e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2023; 13(4); 370-374

Original Research Article

Comparison of Transversus Abdominis Plane Block and Intrathecal Morphine for Laparoscopic Donor Nephrectomy: Randomised Controlled Trial

Guneet Sodhi

DA, MD, DNB Anesthesiology and Critical Care, Reader, Bhojia Dental College and Hospital, Baddi (H.P.)

Received: 15-02-2023 / Revised: 18-03-2023 / Accepted: 15-04-2023
Corresponding author: Dr Guneet Sodhi
Conflict of interest: Nil

Abstract

Background and Aims: Laparoscopic donor nephrectomy (LDN) causes considerable postoperative discomfort, and no effective analgesic method is identified. Standard dosages of opioids for analgesia are typically insufficient and are linked to a slew of undesirable side effects. The effectiveness of transverse abdominal muscle (TAM) block in a variety of laparoscopic operations has been studied. During laparoscopic colorectal procedures, intrathecal morphine (ITM) has been found to provide high-quality, long-lasting analgesia.

Methods: Examining how well a single dose of ITM 5 g/kg works as an analgesic for LDN was the focus of this study. Thirty adult patients having LDN were randomly randomized to receive either IV fentanyl, ultrasound-guided TAP block, or ITM for postoperative analgesia, with the approval of the institutional review board. In this study, we examined 24-hour postoperative fentanyl consumption through patient-controlled analgesia (PCA), fentanyl and muscle relaxant requirements intraoperatively, and visual analog scale (VAS) pain scores. Stata 11.1 software was used to run the necessary statistical tests for the investigation.

Results: ITM patients had considerably greater hemodynamic stability during pneumoperitoneum and in the PACU than those who did not get the treatment. The morphine group required considerably less rescue fentanyl both intraoperatively (P = 0.01) and postoperatively (P = 0.000) up to 24 hours. In both the resting and active VAS measures taken after surgery, the morphine group fared better than the control group.

Conclusion: "ITM 5 µg/kg provides better intraoperative and postoperative analgesia and reduces postoperative PCA fentanyl requirement in laparoscopic donor nephrectomy compared to TAP block or intravenous fentanyl.

Keywords: Donor Nephrectomy, Intrathecal Morphine, Laparoscopy.

Introduction

The adoption of less invasive laparoscopic procedures has not reduced the prevalence of postoperative discomfort in patients who have had nephrectomy. Patients with severe pain after surgery may get epidural analgesia, patient-controlled opioids, or both. Opioids have a side effect profile that includes itching, nausea, and vomiting; moreover, they increase the risk of oversedation and apnea in people who are predisposed to them (such as those

with sleep apnea). Rare but significant infections, hemorrhage, and nerve damage have all been linked to epidurals, as have hypotension, post-dural puncture headaches, and adjustments to anticoagulant therapy[1,2].

An effective but temporary analgesia following LDN may be achieved with a transversus abdominis plane (TAP) block. However, patients having caesarean section, laparoscopic cholecystectomy, or colorectal surgery have had very positive experiences with intrathecal morphine (ITM) at low dosages [3,4]. However, no tests of ITM have been conducted in LDN. The purpose of this research was to evaluate the relative effectiveness of ITM, TAP block, and standard intravenous opioid for the treatment of LDN-induced pain.

Method

This prospective, randomized, open-labeled, controlled clinical trial was conducted on adult voluntary kidney donors who were scheduled for left trans-peritoneal laparoscopic nephrectomy after receiving approval from the appropriate institutional ethical committee and the donors' written informed consent. People who were ASA-I or ASA-II members took part in the research. If a participant had ever had PONV or was a chronic user of analgesics, they were automatically disqualified. The sealed opaque envelope method was used for allocation concealment after a computer-generated randomization process. All patients had a thorough pre-anesthesia evaluation, and those who were interested in learning how to use a VAS or a PCA device were given instruction.

On the morning of operation, all patients were given 0.5 mg of oral alprazolam as a premedication.

An intravenous (IV) cannula was placed and standard ASA monitoring equipment was applied before the patient's study-specific package was opened, revealing their group assignment. Patients in group M received a subarachnoid infusion of 5 g/kg (maximum 300 g) of additive-free morphine in 1 mL typical saline after skin preparation with chlorhexidine and adjacent sedative penetration at the L2-3 or L3-4 interspace in the left parallel position with a 25-G Sprotte needle. Next, while the patients were resting on their backs, an intravenous (IV) infusion of a general anesthetic (GA) comprising 2 g/kg fentanyl, 2-3 mg/kg propofol, and 0.5 mg/kg atracurium was administered. Isoflurane, oxygen, and air were employed to maintain the anesthetic effect. All patients' end-flowing CO2 was maintained between 35 and 45 mmHg and the base aviation route pressure (Macintosh) was maintained between 0.7 and 1.1 while they underwent mechanical ventilation. Group T (TAP block) participants were given a 20-mL bilateral TAP block with 0.375% ropivacaine and 1 g/kg clonidine under ultrasound guidance (Sonosite, linear probe 6-13 Hz) after induction of GA. GA was administered in the same way to patients in Group C as in the other two groups. One milligram per kilogram per hour of fentanyl was administered into all three groups during the whole process. We administered a rescue bolus of 1 g/kg IV fentanyl if the patient's hemodynamic parameters (heart rate, systolic blood pressure, and diastolic blood pressure) rose by more than 20% from baseline.

