

## COMPARISON OF THE EFFICACY OF TRANSVERSUS ABDOMINIS PLANE BLOCK AND LOCAL INFILTRATION OF LOCAL ANAESTHETIC AGENT FOR POSTOPERATIVE ANALGESIA IN INGUINAL HERNIA SURGERY

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### Abstract

**Background:** Transversus Abdominis Plane (TAP) block is a recently developed technique for post operative analgesia in abdominal surgeries. The aim of the study was to compare the efficacy of TAP block and local infiltration of local anaesthetic agent in post operative management of pain in inguinal hernia surgery. **Materials and Methods:** The study included 100 patients of either sex belonging to ASA Grade I and Grade II undergoing elective inguinal hernia surgery under general anaesthesia. The subjects were divided randomly into two groups of 50 patients each. Group I received TAP block and the Group II received local infiltration of local anaesthetic agent at the end of surgery. The pain was assessed at the end of 1, 3, 6 and 12 hours post operatively using Visual analogue scale. **Result:** The result showed that pain score was comparable in both the groups till the end of 6 hours but the TAP block showed a statistically significant better post operative analgesia even at 12 hours post operatively. **Conclusion:** TAP block and local infiltration of local anaesthetic agent both provide significant post operative analgesia initially, but the analgesic effect is long lasting in TAP block.

## INTRODUCTION

The latest concept of day care surgery and success of adequate post-operative analgesia is getting popular among surgeons and anaesthesiologists now a days. Adequate post operative pain management is of utmost importance to make the patient ambulatory as early as possible post operatively and this also decreases post operative complications.<sup>[1,2,3,4]</sup> The commonly practiced method for post operative management of pain is administration of non-steroidal anti-inflammatory drugs and opioids via parenteral routes. Local anaesthetic infiltration locally at the surgical site or wound site has also remained as one of the most popular method for controlling post operative pain. The technique is cost effective, quick and barely requires any special training or expertise or equipments for its use. But the recent advancement in anaesthesia techniques recommend more adequate and precise administration of local anaesthesia or regional block for the management of

post operative pain. The choice of anaesthesia and analgesia technique is dependent upon the site or proposed surgical incision. Sometimes the local anaesthesia block is technique sensitive, precise and demands extra expertise for its use. Transversus abdominis plane (TAP) Block is considered as a newer approach for pain management where the space between internal oblique muscle and Transversus abdominis muscle is infiltrated with local anaesthetic agent. The TAP block technique was advocated in the year 1993 but the formal documentation was done in 2001.<sup>[5,6,7,8]</sup> This technique is considered as a safe and effective tool for a variety of surgeries both in adult and pediatric subjects and is also considered as a part of multimodal analgesia regimen to enhance recovery after major abdominal surgery.<sup>[9,10,11,12,13,14,15,16,17,18,19]</sup> Therefore the study was designed to evaluate the analgesic effect and efficacy of TAP block versus surgical wound infiltration of local anaesthetic agent in inguinal hernia surgery cases.

## MATERIALS AND METHODS

### Study Setting

This was a prospective, comparative, observational, unicentric study. All study participants were counseled and pre anaesthetic checkup was done. An informed and written consent was obtained from the participating subjects before the commencement of the study.

### Inclusion Criteria

Patients of either sex of American Society of Anaesthesiologists (ASA) Grade I and Grade II posted for elective inguinal hernia surgery under general anaesthesia were enrolled in the study.

### Exclusion Criteria

The exclusion criterias were patient having previous hernia repair or known case of diabetes mellitus, hypertension, vascular disease, etc or patient of ASA grade III and above, any contraindication to general anaesthesia and allergy to local anaesthetic agent.

### Study Sample

A total of 100 subjects were randomly divided into two groups of 50 patients each. Group I received ultrasound guided Transversus abdominis plane block and Group II received local wound infiltration with local anaesthetic agent at the end of surgery.

All patients were kept nil per orally eight hours prior to surgery and tablet alprazolam 0.25 mg was given orally night before surgery.

A multiparameter monitor was attached in the operation theatre and baseline values of heart rate (HR), non-invasive blood pressure (NIBP) and arterial oxygen saturation by pulse oximeter (SpO<sub>2</sub>) were recorded and electrocardiograph (ECG) monitoring started. Intravenous line (IV) was secured and IV fluid Ringer's lactate solution was started.

Patients were preoxygenated for three minutes and IV midazolam 1 mg and IV fentanyl citrate 2 microgram per kg was given five minutes before induction of anaesthesia. Anaesthesia was induced with IV propofol 2 mg/kg. Endotracheal intubation was facilitated by IV vecuronium bromide 0.1mg/kg body weight. Anaesthesia was maintained with O<sub>2</sub> (40%) + N<sub>2</sub>O (60%) + isoflurane (1 MAC). Muscle relaxation was maintained with intermittent maintenance doses of IV vecuronium bromide. Patients were mechanically ventilated by volume controlled ventilation. Fifteen minutes prior to reversal slow IV ondansetron 4 mg was given.

