

Laparoscopic Transversus Abdominis Plane Block with Rectus Block for Postoperative Analgesia in Laparoscopic Ventral Hernia Repair: A Novel Approach

Kala Eswaran¹, Abdeali SA Kaderi², Rajendra D Patel³, Sameer A Rege⁴, Jayanti A Bhate⁵, Pramod S Manohar⁶

ABSTRACT

Ventral hernia repair remains one of the common procedures performed by general surgeons. Laparoscopic ventral hernia repair with intraperitoneal on lay mesh (IPOM) PLUS technique has become standard care in hernia repair surgery. Postoperative pain management is the key factor in enhanced recovery after surgery (ERAS). Transversus abdominis plane (TAP) blocks and rectus blocks have succeeded in reducing the opioid analgesics consumption as well as the pain score after ventral hernia repairs. Anesthetic drugs can be delivered into this plane by the conventional blind, USG-guided, or assisted with laparoscopy direct vision. USG-guided blocks require an ultrasound machine, an expert sonologist in operation theater which may not be available.

Case presentation/Context: We performed laparoscopic TAP block with rectus block in 70 patients undergoing laparoscopic ventral hernia repair by IPOM, IPOM-Plus, and EACS-IPOM plus and observed the efficacy and effectiveness of the procedure in relieving postoperative pain using VAS scoring system as well as multiple parameters that indicate faster postoperative recovery of the patient.

Conclusion: Laparoscopy-guided TAP block and rectus block provide a promising modality of postoperative analgesia in laparoscopic ventral hernia repair.

Key messages: With a significantly low postoperative pain score, it can be used as a modality of drug delivery in the areas where intraoperative USG machines, expert sonologist, or anesthetist specialized in ultrasound are not available due to cost issues or issues of PCPNDT.

Keywords: Hernia, Postoperative pain management, TAP block.

Research and Innovation in Anesthesia (2021): 10.5005/jp-journals-10049-0106

INTRODUCTION

Ventral hernia repairs are one of the common procedures performed by general surgeons. Conventional open surgery required a large incision, prosthesis, and drainage and is at risk of pain, wound complications. Laparoscopic repair has considerably shortened hospital length stay, improved the cosmesis and postoperative pain, and is now preferred as the standard for ventral hernia repair. Postoperative pain and management are the key factors in deciding the outcome of the patient. There have been many modalities as self-controlled epidural analgesia, injectable analgesics have been used. Transversus abdominis plane (TAP) block targets blockade of neural afferents (subcostal, ilioinguinal, iliohypogastric nerves) in the neurovascular plane between the internal oblique and transverse abdominal muscles of the abdominal wall to block nerves from T6 to L1. TAP blocks have succeeded in reducing the opioid analgesics consumption as well as the pain score after ventral hernia repairs.^{1,2} Anesthetic drug can be delivered into this plane by the conventional blind, USG-guided, or -assisted with laparoscopy direct vision. Bilateral TAP blocks can be used for midline incisions. This technique is also useful for procedures in which epidural analgesia is contraindicated (i.e., anticoagulated patients). USG-guided blocks require an ultrasound machine, an expert sonologist in operation theater which may not be available. The standard of care in our hospital setting is USG-guided TAP block. This is a study to see the efficacy and effectiveness of laparoscopic TAP with rectus block for analgesia in ventral hernia repair in 70 patients.

¹Department of Anaesthesiology, ICON Hospital, Thane, Maharashtra, India

^{2,4}Department of General Surgery, Seth GS Medical College and King Edward Memorial Hospital, Mumbai, Maharashtra, India

³Department of Anaesthesiology, Seth GS Medical College and King Edward Memorial Hospital, Mumbai, Maharashtra, India

⁵Department of Anaesthesia, Kaushalya Hospital, Thane, Maharashtra, India

⁶Department of Anaesthesia, Mhatre Hospital, Raigad, Maharashtra, India

Corresponding Author: Kala Eswaran, Department of Anaesthesiology, ICON Hospital, Thane, Maharashtra, India, Phone: +91 9820031417, e-mail: drkalaeswaran@gmail.com

How to cite this article: Eswaran K, Kaderi ASA, Patel RD, *et al.* Laparoscopic Transversus Abdominis Plane Block with Rectus Block for Postoperative Analgesia in Laparoscopic Ventral Hernia Repair: A Novel Approach. *Res Inno in Anesth* 2021;6(1):17–20.

