

## Original Article

# Post Laparoscopic Pain Control Using Local Anesthesia through Laparoscopic Port Sites

Seyyed Amir Vejdan<sup>1\*</sup>, Malihe Khosravi<sup>2</sup>, Ghodratoolah Naseh<sup>1</sup>

<sup>1</sup> Burn and General Surgery Wards, Imam Reza Hospital, University of Medicine, Birjand, Iran

<sup>2</sup> Tehran University of Medical Sciences, Tehran, Iran

## Abstract

**Background:** Severe abdominal pain is not common after laparoscopic surgeries, but acute or chronic pain after operation is considerable in some patients. Post-operative Pain control after laparoscopic surgeries, is conventionally achieved using analgesics such as non-steroidal anti-inflammatory drugs (NSAIDs) and narcotics, but their administration has a lot of side effects. This study compares the efficacy and side effects of local anesthetic drugs versus conventional analgesics in post-operative pain control.

**Materials and Methods:** This prospective investigation was conducted into two groups of patients (n=93). Group 1, as control group, was given conventional analgesics such as narcotics and NSAIDs. In investigational group, at the end of laparoscopic surgery, prior to port withdrawal, a local anesthetic mixture, a short acting (Lidocaine 2%) plus a long acting (Bupivacaine 0.5%) is instilled through the port lumen between the abdominal wall layers. The efficacy of both types of medications was compared to their efficacy and side effects.

**Results:** 85% of the control group, received 5 to 20 ml Morphine for pain control while the others were controlled with trans-rectal NSAIDs. In the treatment group, the pain of 65% of the patients was controlled only by local anesthetic drugs, 30% required NSAIDs and the other 5% required narcotics administration for pain control.

**Conclusion:** The administration of local anesthetic drugs after laparoscopic surgery is an effective method for pain control with a low complications rate and side effects of narcotics.

**Keywords:** Post laparoscopy, pain; local anesthetic, narcotics, NSAID

\*Corresponding Author: Seyyed Amir Vejdan. Head of Burn and General Surgery Wards, Imam Reza Hospital, Birjand, Iran. Tel: +98 (561) 2222300, Email: vejdan\_sa@yahoo.com

Please cite this article as: Vejdan SA, Khosravi M, Naseh Gh. Post Laparoscopic Pain Control Using Local Anesthesia through Laparoscopic Port Sites. Novel Biomed. 2014;2(3):102-106.

## Introduction

Post-operative pain control is one of the main concerns which all surgeons seriously take into consideration. More than seventy percent of patients admitted in surgery wards experience severe and intolerable pain requiring analgesics<sup>1</sup>. Despite the administration of narcotics, three quarters of patients experience acute or chronic pain<sup>2</sup>. Post-operative pain control is not only a philanthropic matter, also has an important physiologic role in post-operative consequences<sup>3</sup>.

Conventional post-operative pain control methods

consist of administration of narcotics and non-steroidal anti-inflammatory drugs (NSAIDs) which can control the pain effectively, but their side effects lead to many complications.

One of the most effective ways to decrease the side effects is decreasing the dosage, which can affect the analgesic efficacy and render the drugs useless. Close monitoring and finding another safe and effective alternative for pain control<sup>4</sup>, are the other options.

Local anesthetic drugs (LADs) are increasingly being used intra-operatively for pain control. LADs present some effects when infiltrate locally or intra-peritoneally<sup>5</sup>.

In many types of laparoscopic surgeries, the procedure can be completed with only LADs, and no general or regional anesthesia is required such as dialysis catheter anesthetic drugs instillation<sup>6</sup>.

Applications of LADs are not limited to the skin incisions and they can be applied in to peritoneal cavity to improve pain relief after laparoscopic cholecystectomy. The use of intra-peritoneal local anesthetics is safe, and it results in a statistically significant decrease in early post-operative abdominal pain<sup>7</sup>.

Application of the LADs after operation into the incision is an effective method with few side effects. In laparotomy incisions, especially large ones, application of LADs is not a suitable modality because a high and unacceptable dosage is required which can lead to side effects. But in small-size laparoscopic incisions, LADs can be utilized in a safe dosage range with effective results<sup>8</sup>.

The aim of this study was to compare the efficacy and side effects of conventional analgesics with LADs (a combination of short and long acting agents) in post-operative pain control.