Group I patients were given ultrasound guided TAP block with 20 ml of 0.25 % bupivacaine and Group II patients received local wound infiltration with 20 ml of 0.25% bupivacaine at the end of surgery before extubation.

After the surgery neuromuscular block was reversed with appropriate dose of IV neostigmine

methylsulphate and IV glycopyrrolate and patients were extubated and shifted to the recovery room and monitoring done.

### Pain Evaluation

The post-surgical outcome was evaluated for pain using Visual analogue scale. The post-operative pain was recorded using Visual analog scale (VAS) on a scale of 1 to 10. The VAS score was recorded at 1, 3, 6 and 12 hours post operatively, during rest and mobilization by a blinded investigator. Patients having VAS score of more than 4 were administered IV diclofenac sodium 75 mg as infusion in 100 ml of normal saline as rescue analgesic.

### Statistical Analysis

The database stability using Microsoft Excel software and was subjected to statistical analysis using SPSS software version 16.0.

## RESULTS

A total of 100 subjects of ASA Grade 1 and Grade II were assessed using VAS score post operatively to evaluate post-operative pain in TAP block and local infiltration of local anaesthetic group in inguinal hernia surgery.

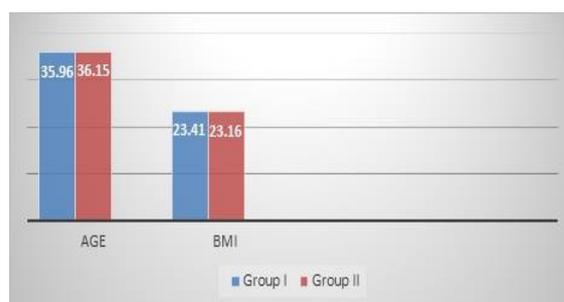


Figure 1: Mean Age and BMI

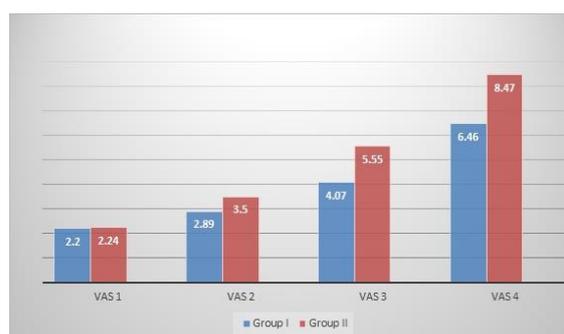


Figure 2: Mean VAS Scores in the two groups.

The total number of participants in both the groups were 50 each. In Group I, 28 and 22 subjects were in ASA Grade I and II respectively. In Group II, 24 and 26 subjects were in ASA Grade I and II respectively. There was no statistically significant difference in ASA grades of patients in the two groups ( $p=0.571$ ). The patients in group I were in the age range of 19 to 72 years with a mean age of  $35.96 \pm 14.22$  years. Whereas in group II the

participating subjects were in the age range of 17 and 61.5 years with a mean age of 36.55±12.92 respectively. However there was no statistically significant difference in age of the patients of both the groups (p=0.963). The mean body mass index (BMI) of patients in group I was 32.41±4.60 while the same in group II was 23.16±5.11. This difference in mean values of the BMI was not statistically significant (p=0.853). [Table 1 and Figure 1]

The comparison of pain score between Group I and Group II as recorded using VAS Score is shown in table 2 and [Figure 2]. The pain score recorded at the end of 1st, 3rd, 6th and 12th hour is shown as VAS 1, VAS 3, VAS 6 and VAS 12 respectively. The mean difference in the pain score at the end of different time intervals was not found to be statistically significant till 6th hour post operatively. While this mean difference in the VAS pain score at the end of 12th hour was found to be highly statistically significant.