Source of support: Nil

Conflict of interest: None

MATERIALS AND METHODS

This study was carried out in patients of the age group of 18–70 years having ventral hernia of M2, M3, M4 ventral hernias of EHS classification excluding female participants who are pregnant,

lactating, or planning for pregnancy and patients with any contraindication for the laparoscopic procedure during the time period of June 2018 to June 2019 under a single unit in Department of General Surgery at KEM Hospital, Mumbai. The patients underwent appropriate laparoscopic ventral hernia repair in the form of intraperitoneal on lay mesh (IPOM) repair with or without defect closure, with or without endoscopic anterior component separation. All patients were given TAP block with rectus block under general anesthesia using propofol and laparoscopic visualization of the abdominal wall identifying the transversus abdominis muscle lateral to the linea semilunaris. Following this, the drug was injected using a 21-G blunted steep bevel hypodermic needle perpendicular midway between the subcostal margin and iliac crest in the anterior axillary line. The needle was passed through the skin until two pops are felt indicating the needle has passed through two fascial layers. When the needle was seen just across the parietal peritoneum, it was withdrawn by 1 mm and drug injected over the transversus abdominis muscle. This raises a bleb of transversus abdominis with the peritoneum is seen. The laparoscopic visualization ensures that the needle is not anywhere penetrating the peritoneum. A similar procedure was performed along the subcostal margin just medial to mid-clavicular line with the needle facing posterolaterally. The rectus block was performed in the subcostal line with a hypodermic needle 21-G at a point just medial to the linea semilunaris posterior to the rectus sheath. After giving TAP block and rectus plane block, the meshplasty was done. Seven milliliters of 0.25% bupivacaine³ or ropivacaine⁴ were given bilaterally in the anterior axillary line and in the subcostal landmarks and 8 mL of the same drug into the rectus plane. On injection of local anesthetic, "Doyle's internal bulge sign" could be seen as the transversus abdominis muscle with peritoneum is pushed internally as illustrated in Figure 1 depicting left and right sided TAP block, respectively. Figure 2 depict the patients post operative NSAID requirement and comorbidity distribution in selected patient population (N = 70).

The postoperative opioid analgesic use, VAS score for pain relief (obtained at timepoints of 0, 4, 8, 24, and 48 hours), patient's subjective response in terms of pain at days 5 and day of discharge, duration of pain relief, hospital stay, any other analgesic required and dosage of analgesics used postoperatively under patient-controlled analgesia regimen was recorded and following results were obtained (Table 1).

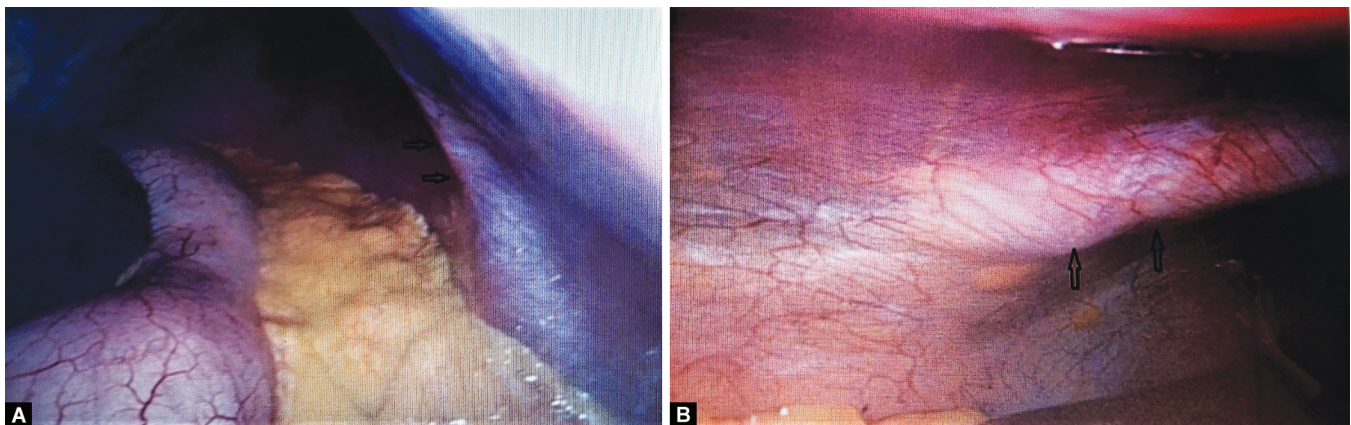
DISCUSSION

One of the earliest prospective randomized controlled trials about the efficacy of TAP block was published in the late 2000s. TAP block was found "highly" effective in postoperative wound pain relief. In a similar study, it was reported that TAP block has reduced morphine consumption at the 24th postoperative hour and found significantly a lower pain score at rest and on coughing in the TAP block group compared with the standard pain care group. Another study concluded that TAP block does not provide comparable pain relief and additional benefit to spinal morphine in post-caesarean section patients. Some "trick" points to minimize the possibility of visceral damage such as the "double-pop" technique. During the next 2 years, several studies were published about the usage of ultrasound to perform TAP block. The common conclusion of all these studies was the ultrasonographic guidance could permit precise and safe placement of the anesthetic agent for TAP block. TAP block under direct vision but on laparoscopic procedures. Following this report, a similar laparoscopic-guided TAP block technique during laparoscopic nephrectomy suggested that safety and time profit were the main advantages of this approach.⁵ The use of laparoscopic-guided TAP block in >100 patients who had laparoscopic colorectal surgery has been reported in the literature showing enhanced recovery.⁶

