

ANALGESIC EFFICACY OF SURGEON-ASSISTED TRANSVERSE ABDOMINIS PLANE BLOCK IN PATIENTS UNDERGOING OPEN CHOLECYSTECTOMY

Siddharth Parmar, Abdul Nasir Sheikh, Atul Vyas, Garima Puri
Department of Anaesthesiology, BJ Medical College, Ahmedabad, Gujarat, India

Correspondence to: Siddharth Parmar (drsid25@gmail.com)

DOI: 10.5455/ijmsph.2013.170420133

Received Date: 03.03.2013

Accepted Date: 17.04.2013

ABSTRACT

Background: Unavailability of ultrasound and unpredictable success with traditional blind technique makes Transversus Abdominis Plane Block under-utilized in developing country like India.

Aims & Objective: The present study was designed to evaluate the analgesic efficacy of Surgeon-assisted Transversus Abdominis Plane Block as an adjuvant to routine analgesic in reducing pain score during first 12 hours postoperatively in patients undergoing open cholecystectomy.

Material and Methods: This was randomized, double-blinded, controlled, clinical trial carried out in tertiary care, teaching hospital. All the patients received a routine general anaesthesia with standard monitoring. Group A received routine analgesic which included Diclofenac sodium 75 mg intravenously (IV) at 8 hourly and group B received routine analgesic & Transversus Abdominis Plane Block with 15 ml of bupivacaine 0.25% at the end of surgery. Visual analogue score for pain, incidence of post-operative nausea and vomiting and demand of rescue opioid (Tramadol 2 mg/kg IV) in post-operative period were assessed every 2 hourly up to 12 hours after the surgery by an investigator blinded to group allocation.

Results: Transversus Abdominis Plane block reduced visual analogue scale for pain on emergence and at all postoperative time points up to 12 hours ($p < 0.0009$). The incidence of post-operative nausea and vomiting, and demand of rescue opioid in the first 12 postoperative hours were also reduced ($p < 0.0001$). There were no complications attributable to the block.

Conclusion: Transversus Abdominis Plane Block is effective as an adjuvant to routine analgesic to reduce pain after open cholecystectomy and reduces post-operative opioid demand and nausea & vomiting.

KEY-WORDS: Transversus Abdominis Plane Block; Post-Operative Pain; Bupivacaine; Cholecystectomy

Introduction

Transversus Abdominis Plane (TAP) Block is a relatively new regional anaesthesia technique which infiltrates local anaesthetic between the internal oblique and transverse abdominis muscles and provides analgesia to the parietal peritoneum as well as the skin and muscles of the anterior abdominal wall.^[1] First described just a decade ago, it has undergone several modifications, which have highlighted its potential utility for an increasing array of surgical procedures.^[2] But, unavailability of ultrasound for anaesthesiologists and unpredictable success with traditional blind technique makes TAP blocks under-utilized in developing country like India.^[3]

The present study was designed to evaluate the analgesic efficacy of Surgeon-assisted TAP block

as an adjuvant to routine analgesic (diclofenac sodium 75 mg IV at 8 hourly) in reducing pain during first 12 hours postoperatively in patients undergoing open cholecystectomy.

Materials and Methods

After obtaining approval from ethics committee, and written informed consent from the patient, we studied 40 patients of either sex, age between 18 to 50 years old, ASA physical status I to III patients scheduled for open cholecystectomy via an oblique subcostal incision in a randomized, double-blinded controlled clinical trial. Patients with known allergy to bupivacaine, cardio-respiratory disease, altered liver and renal functions, obesity and pregnancy were excluded. Patients were randomly allocated into two groups: Group A (n=15) and Group B (n=15).

Group A received routine analgesic which included diclofenac sodium 75 mg IV at 8 hourly and group B received routine analgesic & TAP block with 15 ml of 0.25% bupivacaine.

All the patients received a routine general anaesthetic with standard monitoring. All patients were premedicated with glycopyrrolate 4 mcg/kg and fentanyl 2 mg/kg and ondansetron 4 mg IV. Anaesthesia was induced by thiopentone sodium 7 mg/kg and succinylcholine 2 mg/kg IV. After intubating, anaesthesia was maintained with 50% nitrous oxide in oxygen, Isoflurane, and IV Vecuronium bromide. A routine postoperative analgesic in form of diclofenac sodium 75 mg IV at 8 hourly was used for both groups at the end of surgery. All patients were extubated after giving neostigmine 5 mcg/kg with glycopyrrolate 8 mcg/kg IV.

Surgeon-assisted TAP BLOCK: At the end of surgery, just before closure of anterior abdominal wall, the rectus abdominis and transverse abdominis were identified by the operating surgeon. A spinal needle (22 Gauge) was introduced in the neuro-fascial plane between the transverse abdominis muscle and rectus abdominis muscle parallel to the subcostal margin directed to the ipsilateral iliac crest and 15 ml of 0.25% bupivacaine was injected after negative aspiration by the investigator.

