

Does wound infiltration of tramadol reduce postoperative pain in laparoscopic or open herniorrhaphy?

Remziye Sivaci^{1*}, Erol Eroglu², Lutfi Yavuz², Fusun Eroglu², Yaşar Sivaci³

¹ Department of Anesthesiology and Reanimation, Kocatepe University, School of Medicine, Afyon, Turkey. ² Department of General Surgery, Suleyman Demirel University, School of Medicine, Isparta, Turkey. ³ Hospital of Pulmonary Disease, Afyon, Turkey,

Abstract

Introduction: The laparoscopic approach may be associated with more postoperative pain initially. The aim of this study was to evaluate the effects of administered tramadol at wound closure on postoperative pain and analgesic requirements under spinal anesthesia in laparoscopic inguinal herniorrhaphy (LH) or tension free open inguinal herniorrhaphy (TFOH).

Methods: Twenty patients were randomly divided into two groups (n= 10 in each) as LH or TFOH. Patients received infiltration of 200 mg tramadol with 40 mL of 0.9% saline solution at wound closure procedure. Postoperative pain was assessed with a Visual Analog Scale (VAS) at 3, 6, 12, and 24 hours postoperatively. Additional requirements of tramadol for postoperative pain relief were registered.

Results: VAS scores at postoperative 12 and 24 hours were significantly higher according to 3rd hour VAS scores in both groups. The VAS scores at 12 hours after operation significantly lower in LH group than in TFOH group (1.5 ± 0.97 vs 5.1 ± 0.99). Additional requirements of tramadol for postoperative pain relief were significantly lower in LH group.

Conclusion: We conclude that wound infiltration of 200 mg tramadol reduce postoperative pain in LH group.

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Keywords: laparoscopy herniorrhaphy, postoperative pain, tramadol

Introduction

Pain after laparoscopic surgery may vary in quality and localization and is reported in several studies to be incisional, intraabdominal, or referred (1). The etiology is complex, including damage to abdominal wall structures, the induction of visceral trauma and inflammation and peritoneal irritation because of CO₂ entrapment beneath the hemi diaphragms. Pain after laparoscopic procedure is significantly less and shorter than that caused by the same surgical procedure made possible by open surgery (2). Compared with open procedures, laparoscopic surgery, a minimally invasive technique,

is associated with reduced surgical trauma (3). Anti-inflammatory drugs decrease postoperative pain as local anesthetics and opioids when administered at the surgical site at time of wound closure. Tramadol is a centrally acting synthetic analgesic with μ -opioid receptor agonist activity. Infiltration of tramadol into the surgical wound reduces postoperative pain with very few side effects (4). Patients benefit from laparoscopic extraperitoneal hernia repair because this allows earlier mobilization than the more classical open surgical approach (5). Laparoscopic inguinal herniorrhaphy (LH) provides distinct advantages over open herniorrhaphy and it is the treatment of choice for many patients. LH is associated with less pain and disability without increasing mortality or overall morbidity (6-8). Although the effect of wound infiltration of tramadol following LH provides better postoperative analgesia than open herni-

* Corresponding author: Remziye Sivaci, MD.
Dumlupinar Mh. Turabi Cd. Tutuncu Apt.
B Blok NO: 2/1 D:9 03200 AFYON- TURKEY
Tel: + 90 272 2145511; Fax: + 90 272 2158281
E-mail: remziyeesivaci@gmail.com

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orrhaphy, this issue is not well documented yet. The aim of this study was to evaluate postoperative pain relief effects and analgesic requirements of locally administered tramadol after LH and tension free open herniorrhaphy (TFOH) under spinal anesthesia.

Methods

Twenty ASA physical status I or II patients were randomized for elective unilateral either LH or TFOH (n=10 in each). Informed consent was obtained from each patient. Patients were evaluated as primary inguinal hernia type II-a,b and III-a according to Nyhus Classification. Patients with renal disease, active peptic ulceration, a history of drug or alcohol abuse, chronic pain states, or daily intake of non-steroidal anti-inflammatory drugs or opioids were excluded from the study. Any kind of complications were explained to all of the patients and informed consent was provided. All patients were instructed preoperatively about the use of a visual analog pain scale (VAS) (0= no pain to 10= excruciating pain). The patients didn't receive any analgesic premedication. Age (year), height (cm) and weights (kg) were recorded and all patients had received IV saline infusion (0.09% NaCl, 10 mL kg⁻¹) in the operating room about 20 min before spinal anesthesia. Standard monitors were included an electrocardiogram, non-invasive blood pressure device, and pulse oxymetry. Oxygen was administered to all patients via nasal catheters at rate 2 mL/min. Spinal anesthesia was made with a 26 G Quincke point needle in the lateral position at the L4-L5 interspaces. After clear, free flow of cerebrospinal fluid was obtained, 3 mL heavy 0.5% bupivacaine (*Marcaine heavy, Astra Zeneca, England) was administered intratecally. Patients were then placed with a supine horizontal position until the end of the study. Any decrease or increase in baseline systolic blood pressure of more than 20% was treated and excluded from the study. When a bradycardia or tachycardia occurs then atropine 0.5 mg was given. Data were recorded on a chart recorder. No opioids were given during the operation. The extra peritoneal laparoscopic hernia repairs were performed by the same surgeon. A subumbilical incision was made and the rectus sheath was retracted to create a plane between the pos-