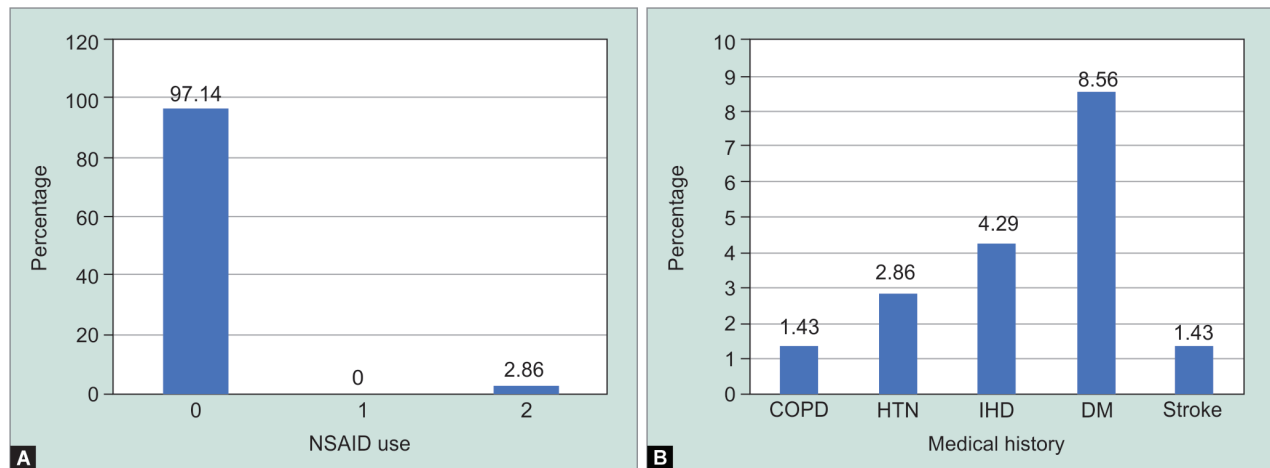
In a retrospective study done in the rural population in India, the majority of the patients were in the age group of 40 to 70 years with abdominal wall hernias predominant and predisposed in favor of males in the ratio of 7:1. Hernias reported include epigastric, paraumbilical, umbilical, and diversification of recti and previous surgeries leading to incisional hernias.⁷

It is necessary to validate the analgesic efficacy of laparoscopic-assisted TAP (LTAP) block during the postoperative period to provide additional information regarding the clinical impact of TAP block on recovery of surgical patients. Unlike epidural block, it does not produce an unwanted motor block, hypotension, or urinary retention. The reduction in the use of intravenous opiates as a consequence of appropriate analgesia by TAP block also reduces the incidence of side effects of opiate use.

In the study that we conducted involving 70 participants, comprising 39 females and 31 males with an average BMI of 32.67, having either umbilical or paraumbilical hernia patients underwent IPOM, IPOM Plus, or IPOM plus with endoscopic anterior component



Figs 1A and B: (A) Left-sided TAP block; (B) Right-sided TAP block



Figs 2A and B: (A) Percentage of laparoscopic TAP patients requiring NSAID (N = 70); (B) Percentage of other comorbidities (N = 70)

Table 1: Tabular representation of patient demographics, pain scores, and other parameters

Results: Lap-TAP (n = 70)		
Age in years, median (IQR)	–	50.47 (8.01)
BMI kg/m ² , median (IQR)	–	32.67 (3.58)
Gender, n (%)	Female	39 (55.71)
	Male	31 (44.29)
Hernia, n (%)	Infraumbilical	20 (28.57)
	Umbilical	50 (71.43)
Primary/Rec, n (%)	Incisional	19 (27.14)
	Primary	51 (72.86)
Site, n (%)	Infraumbilical	18 (25.71)
	Umbilical	52 (74.29)
Content, n (%)	Omentum	58 (82.86)
	Intestine	12 (17.14)
Adhesiolysis, n (%)	Yes	9 (12.86)
	No	61 (87.14)
Defect size (perceived) in cm, median (IQR)	–	3.0 (3.0, 4.0)
Defect size (intraoperative), median (IQR)	–	3.5 (3.0, 4.0)
Duration of surgery in minutes, median (IQR)	–	55 (50, 64)
Time of block in minutes, median (IQR)	–	4.0 (4.0, 4.0)
Surgery, N (%)	ECS_LAP	4 (5.71)
	IPOM PLUS	66 (94.29)
Suturing, N (%)	Extracorporeal	4 (5.71)
	Intracorporeal	66 (94.29)
Pain score, median (IQR)	0 hours after surgery	5.5 (3, 8)
	4 hours after surgery	3 (2, 3)
	8 hours after surgery	2 (2, 3)
	24 hours after surgery	2 (2, 2)
	48 hours after surgery	2 (2, 2)
Orals after surgery in hours, median (IQR)	–	4.0 (4.0, 6.0)
Discharge in days, median (IQR)	–	2.0 (2.0, 2.0)