The patients and staff providing postoperative care were blinded to the group assignment. Post-operative pain were assessed every 2 hourly up to 12 hours after the surgery by an investigator blinded to group allocation. Pain severity was measured using a visual analogue scale (VAS). Tramadol 2 mg/kg IV was used as rescue opioid. Rescue opioid was injected in both groups either when post-operative VAS >7 or patient's demand for pain relief.

Primary outcome in the study was post-operative VAS. The secondary outcome was incidence of post-operative nausea and vomiting (PONV) and need of rescue opioid for pain.

By means of the pilot study, the sample size was calculated so that reduction of VAS 3 or more would be statistically significant with the

significance level (α) of 0.05 and the power of test ($1-\beta$) of 80%. We calculated that 15 patients would be required per group. The means of continuous variables were compared using the student's t-test and categorical variables were compared using fisher's exact test. A p value < 0.05 was considered statistically significant.

Results

The groups were comparable in terms of age, weight, gender and ASA grade (Table 1). The VAS of both groups was assessed at every 2 hourly from 0 hour to 12 hours post-operatively and was significantly lower in Group B than that of the Group A ($p < 0.009$, Table 2). Incidence of PONV was 10 (66.67%) in Group A and 5 (33.33%) in Group B ($p < 0.0001$, Table 3). The demand of rescue opioid was 12 (80%) in Group A and 6 (40%) in Group B ($p < 0.0001$, Table 3). There were no complications attributable to the TAP block.

Table-1: Demographics of the Study

Parameter	Group A	Group B
Age in years (Mean \pm SD)	43.47 \pm 10.17	38.47 \pm 13.26
Weight in kg (Mean \pm SD)	52.73 \pm 7.82	52 \pm 7.1
Gender (Male:Female)	4 : 11	3 : 12
ASA Grade (I:II)	12 : 3	12 : 3

Table-2: VAS Pain Score in Post-Operative Period

Parameter	Group A (Mean \pm SD)	Group B (Mean \pm SD)	P value
VAS at 0 min	6 \pm 0.76	1.40 \pm 0.74	< 0.0001
VAS at 2 hours	4.73 \pm 0.46	1.80 \pm 0.68	< 0.0001
VAS at 4 hours	4.67 \pm 0.49	2.07 \pm 0.70	< 0.0001
VAS at 6 hours	4.27 \pm 0.59	2.40 \pm 0.51	< 0.0001
VAS at 8 hours	4.00 \pm 0.65	3.20 \pm 0.56	0.0012
VAS at 10 hours	2.87 \pm 0.64	2.07 \pm 0.59	0.0014
VAS at 12 hours	2.60 \pm 0.51	2.00 \pm 0.65	0.0090

Table-3: Comparison of Parameters

Parameter	Group A No (%)	Group B No (%)	P value
PONV	10 (66.67%)	5 (33.33%)	< 0.0001
Demand of rescue opioid	12 (80%)	6 (40%)	< 0.0001

Discussion

Effective analgesia has shown to reduce post-operative stress response^[4] and morbidity^[5]; and it also facilitates rehabilitation and accelerates recovery from surgery^[5,6]. Other benefits include reduced pain intensity and improved patient comfort.^[6]

Traditional blind 'pop-up' technique for TAP block depends solely on the palpated sensation without a visual guide, can cause serious complications like intestinal puncture^[7] and organ damage^[8]. Ultrasound can serve guidance for neuro-fascial plane identification, needle advancement & drug distribution under vision. We used Surgeon-assisted TAP block under direct vision in present study because of unpredictable success rate with traditional blind technique and unavailability of ultrasound. There was no incidence of complication during TAP block in the present study.

TAP block is evolving rapidly, leading to the development of a variety of approaches: from the classical posterior approach to subcostal, and most recently, oblique subcostal approaches. We have used subcostal approach for TAP block as the subcostal approach^[9,10] is best suited for upper abdominal procedures and the posterior approach^[11,12] is ideal for incisions below the umbilicus.

It may be injustice to use TAP block alone for post-operative pain as TAP block reduces incisional pain of abdomen, not visceral pain. So, we have used TAP block as an adjuvant to routine analgesic regimen in present study.

While the majority of published literature on TAP blocks is purely from the perspective of anaesthesiologists, a growing number of reports have demonstrated that surgeons can help to facilitate these blocks.

Araco et al^[13] described a surgical TAP block in which blunt dissection through the external and internal oblique muscles leads to injection of 1mg/kg/side of 0.5% bupivacaine into the TAP under direct visualization in abdominoplasty. They concluded that TAP block provided superior analgesia compared to IV/PO medications.

Chetwood et al^[14] described a laparoscopic-assisted technique wherein anatomical landmarks guided TAP block was performed while the injection area was observed with intra-abdominal laparoscopic camera. A peritoneal bulge at injection area was considered as endpoint for this technique.