terior aspect of the rectus muscle and the peritoneum. A space-maker balloon trocar apparatus was then introduced and inflated with isotonic sodium chloride solution (1000 mL) before deflation. The dissection exposed the hernial defect and allowed placement of the mesh. At the end of surgical procedure, Tramadol 200 mg in 40 mL of 0.9% saline was injected to the wound locally by the surgeon. The patients were placed in a 30° sitting position to keep the injected volume in the ilioinguinal dependent area of the fascial plane. Data collected that included to time intervals (minute) duration of spinal anesthesia (bupivacain injection to loss of sensorial level of L2) and duration of surgery (incision to end of surgery). Patients were transferred to the recovery room and observed by nursing staff and have not received any other analgesics during the study. Postoperative pain was assessed by using a VAS during unassisted mobilization at 3, 6, 12 and 24 hour after operation. When VAS value was ≥ 3 , tramadol was given intramuscularly for postoperative analgesia and total amount of tramadol were documented for each patient. Postoperative complications included nausea and vomiting were also noted.

Statistical analysis

The results were expressed as mean values \pm standard deviation. Mann-Whitney-U was used to compare VAS scores and total amounts of tramadol as additional analgesic postoperatively for each patient between two groups. Friedman test and Wilcoxon test were used for repeated and related measures. P values less than 0.05 was considered as statistically significant. The study was conducted in accordance with the ethical standards of the Helsinki Declaration of 1975.

Results

Age, height, weight, duration of anesthesia and surgery were similar in two groups (Table 1). VAS scores on postoperative periods in the groups and levels of statistical significance changes according to 3th hour VAS scores were shown in Table 2. VAS scores at postoperative 12 and 24 hours were significantly higher in both groups. The significant is greater in TFOH group. The VAS scores were reduced significantly in LH group than in TFOH group at 12 hours after

TABLE 1. Patients demographic data and duration of anesthesia and surgery in two groups

	LH (n=10)	TFOH (n=10)
Age (yr)	49.3 ± 9,8	49.6 ± 8.3
Height (cm)	168.9 ± 7.0	169.1 ± 3.8
Weight (kg)	71.2 ± 5.2	75.7 ± 4.9
Duration of anesthesia (min)	80.7 ± 9.1	78.6 ± 9.5
Duration of surgery (min)	64.4 ± 8.2	62.6 ± 8.2

LH; laparoscopic herniorrhaphy group, TFOH; tension free open herniorrhaphy group

TABLE 2. Visual analog scale (VAS) scores on postoperative periods in two groups and levels of statistical significance changes according to 3th hour VAS scores.

Hours	LH (n=10)		TFOH(n=10)	
	VAS	<i>p</i> [†]	VAS	<i>p</i> [†]
3	0.8 ± 0.78 (1 [0-2])	-	1.0 ± 0.94 (1 [0-3])	-
6	1.0 ± 0.81 (1 [0-2])	0.317	1.3 ± 0.67 (1 [0-2])	0.429
12	1.5 ± 0.97 (2 [0-3])	0.020	5.1 ± 0.99 (5 [4-7])	0.005
24	5 ± 1.33 (4.5 [3-6])	0.005	6.4 ± 1.34 (6 [5-9])	0.005

Data was shown as median [min - max] ± standard deviation. *p*[†]: levels of statistical significance changes according to 3th hour (Wilcoxon signed ranks).

LH; laparoscopic herniorrhaphy group, TFOH; tension free open herniorrhaphy group

TABLE 3. Tramadol requirements in two groups

	LH	TFOH
Tramadol use	n	n
None	5	0
1 time	5	3
2 time	0	7
<i>p</i>	0.001	62.6 ± 8.2

LH; laparoscopic herniorrhaphy group, TFOH; tension free open herniorrhaphy group

TABLE 4. Nausea and vomiting

	LH	TFOH
	n	n
Never	9	6
Nausea	1	1
Vomiting	0	3
<i>p</i>	0.218	62.6 ± 8.2

LH; laparoscopic herniorrhaphy group, TFOH; tension free open herniorrhaphy group

operation (1.5 ± 0.97 and 5.1 ± 0.99) (Table 2). Fifteen patients received additional tramadol postoperatively. There was statistically significant difference between groups for the time to the first request for tramadol between LH group and TFOH group; the patients in the TFOH groups needed additional tramadol earlier than the patients in the LH group. Tramadol requirements were significantly lower in LH group while 5 patients never received and 5 patients received only once after operation (Table 3). The highest frequency of postoperative nausea and vomiting (PONV) coincided in early postoperative period. There were not statistically significant differences between groups in means of PONV (Table 4).