**Table 1: Variables in the two groups**

Variables	Group I (n=50)		Group II (n=50)		p-value
	Mean	SD	Mean	SD	
Age (years)	35.96	14.22	36.15	12.92	0.963
BMI (kg/m <sup>2</sup> )	23.41	4.60	23.16	5.11	0.853
ASA Grade					
I	28		24		0.571
II	22		26		

**Table 2: Comparison of Pain Scores in the two groups.**

Variables	Group I (n=50)		Group II (n=50)		p-value
	Mean	SD	Mean	SD	
VAS1	2.20	1.12	2.24	1.13	0.905
VAS3	2.89	1.63	3.50	1.57	0.186
VAS6	4.07	1.79	5.55	1.64	0.004
VAS12	6.46	1.9	8.47	1.19	<0.001

## DISCUSSION

Infiltration of surgical wound site using local anaesthetic agent remains the most common practice worldwide for post operative pain management. The technique has proven to provide adequate analgesia in majority of cases for post-operative management of pain.<sup>[20]</sup> The main advantages of this technique includes quick, cost effective, low systemic complications, effective and does not require special expertise.<sup>[21,22]</sup> Recently TAP block technique has been studied and advocated by various researchers for the management of post operative pain in lower abdominal surgery. Administration of ultrasound guided TAP block is easy, safe and reliable with less complications and reduced chances of injury to adjoining structures.<sup>[23]</sup> Previous studies have claimed the effectiveness of TAP block for post operative pain control to be affective till 24 hours and even till 48 hours in some cases. The present study evaluated post operative pain control using VAS score till 12 hours post operatively.<sup>[24]</sup> The current study observed statistically significant lower pain score 12 hours post operatively in group I compared to group II, both at rest and during movement. A similar finding was reported by previous researchers.<sup>[25,26,27,28,29,30]</sup> The reduced post operative pain enhances early mobilization of the patient which secondarily improves pulmonary function and helps in better recovery of the surgical patient. Previous study found no significant difference in pain between TAP block and wound infiltration 1 hour postoperatively but the difference was significant at the end of 8 hours and 24 hours

postoperatively.<sup>[31]</sup> They concluded that the local infiltration of local anaesthetic agent is reliable only till 8 hours post operatively for the management of post surgical pain. A study result found a comparative post operative pain control only till 6 hours in both the groups.

## CONCLUSION

We observed that the analgesia was similar in both the groups till 6 hours post operatively, but the analgesia was prolonged in TAP block group till 12 hours post operatively. Thus TAP block may be used for more effective, prolonged and reliable post operative pain relief in patients undergoing inguinal hernia surgery.

## REFERENCES

- Schug SA. 2011--the global year against acute pain. *Anaesth Intensive Care.* 2011;39(1):11-4. doi: 10.1177/0310057X1103900102.
- Liu SS, Wu CL. Effect of postoperative analgesia on major postoperative complications: a systematic update of the evidence. *Anesth Analg.* 2007;104(3):689-702. doi: 10.1213/01.ane.0000255040.71600.41.
- Mhuirheartaigh RJ, Moore RA, McQuay HJ. Analysis of individual patient data from clinical trials: epidural morphine for postoperative pain. *Br J Anaesth.* 2009;103(6):874-81. doi: 10.1093/bja/aep300.
- 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 Anesthesiol.* 2014;14:121. doi: 10.1186/1471-2253-14-121.
- Ahmed A, Latif N, Khan R. Post-operative analgesia for major abdominal surgery and its effectiveness in a tertiary