## Methods

During a 17-month period, 93 patients were divided into two groups and compared with each other. Group 1, the control group, consisted of 46 patients, 34 females and 12 males with an average age of 45. The average BMI was 32. Investigational group consisted of 47 patients, 33 females and 14 male patients with average age of 43.5 year. Average BMI was 33.5. All of the patients had gall stones and were scheduled for elective laparoscopic cholecystectomy and their post-operative pain was handled using two different methods: The control group was managed with the conventional analgesics (narcotics and NSAID) and the investigational group was controlled with local anesthetic drugs. Included criteria for patients were in a narrow range of weight (maximally 10% difference of mean) and did not have acute cholecystitis (inflammation is an additional factor which can change the results). For excluding an acute cholecystitis, we used clinical and sonographics findings. In each group the size and numbers of the ports were equal. The operation of both groups was performed with

3 ports, two 10 mm ports, one of them placed in supra-umbilicus (camera port) and the other placed in epigastrium for extracting the gall bladder. One 5mm port was placed in the mid-clavicular line lateral to the umbilicus. At the end of operation after extracting the gall bladder, 80% of the abdominal gas was evacuated and the ports were withdrawn slowly under direct vision. When the ports were passing through the abdominal wall layers, instillation of a local anesthetic mixture through the ports was started and continued up to the subcutaneous layer. Then facia defect of 10 mm ports were closed with separate nylon sutures and for 5 mm port we closed just skin incision. Finally, patients transferred to the surgery ward and were checked out by the nurses hourly to evaluate the pain severity. In both groups, if patients had intolerable pain, firstly a diclofenac sodium suppository was prescribed and pain was checked for the next hour. If pain was not controlled, an intra-venous bolus dose of Morphine (5mg) was administered and repeated PRN every 4-6 hours. Morphine was the main narcotic for pain relief and the dosage range was between 5-10 mg. The Local anesthetic mixture for each port consisted of 7mL 2% Lidocaine, 1 mL Bupivacaine and 0.2 mL Natrium Bicarbonate. Alkalinizing (Natrium Bicarbonate) the surgical incision can prolong the anesthetic time<sup>9</sup> and yield better results with lower doses of the drugs. Patient selection was based on the exclusion criteria for patients with gall stone. All of our patients were randomized simply into treatment and control group. The goals and advantages of this study were totally explained for all of the patients and consent from was taken.

Operation time was equal in both groups which did not show any significant difference. The average of operation time for groups 1 and 2 was 34 and 37 minutes, respectively. Operations lasting more than 60 minutes were excluded from the study. Prophylactic antibiotic administered as a single dose of second generation cephalosporin (1gr) pre-operatively and continued on the first day of operation. During the operation, all of the patients received morphine as analgesic drug with a limited dose and if the patients required more doses of morphine or other types of analgesics, they were excluded from the study. Side effects were recorded 4 hours after operation, because by this time the effects of general anesthetic drugs had partially cleared and any other side effect can be related to the analgesics.

Procedure was explained totally to the patients by the responsible surgeon and consent form was taken and then they were selected and enrolled in to the study. There was no ethical limitation.

Exclusion criteria: BMI more than 35, Operation time more than 60 min, any history of local anesthetic drugs sensitivity, Extensive intra-abdominal manipulations in case of sever gall bladder inflammation like abscess and phlegmon, opium addiction or other drug abuse and any history of other medical diseases.

For data analysis we used SPSS 16.0 and Chi-Square test exhibits the significant difference between groups. We considered  $p$  less than 0.05 as a significant value.

## Results

All of the 93 patients were divided into two groups. The pain of the control group was controlled using conventional medication (narcotics and NSAIDs) and group 2 was managed with local anesthetic pain killers. 85% of group 1 did not respond to NSAIDs alone and needed narcotics. The 15% of them responded just to the NSAIDs and did not need other medications. 65% of group 2 did not need any medication and their pain was relieved by only the LADs. Out of the remaining 35% of patients, 30% needed NSAIDs (Figure 1).

For data analysis we used Chi-Square test which shows the significant difference between groups. We considered  $P$  less than 0.05 as a significant value. The results showed there was a statistically significant relationship between the groups tending to ask for sedatives (Chi-Square=63.187,  $df=2$ ,  $p<0.0001$ ). Our

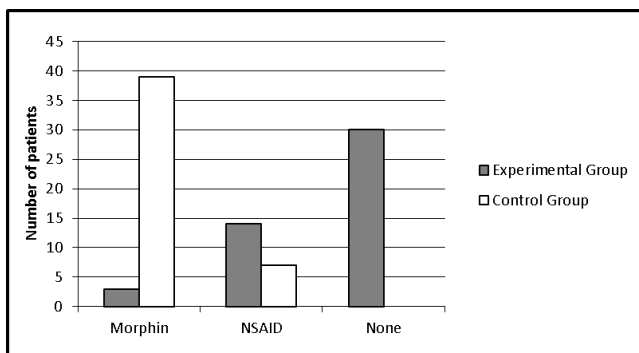


Figure 1. Distribution of analgesics administration.

data in table 2 shows that the complication rate is statistically less in group two (Table 1). LADs did not have sedative effects and patients in this group were ambulated earlier (average 3.5h) post-operatively when compared with the control group (average 6.5h). The First post-operative request for analgesic by patients in control group and patients in treatment group which did not respond to LADs, was 1 hour and 4 hours, respectively. For each patient in control group, elapsed time for preparation of narcotics and close monitoring for their side effects after administration by the nurses was about 30 minutes. In the treatment group we did not have this waste of time.