Discussion

Laparoscopic surgery, compared with open procedures, may be associated with diminished surgical trauma response and shortened recovery time; early postoperative pain after laparoscopic procedure which is a frequent complaint (9). Saff et al showed that laparoscopic extraperitoneal hernia repair with bupivacaine resulted in a lack of pain-relieving efficacy (5). There are different reasons for pain in extraperitoneal laparoscopic hernia repair based on the afferent source of pain signals. There is a significant contribution of visceral pain fibers that are more diffuse in distribution and innervation (5). These fibers are more refractory to blockade with local anesthetics and nonsteroidal anti-inflammatory drugs than somatic fibers (2,10). The latter are related to stimulation of neuronal serotonin release and inhibition of presynaptic reuptake of norepinephrine and serotonin (11). Tramadol is a synthetic and centrally acting analgesic. It has both opioid and non-opioid properties. Tramadol has been shown to have a similar potent effect on pain as morphin (12). In clinical trials, tramadol has not displayed the serious side effects typically seen with the use of opioid analgesics or non-steroidal anti-inflammatory drugs (13-15). Direct infiltration into the wound is a common form of postoperative analgesia in the surgery because of reduced side effects of the drugs on cardiovascular and central nervous system (16). Relieving pain in patients with herniorrhaphy can be problematic. Inadequate analgesia may delay discharge or pro-

long hospital stay (6). Concerns over the safety of analgesics often lead physicians to use small doses of these drugs with consequent sacrifices in efficacy; the respiratory depression, together with the prevalent nausea and vomiting, caused by opioids. There is no available literature concerning the magnitude of pain in LH and TFOH after wound infiltration of tramadol postoperatively. It is a general belief that most surgeons thought that LH causes less postoperative pain than TFOH (2). We have found that VAS scores at postoperative 12 and 24 hours were significantly higher according to 3th hour VAS scores in both groups. The VAS scores were reduced significantly in LH group than in TFOH group at 12 hours after operation (1.5 ± 0.97 and 5.1 ± 0.99). Pain and postoperative tramadol requirements decreased in group LH. This difference is significant; it also may bias the results toward less pain and need for analgesics in LH group. Fifteen patients received tramadol postoperatively. There was statistically significant difference between groups for the time to the first request for tramadol between LH group and TFOH group; the patients in the TFOH groups needed additional tramadol earlier than the patients in the LH group. Tramadol requirements were significantly lower in LH group while 5 patients never received and 5 patients received only once after operation. The recommended systemic dose of tramadol for postoperative pain is 50 mg intramuscular injection. Morphine produces a prolonged postoperative analgesia, but is associated with major side effects such as postoperative nausea and vomiting, in particular the potential of delayed respiratory depression (15). Clonidine, an alpha 2 adrenergic agonist, has been shown to potentate postoperative analgesia. Although, clonidine improved the efficacy of analgesia, it was associated with prolonged sedation. Of all the agents used, wound infiltration of tramadol seems to show promise because of the absence of the side effects (18). Inadequate pain treatment causes discom-

fort, prevents sleep and thereby contributes to postoperative fatigue, delays discharge, and limits activity, prolong recovery period, and may induce nausea and vomiting. There were not statistically significant differences between groups in means of PONV in this study also. Yndgaard S. et al., have been shown that analgesic effect of subfascial infiltration with local analgesic was observed on postoperative pain after herniorrhaphy. Therefore, using tramadol may provide better effect is the postoperative pain and less side effects (19). The results of the VAS score indicate a negligible effect with a significant level for long-lasting period postoperatively when wound infiltration of tramadol was used in LH group. The effect of tramadol is clear: it lasts for a longer period and is evident during the mobilization. At postoperative 12 and 24 hour, the median VAS score in LH group decreased than TFOH group. Most of the patients in the group had not needed analgesic requirements but only a few patients was given analgesic drug for pain and with low VAS scores remained in the group. The nausea, vomiting and sedation, which are frequently associated with the administration of parenteral opioids and similar drugs such as tramadol. But, wound infiltration of these drugs has been found more suitable for use in a day care setting and postoperative analgesia (20).

Conclusion

We conclude that wound infiltration of 200 mg tramadol provides more long lasting effect for pain management in LH group without respiratory depression, PONV or other side effects

Conflict of interest

Authors declare no conflict of interest.

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