- care hospital. *J Anaesthesiol Clin Pharmacol*. 2013;29(4):472-7. doi: 10.4103/0970-9185.119137.
6. Kuppavelumani P, Jaradi H, Delilkan A. Abdominal nerve blockade for postoperative analgesia after caesarean section. *Asia Oceania J Obstet Gynaecol*. 1993;19(2):165-9. doi: 10.1111/j.1447-0756.1993.tb00368.x.
  7. Rafi AN. Abdominal field block: a new approach via the lumbar triangle. *Anaesthesia*. 2001;56(10):1024-6. doi: 10.1046/j.1365-2044.2001.02279-40.x.
  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. *Br J Anaesth*. 2011;106(3):380-6. doi: 10.1093/bja/aeq363.
  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. *Obes Surg*. 2013;23(8):1309-14. doi: 10.1007/s11695-013-0958-3.
  10. 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(7):415-21. doi: 10.1097/EJA.0b013e32835fc86f.
  11. Atim A, Bilgin F, Kilickaya O, Purtuloglu T, Alanbay I, Orhan ME, et al. The efficacy of ultrasound-guided transversus abdominis plane block in patients undergoing hysterectomy. *Anaesth Intensive Care*. 2011;39(4):630-4. doi: 10.1177/0310057X1103900415.
  12. Sivapurapu V, Vasudevan A, Gupta S, Badhe AS. Comparison of analgesic efficacy of transversus abdominis plane block with direct infiltration of local anesthetic into surgical incision in lower abdominal gynecological surgeries. *J Anaesthesiol Clin Pharmacol*. 2013;29(1):71-5. doi: 10.4103/0970-9185.105807.
  13. Belavy D, Cowlishaw PJ, Howes M, Phillips F. Ultrasound-guided transversus abdominis plane block for analgesia after Caesarean delivery. *Br J Anaesth*. 2009;103(5):726-30. doi: 10.1093/bja/aep235.
  14. Skjelsager A, Ruhnau B, Kistorp TK, Kridina I, Hvarness H, Mathiesen O, et al. Transversus abdominis plane block or subcutaneous wound infiltration after open radical prostatectomy: a randomized study. *Acta Anaesthesiol Scand*. 2013;57(4):502-8. doi: 10.1111/aas.12080.
  15. Araco A, Pooney J, Araco F, Gravante G. Transversus abdominis plane block reduces the analgesic requirements after abdominoplasty with flank liposuction. *Ann Plast Surg*. 2010;65(4):385-8. doi: 10.1097/SAP.0b013e3181cc2a24.
  16. Sforza M, Andjelkov K, Zaccheddu R, Nagi H, Colic M. Transversus abdominis plane block anesthesia in abdominoplasties. *Plast Reconstr Surg*. 2011;128(2):529-535. doi: 10.1097/PRS.0b013e31821e6f51.
  17. Sahin L, Sahin M, Gul R, Saricicek V, Isikay N. Ultrasound-guided transversus abdominis plane block in children: a randomised comparison with wound infiltration. *Eur J Anaesthesiol*. 2013;30(7):409-14. doi: 10.1097/EJA.0b013e32835d2fcb.
  18. Sandeman DJ, Bennett M, Dilley AV, Perczuk A, Lim S, Kelly KJ. Ultrasound-guided transversus abdominis plane blocks for laparoscopic appendectomy in children: a prospective randomized trial. *Br J Anaesth*. 2011;106(6):882-6. doi: 10.1093/bja/aer069.
  19. 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(10):e635-42. doi: 10.1111/j.1463-1318.2012.03104.x.
  20. Ranjit S, Shrestha SK. Comparison of ultrasound guided transversus abdominis plane block versus local wound infiltration for post operative analgesia in patients undergoing gynaecological surgery under general anaesthesia. *Kathmandu Univ Med J (KUMJ)*. 2014;12(46):93-6. doi: 10.3126/kumj.v12i2.13652.
  21. 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. *Anesth Analg*. 2008;107(6):2056-60. doi: 10.1213/ane.0b013e3181871313.
  22. McDermott G, Korba E, Mata U, Jaigirdar M, Narayanan N, Boylan J, et al. Should we stop doing blind transversus abdominis plane blocks? *Br J Anaesth*. 2012;108(3):499-502. doi: 10.1093/bja/aer422.
  23. Karim Mukhtar. Transversus Abdominis Plane Block. *J NYSORA*. 2009; 12:28-33.
  24. 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(1):193-7. doi: 10.1213/01.ane.0000250223.49963.0f.
  25. Guo Q, Li R, Wang L, Zhang D, Ma Y. Transversus abdominis plane block versus local anaesthetic wound infiltration for postoperative analgesia: A systematic review and meta-analysis. *Int J Clin Exp Med*. 2015;8(10):17343-52.
  26. Albi-Feldzer A, Mouret-Fourme E E, Hamouda S, Motamed C, Dubois PY, Jouanneau L, et al. A double-blind randomized trial of wound and intercostal space infiltration with ropivacaine during breast cancer surgery: effects on chronic postoperative pain. *Anesthesiology*. 2013;118(2):318-26. doi: 10.1097/ALN.0b013e31827d88d8.
  27. Guo Q, Li R, Wang L, Zhang D, Ma Y. Transversus abdominis plane block versus local anaesthetic wound infiltration for postoperative analgesia: A systematic review and meta-analysis. *Int J Clin Exp Med*. 2015;8(10):17343-52.
  28. Busch CA, Whitehouse MR, Shore BJ, MacDonald SJ, McCalden RW, Bourne RB. The efficacy of periarticular multimodal drug infiltration in total hip arthroplasty. *Clin Orthop Relat Res*. 2010;468(8):2152-9. doi: 10.1007/s11999-009-1198-7.
  29. Bays RA, Barry L, Vasilenko P. The use of bupivacaine in elective inguinal herniorrhaphy as a fast and safe technique for relief of postoperative pain. *Surg Gynecol Obstet*. 1991;173(6):433-7.
  30. Trotter TN, Hayes-Gregson P, Robinson S, Cole L, Coley S, Fell D. Wound infiltration of local anaesthetic after lower segment caesarean section. *Anaesthesia*. 1991;46(5):404-7. doi: 10.1111/j.1365-2044.1991.tb09558.x.
  31. Ventham NT, Hughes M, O'Neill S, Johns N, Brady RR, Wigmore SJ. Systematic review and meta-analysis of continuous local anaesthetic wound infiltration versus epidural analgesia for postoperative pain following abdominal surgery. *Br J Surg*. 2013;100(10):1280-9. doi: 10.1002/bjs.9204.