## Discussion

Although laparoscopic cholecystectomy, compared with open surgery, may be associated with decreased surgical trauma response and pain<sup>10,11</sup>, but early postoperative pain after laparoscopic procedures is a common complaint<sup>12</sup>. Laparoscopic port sites use of LADs for postoperative pain relief is an attractive method, which in theory may improve early pain control and minimize the need for opioids<sup>13</sup>. In the other side, narcotics which are the main method for pain control after operation, has lots of side effects.

In investigational group, results demonstrate that 65% of patients well responded to the local anesthetic drugs without any need to NSAIDs or narcotics. Only 5% of patients required narcotics administration and the pain of 30% of the patients was controlled with NSAIDs only. The control group exhibits very different results which are clinically and statistically important. In this group more than 85% of patients require narcotic administration and just 15% of patients' pain was controlled with NSAIDs alone. Narcotic administration in control group presented lots of side effects such as: nausea, vomiting, weakness, drowsiness, itching, headache and light headedness that are very bothersome for patients.

Local anesthetic drugs, if used appropriately, can decrease administration of narcotics in some conditions<sup>3</sup>. In a study in Italy, Cantore and et al. exhibits that pre-incision local infiltration with levobupivacaine reduces pain and analgesic consumption after laparoscopic cholecystectomy<sup>14</sup>. Another investigation<sup>15</sup> disclosed that

**Table 1:** Statistical evaluations of complication related to local anesthetic drugs

Complications	Group 1	Group 2	Odd Ratio (1.00/2.00)	CI95%	P value
	Number (%)	Number (%)			
Nausea & vomiting	25 (54.3)	7 (14.9)	16.034	2.526-18.320	0.000
Drowsiness	39 (84.8)	5 (10.6)	46.800	13.712-159.732	0.000
Weakness	33 (71.7)	15 (31.9)	5.415	2.229-13.157	0.000
Itching	10 (21.7)	0 (0.0)	0.783*	0.672-0.911	0.000
Headache and light headedness	28 (60.9)	2 (4.3)	35.000	7.540-162.472	0.000

intra-operative infusion of Lidocaine reduces postoperative Fentanyl requirements in patients undergoing laparoscopic cholecystectomy. Post-operative application of LADs for pain control instead of first administration of narcotics or NSAID can considerably decrease the severity of pain<sup>16,17</sup>. In advanced and prolonged laparoscopic surgeries, inserting a catheter inside the wound and the continuous infusion of local anesthetic drugs can decrease narcotic use and the length of hospitalization<sup>18</sup>. Intravenous infusion of Lidocaine pre and post-operatively not only could decrease the post-operative pain but also decreased the hospital stay time and costs<sup>19</sup>. Intraperitoneal injection of LADs is effective for decreasing post-operative pain and reduces the amount of narcotics and their side effects<sup>20</sup>. Analgesic and anti-inflammatory effects of the LADs, have some hormonal interactions like decreased plasma level of the cortisol which can reduce the length of inflammatory processes<sup>21</sup>. Intraperitoneal and mesosalpinx local anesthetic block, not port-site infiltration, have some impact on postoperative pain after laparoscopy.

There are many papers that do not support this study and mention that this matter requires further extensive investigations. For example in a study<sup>22</sup>, the application of placebo-controlled comparison of local anesthetic and NSAIDs for postoperative pain management after laparoscopic surgery has shown no difference between them and none of them can control the post-operative pain properly. In another investigation<sup>23</sup> LADs were not able to reduce post-operative pain significantly in mini-laparoscopic surgeries in children and young adults.

**Recommendation:** Instillation of LADs through laparoscopic port sites at the end of laparoscopic surgeries not only can control the pain effectively, also can decrease the need for narcotics and NSAIDs. They

are recommendable in the post-operative phase for all laparoscopic surgeries without any limitations. Patients feel better because of decreased narcotics side effects. We propose, instillation of LADs through laparoscopic port sites at the end of the operation during port withdrawal, can achieve effective results.

