ultrasound image during initial injection of a small amount of local anesthetic.



CONCLUSION

Addition of small dose of fentanyl to bupivacaine for bilateral ultrasound-guided transversus abdominis plane (TAP) block improves analgesia and prolongs the time to first analgesic requirements and decreases the need for postoperative analgesics in patients undergoing total abdominal hysterectomy with no remarkable side effects. The technique is found to be safe and effective.

REFERENCES

1. Lubenow TR, McCarthy RJ, Ivankovich AD. Management of acute postoperative pain. *Clinical Anesthesia*. 2nd ed. Philadelphia, PA: JB Lippincott; 1992: 1551-1552.
2. Venkateswaran R, Prasad KN. Management of postoperative pain. *Indian Journal of Anaesthesia* 2006; 50(5): 345-354.
3. Webster K. The Transversus Abdominis Plane (TAP) block: abdominal plane regional anaesthesia." *Update in Anaesthesia* 2008; 24(1): 24-29.

4. White PF. The role of non opioid analgesic techniques in the management of postoperative pain. In: Hadzic A. *Textbook of Regional Anesthesia and Acute Pain Management*. New York, NY: McGraw-Hill; 2007; 1106.
5. Rafi AN. Abdominal field block: a new approach via the lumbar triangle. *Anaesthesia* 2001; 56(10): 1024-1026.
6. Hebbard P, Fujiwara Y, Shibata Y, Royse C. Ultrasound-guided transversus abdominis plane (TAP) block. *Anaesthesia and Intensive Care* 2007; 35(4): 616-617.
7. Nishikawa K, Kanaya N, Nakayama M, Igarashi M, Tsunoda K, Namiki A. Fentanyl improves analgesia but prolongs the onset of axillary brachial plexus block by peripheral mechanism. *Anesthesia and Analgesia*. 2000; 91(2): 384-387.
8. Moharari RS, Sadeghi J, Khajavi MR, Davari ME, Mojtahedzadeh M. Fentanyl supplement expedites the onset time of sensory and motor blocking in interscalene lidocaine anesthesia. 2010; 18(4): 298-302.
9. Chavan SG, Koshire AR, Panbude P. Effect of addition of fentanyl to local anesthetic in brachial plexus block on duration of analgesia. *Anesthesia Essays and researches* 2011 Jan-Jun; 5(1): 39-42.
10. McDonnell JG, O'Donnell BD, 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 and Analgesia* 2007 Jan; 104: 193-197.
11. Carney J, McDonnell JG, O'hana A, Bhinder R, Laffey JG. The transversus abdominis plane block provides effective postoperative analgesia in patient undergoing total abdominal hysterectomy. *Anesthesia and Analgesia* 2008; 107: 2056-2060.
12. McDonnell JG, Laffey JG. Transversus abdominis plane block. *Anesthesia and Analgesia* 2007; 105(3): A-883.
13. Ammar AS, Mahmoud KM. Effect of adding dexamethasone to bupivacaine on transversus abdominis plane block for abdominal hysterectomy: A prospective randomized controlled trial. *Saudi Journal of Anaesthesia* 2012 Jul-Sep; 6(3): 229-233.