separation for 72.86% primary hernia and 27.14% incisional hernia, all repaired with intracorporeal or extracorporeal suturing and absorbable tackers for mesh fixation, the average duration of surgery was 55 minutes, including the block time with was average of 4 minutes. The pain score was measured at 0, 4, 8, 24, and 48 hours and was found to be a mean of 5.5, 3, 2, 2, and 2, respectively. Patients have started orals on an average at 4 hours post-surgery and were discharged at 2 days.

Laparoscopic TAP block is superior to USG-guided TAP block in postoperative analgesia and decreasing opioid use in the first 24 hours in laparoscopic colorectal surgeries.

There is a beneficial effect of TAP block for early/late pain at rest but not for early/late pain on movement. Pain on movement is often more severe than pain at rest. Complete relief of pain on movement is not commonly achieved with local or systemic analgesic techniques but frequently requires the use of more potent neuraxial techniques.

CONCLUSION

Epidural anesthesia provided good pain relief but with laparoscopic repair, it became an additional intervention and there was a risk of paralytic ileus and distension of the abdomen leading to cardiorespiratory distress. Another disadvantage with epidurals was *in situ* catheters were needed which required the coagulation profile to be normal.⁸

During the last few years, the use of TAP block as an alternative to epidural analgesia is a growing option. A TAP block provides analgesia of the anterolateral abdominal wall through blockade of lateral and anterior cutaneous branches of T7 to L1. The best results of TAP block analgesia are seen with USG-guided placement of LA.⁹

Laparoscopy-guided TAP block and rectus block provide a promising modality of postoperative analgesia in laparoscopic ventral hernia repair. With a significantly low postoperative pain score, it can be used as a modality of drug delivery in the areas where intraoperative USG machines, expert sonologist, or anesthetist specialized in ultrasound are not available due to cost issues or issues of PCPNDT. Further studies are required and being carried out to determine the effectiveness of this procedure in laparoscopic and open procedures including cholecystectomy, colectomy, and bariatric procedures and also to compare the efficacy when compared with conventional standards.

REFERENCES

1. Rafi AN. Abdominal field block: a new approach via the Lumbar triangle. *Anaesthesia* 2001;56(10):1024–1026. DOI: 10.1046/j.1365-2044.2001.02279-40.x.
2. McDonnell JG, O'Donnell BD, Tuite D, et al. The regional abdominal field infiltration technique computerised tomographic and anatomical identification of a novel approach to the transversus abdominis neuro-vascular fascial plane. *Anaesthesiology* 2004;101:A899.
3. Bupivacaine Accord 0.25%w/v solution, SMPC, Electronic medicines compendium.
4. Kuthalia G, Chaudhary G. Ropivacaine: a review of its pharmacology and clinical use. *Indian J. Anaesth* 2011;55(2):104–110. DOI: 10.4103/0019-5049.79875.
5. Chetwood A, Agrawal S, Hrouda D, et al. Laparoscopic assisted transversus abdominis plane block: a novel insertion technique during laparoscopic nephrectomy. *Anaesthesia* 2011;66(4):317–318. DOI: 10.1111/j.1365-2044.2011.06664.x.
6. Favuzza J, Brady K, Delaney CP. Transversus abdominis plane blocks and enhanced recovery Pathways. *Surg Endos* 2013;27(7):2481–2486. DOI: 10.1007/s00464-012-2761-y.
7. Earle DB, McLellan JA. Repair of umbilical and epigastric hernias. *Surg. Clin. North Am.* 2013;93(5):1057–1089. DOI: 10.1016/j.suc.2013.06.017.
8. Wheatley RG, Schug SA, Watson D. Safety and efficacy of postoperative epidural analgesia. *Br J Anaesth* 2001;87(1):47–61. DOI: 10.1093/bja/87.1.47.
9. Frassanito L, Pitoni S, Gonnella G, et al. Utility of ultrasound-guided transversus abdominis plane block for day-case inguinal hernia repair. *Korean J Anesthesiol* 2017;70(1):46–51. DOI: 10.4097/kjae.2017.70.1.46.