After tracheal intubation, neuromuscular inhibition was reversed with neostigmine (0.05 mg/kg) and glycopyrrolate (0.01 mg/kg). All of the patients were transferred to the PACU, where they were each linked to a PCA device that could dispense 25 micrograms of fentanyl on demand, with a lockout time of ten minutes and a maximum dose of 150 micrograms per hour. If patients still had pain after receiving the maximal dosage of PCA fentanyl, they were given a 3 mg IV bolus of morphine as rescue medication. Rest and activity VAS ratings were taken upon waking, every 2 hours for the first 6 hours, and again at 12 and 24 hours by a blinded researcher.

Means and standard deviations were provided for quantitative data, while Chi-square and Fischer's exact tests were employed for qualitative data comparisons. The cutoff for significance was a 0.05 probability level.

Result Similar VAS resting ratings were recorded at 0, 2, and 6 hours in the PACU for patients who received TAP block or subarachnoid morphine. At 0 and 2 and 6 h, VAS scores in the TAP and subarachnoid morphine groups were significantly lower than in the control group (P0.0001). Patients' VAS ratings for movement and deep breathing were significantly lower after subarachnoid morphine (M) administration compared to both the control group and TAP block patients at all time periods (P 0.0001 at 1 and 2 h and P 0.011 at 6 h). Morphine patients' resting and active VAS ratings were significantly (P 0.0001) lower after 12 and 24 hours compared to those of patients in the control and treatment groups. There was no difference in VAS between the control and TAP groups at 12 and 24 hours.

After pneumoperitoneum, participants in group M had significantly lower peak heart rates and mean arterial pressures compared to those in groups T and C. Group M required less intraoperative rescue fentanyl than the other groups, whereas all groups required about the same number of boluses of muscle relaxants (Table 1).

Table 1: Outcome measures

Parameter	Group C (*n*=10) (Mean±SD)	GroupM (*n*=10) (Mean±SD)	Group T (*n*=10) (Mean±SD)	*P*
Age (years±S.D.)	38.10±10.11	40.4±7.57	41.05±10.15	0.4350
Weight (kg±S.D.)	45.1±9.21	50±10.05	51.10±10.50	0.5420
Parameter Group C		Group M	Group T	*P*
Heart rate at pneumoperitonium 74.05±5.45		70.15±3.17	73.1±3.10	0.00
Hear rate at PACU 77±5.40		70±4.11	74±3.21	0.006
MAP at pneumoperitonium 85.05±5.02		80.1±3.15	82.15±5.14	0.002
MAP at PACU 89.1±5.50		80.10±3.15	85.1±5.58	0.010
Intraoperative rescue fentanyl consumption 80.5		41.1	50	0.016
Number of intraoperative muscle relaxant boluses required 4		2	3	0.14
24-h PCA fentanyl consumption 745		250	456	0.0001
Number of rescue morphine boluses 2		1	1	0.0001

Discussion

There has been a resurgence of interest in TAP blocks as a means of delivering analgesia to the anterior abdominal wall because of the increased effectiveness and safety afforded by ultrasound-guided procedures. TAP blocks have been shown in several trials to be a helpful method of pain management for a wide range of abdominal procedures, both major and minor. [3-5]. When given 5 g/kg of ITM before to induction, the hemodynamic response to pneumo-peritoneum in LDN is better controlled, postoperative analgesia is enhanced, intake of fentanyl and rescue morphine boluses from the patient-controlled analgesia device are lowered, and intraoperative fentanyl demand is decreased. Significant discomfort is possible following most forms of laparoscopic surgery, and it

reaches its peak during the first 24 hours after the procedure. [6]. Pain after LDN may originate from the urinary catheter, the port, the abdominal incision (made to remove the kidney), the pelvic organs, the diaphragm, ureteric colic, or the kidney itself. Since severe postoperative pain might be a clear deterrent for live kidney donation, it is important to establish and agree upon a multimodal pain management strategy before to the procedure. The effectiveness of several anesthetic methods, including epidural opioids, TAP blocks, paravertebral blocks, and parenteral opioids, has been evaluated in patients receiving LDN. [7,8]. This is the first research that we are aware of that evaluated ITM for LDN. In the first 24 hours after surgery, patients whose pain was managed with ITM reported consistently and substantially decreased resting pain levels.