Bharati et al^[15] and Owen et al^[16] used 20 ml/side of 0.25% bupivacaine in colorectal surgery and Caesarean section respectively and described a trans-peritoneal approach wherein a blunt tipped block needle was advanced from inside the abdominal wall through the parietal peritoneum, then the transversus abdominis muscle, and into the TAP as indicated by a single pop sensation. They both concluded that TAP block provided superior analgesia compared to IV/PO medications.

TAP block may also be a safe alternative to neuraxial blockade in patients who are anti-coagulated, coagulopathy, or in patients who would not tolerate the hemodynamic response often associated with profound neuraxial sympathectomy. Nonetheless, it may be a good alternative strategy for patients who are highly sensitive to opioids. The TAP block is an effective and safe adjunct to multimodal postoperative analgesia for abdominal surgery.

Further studies are needed to investigate the most suitable local anaesthetic agent (type, concentration and volume of injection), efficacy of continuous infusion through a catheter and comparison with epidural analgesia.

Two potential limitations of the present study should be considered. First, assessment of postoperative pain was limited to first 12 hours. However, reports^[17-19] have demonstrated the efficacy for 24 hours post-operatively. Second, the sensory blocking range was not assessed because the block had performed after induction of general anaesthesia.

Conclusion

The TAP block could provide effective analgesia in post-operative period up to 12 hours after open cholecystectomy and reduce the incidence of PONV and demand of rescue opioid. It holds considerable promise on account of its efficacy, low complication rate and simplicity.

References

1. 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.
2. Rafi AN. Abdominal field block: a new approach via the lumbar triangle. *Anaesthesia.* 2001;56(10):1024-6.
 3. Young MJ, Gorlin AW, Modest VE, Quraishi SA. Clinical Implications of the Transversus Abdominis Plane Block in Adults. *Anesthesiol Res Pract.* 2012; 2012: 731645.
 4. Kehlet H. Surgical stress: the role of pain and analgesia. *Br J Anaesth* 1989;63:189-95.
 5. Capdevila X, Barthelet Y, Biboulet P, et al. Effects of perioperative analgesic technique on the surgical outcome and duration of rehabilitation after major knee surgery. *Anesthesiology* 1999;91:8-15.
 6. Bonnet F, Marret E. Influence of anaesthetic and analgesic techniques on outcome after surgery. *Br J Anaesth* 2005;95:52-8.
 7. Jöhr M, Sossai R. Colonic puncture during ilioinguinal nerve block in a child. *Anesth Analg* 1999; 88: 1051-2.
 8. Farooq M, Carey M. A case of liver trauma with a blunt regional anesthesia needle while performing transversus abdominis plane block. *Reg Anesth Pain Med* 2008; 33: 274-5.
 9. Barrington MJ, Ivanusic JJ, Rozen WM, Hebbard P. Spread of injectate after ultrasound-guided subcostal transversus abdominis plane block: a cadaveric study. *Anaesthesia* 2009;64:745-750.
 10. Hebbard P. Subcostal transversus abdominis plane block under ultrasound guidance. *Anesth Analg* 2008;106:674
 11. Shibata Y, Sato Y, Fujiwara Y, Komatsu T. Transversus abdominis plane block. *Anesth Analg* 2007;105:883.
 12. Tran TM, Ivanusic JJ, Hebbard P, Barrington MJ. Determination of spread of injectate after ultrasound-guided transversus abdominis plane block: a cadaveric study. *Br J Anaesth* 2009;102:123-127.
 13. 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.
 14. Chetwood A, Agrawal S, Hrouda D, Doyle P. Laparoscopic assisted transversus abdominis plane block: a novel insertion technique during laparoscopic nephrectomy. *Anaesthesia* 2011; 66(4):317-318.
 15. 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. *Anesth Analg.* 2011;112(6):1504-8.
 16. Owen DJ, Harrod I, Ford J, Luckas M, Gudimetla V. The surgical transversus abdominis plane block - a novel approach for performing an established technique. *BJOG.* 2011;118(1):24-7.
 17. O'Donnell BD, McDonnell JG, McShane AJ. The transversus abdominis plane (TAP) block in open retropubic prostatectomy. *Reg Anesth Pain Med.* 2006; 31:91.
 18. McDonnell JG, O'Donnell B, Curley G, Heffernan A, Power C, Laffey JG. The analgesic efficacy of transversus abdominis block after abdominal surgery. *Anesth Analg* 2007; 104:193-7.
 19. 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(1):186-91.

Cite this article as: Parmar, Sheikh AA, Vyas AB, Puri GM. Ankle Brachial Analgesic efficacy of Surgeon-Assisted Transverse Abdominis Plane Block in patients undergoing open cholecystectomy. *Int J Med Sci Public Health* 2013; 2:594-597.

Source of Support: Nil

Conflict of interest: None declared