In the current trial, ITM not only eliminated the need for an epidural catheter and the associated logistics of managing a continuous infusion of pain medication for more than 24 hours, but it also delivered superior analgesia during that time. Compared to a thoracic epidural, a subarachnoid block is less invasive and safer to apply.

Multiple studies in pregnant women having caesarean sections have shown that ITM is preferable than TAP block. [9]. ITM contains many modes of analgesia and provides both visceral and somatic analgesia, in contrast to TAP block, which predominantly produces somatic analgesia and may be best viewed of as part of a multimodal analgesic strategy than as a standalone comparison.

Patients who had a TAP block reported pain alleviation on the VAS equivalent to that of the morphine group for up to 6 hours postoperatively, showing little resting and movement pain. Once the effects of the TAP block had worn off and the control group was more typical of the total, VAS ratings improved both at rest and during movement. We decided to utilize a higher dose of medicine (0.375% ropivacaine 20 ml each side) to achieve the same effect as the TAP block's primary rival, ITM, which is known to deliver longer-lasting analgesia (even up to 24 hours). Aniskevich *et al*. [10] patients having hand-assisted laparoscopic nephrectomy had lower 24-hour pain ratings and a tendency toward lower total morphine intake after receiving a bilateral thoracic aortic block with 0.5% ropivacaine.

Two recent meta-analyses evaluating TAP block's effectiveness in patients after colorectal surgery, however, indicated that it was ineffective in reducing patients' reports of dynamic pain. Patients in the control group reported significantly greater pain levels than those in the morphine and TAP groups throughout the course of the experiment. Fentanyl PCA was used by patients in all three groups to keep their pain at 4 or lower on the VAS, indicating that PCA users had less pain than those in the control and observational groups. The much decreased median PCA fentanyl consumption in group M after surgery compared to other groups demonstrates the opioid-sparing advantage of ITM.

Multiple problems exist with the present inquiry. A bilateral TAP block may not be the best option initially. Since the laparoscopic ports are located on both the left and right sides of the abdomen, we decided to take a symmetrical strategy. In contrast, the continuous catheter approach might have been performed on the ipsilateral side with infiltration of the contralateral port site. Secondly, it was not established how long patients had pain relief from ITM.

Conclusion

Low-dose ITM has been shown to lower perioperative parenteral opioid use in patients having live LDN under general anesthesia without increasing the risk of adverse events. This is due to the fact that ITM provides improved postoperative analgesia for up to 24 hours and reduces the hemodynamic response to pneumoperitoneum. However, this has to be

validated in a broader LDN population before we can be confident in our findings.

References

1. Yarwood J, Berrill A. Nerve blocks of the anterior abdominal wall. Continuing Education in Anaesthesia, Critical Care and Pain. 2010;10: 182–186.
2. Mukhtar K, Khattak I. Transversus abdominis plane block for renal transplant recipients. Br J Anaesth. 2010;104:663–664.
3. Kurhekar P, Madan Kumar S, Sampath D. Comparative evaluation of intrathecal morphine and intrathecal dexmedetomidine in patients undergoing gynaecological surgeries under spinal anaesthesia: A prospective randomised double blind study. Ind J Anaesth. 2016; 60:382-7.
4. Kong S-K, Onsiong SMK, Chiu WKY, Li MKW. Use of intrathecal morphine for postoperative pain relief after elective laparoscopic colorectal surgery. Anaesthesia. 2002;57:1168-73.
5. Abdallah FW, Chan VW, Brull R. Transversus abdominis plane block. A systematic review. Reg Anesth Pain Med. 2012;37:193–209.
6. Costello JF, Moore AR, Wieczorek PM, *et al*. The transversus abdominis plane block, when used as part of a multimodal regimen inclusive of intrathecal morphine, does not improve analgesia after cesarean delivery. Reg Anesth Pain Med. 2009;34:586–589.
7. McMorrow RC, Ni Mhuircheartaigh RJ, Ahmed KA, *et al*. Comparison of transversus abdominis plane block vs spinal morphine for pain relief after caesarean section. Br J Anaesth. 2011; 106: 706–712.
8. Sforza M, Andejelkov K, Zaccheddu R, Nagi H, Colic M. Transversus abdominis plane block anesthesia in abdominoplasties. Plast Reconstr Surg. 2011;128:529–535.
9. Loane H, Preston R, Douglas MJ, Massey S, Papsdorf M, Tyler J. A randomized controlled trial comparing intrathecal morphine with transversus abdominis plane block for post-cesarean delivery analgesia. Int J Obstet Anesth. 2012; 21:112-8.
10. Aniskevich S, Taner CB, Perry DK, Robards CB, Porter SB, Thomas CS, *et al*. Ultrasound-guided transversus abdominis plane blocks for patients undergoing laparoscopic hand-assisted nephrectomy: A, placebo-controlled trial. Local Reg Anesth. 2014;7:11-6.