## References

1. Soler Company E1, Faus Soler M, Montaner Abasolo M, Morales Olivas F, Martínez-Pons Navarro V. Factors affecting postoperative pain. *Rev Esp Anesthesiol Reanim.* 2001;48(4):163-70.
2. Cunningham FG, MacDonald PC, Grant NF. Williams obstetrics. 21st ed. New York: McGraw-Hill. 2001:362-558.
3. Carolyn Middleton, BSc. Understanding the physiological effects of unrelieved pain. *Nurse Times.* 2003;99(37):28-31.
4. Duthie DJR, Nimmo WS. Adverse effects of opioid analgesic drugs. *Br J Anesth.* 1987; 59:61-77
5. Crabtree JH, Fishman A. laparoscopic approach under local anesthesia for peritoneal dialysis access, *Peritoneal Dialysis International.* 2000;20(6):757-65.
6. Alexander P, Boddy BM, Mehta S. The Effect of Intraperitoneal Local Anesthesia in Laparoscopic Cholecystectomy: *Anesth Analg.* 2006;103:682-688.
7. Møiniche S, Henrik MD. Local Anesthetic Infiltration for Postoperative Pain Relief after Laparoscopy. *Regional Anesthesia and Pain Medicine.* 2000;90(4):899-912.
8. Cantore F, Boni L, Di Giuseppe M, Giavarini L, Rovera F, Dionigi G. Pre-incision local infiltration with levobupivacaine reduces pain and analgesic consumption after laparoscopic cholecystectomy: a new device for day-case procedure. *Int J Surg.* 2008;6 Suppl 1:S89-92.
9. Curatolo M, Petersen-Felix S, Arendt-Nielsen L, Lauber R, Höglström H, Scaramozzino P, et al. Adding sodium bicarbonate to lidocaine enhances the depth of epidural blockade. *Anesth Analg.* 1998;86(2):341-7.
10. Barkun JS, Barkun AN, Sampalis JS. Randomized controlled trial of laparoscopic versus mini cholecystectomy. *Lancet.* 1992;340:1116-9.
11. Ure Bm, Troidl H, Spangenberg W. Pain after laparoscopic cholecystectomy: intensity and localization of pain and analysis of predictors in preoperative symptoms and intraoperative events. *Surg*

Endosc. 1994;8:90–6.

12. McMahon AJ, Russel IT, Baxter SR, et al. Laparoscopic versus minilaparotomy cholecystectomy: a randomised trial. *Lancet*. 1994;343:135–8.

13. Joris J, Cigarini I, Legrand M. Metabolic and respiratory changes after cholecystectomy performed via laparotomy or laparoscopy. *Br J Anaesth*. 1992;69:341–5.

14. Lauwick S, Kim do J, Michelagnoli G, Mistraretti G, Feldman L, Fried G, Carli F. Intraoperative infusion of lidocaine reduces postoperative fentanyl requirements in patients undergoing laparoscopic cholecystectomy. *Can J Anaesth*. 2008;55(11):754–62.

15. Kim JH, Lee YS, Shin HW, Chang MS, Park YC, Kim WY. Effect of administration of ketorolac and local anesthetic infiltration for pain relief after laparoscopic-assisted vaginal hysterectomy. *Int Med journal of Res*. 2005; 33(4):372–8.

16. Salman MA, Yücebaş ME, Coşkun F, Aypar U. Day-case laparoscopy, A comparison of prophylactic opioid, NSAID or local anesthesia for postoperative analgesia. *Acta anesthesiology Scand*. 2000;44(5):536–42.

17. Yoost TR, McIntyre M, Savage SJ. Continuous infusion of local anesthetic decreases narcotic use and length of hospitalization after laparoscopic renal surgery. *J Endo-urolology* 2009 Apr;23(4):623–6.

18. Clarke C, McConachie I, Banner R. Lidocaine infusion as a rescue analgesic in the perioperative setting. *Pain Res Manag*. 2008;

13(5):421–3.

19. Sherwinter DA, Ghaznavi AM, Spinner D, Savel RH, Macura JM, Adler H. Continuous infusion of intraperitoneal bupivacaine after laparoscopic surgery: a randomized controlled trial. *Obstetric Surg*. 2008;18(12):1581–6.

20. Pasqualucci A, Contardo R, Da Broi U, Colo F. The effects of intraperitoneal local anesthetic on analgesic requirements and endocrine response after laparoscopic cholecystectomy. *Journal of Laparo-endoscopic Surg*. 1994;4(6):405–12.

21. Newcomb W, Lincourt A, Hope W, Schmelzer T. Prospective, double-blinded, randomized, placebo-controlled comparison of local anesthetic and NSAIDs for postoperative pain management after laparoscopic surgery. *American j of Surg*. 2007;73(6):618–24.

22. Tsai YC, Wu CC, Yang SS. Is local anesthesia or oral analgesics necessary after mini-laparoscopic functional surgery in children and young adult. *Surgery Laparo-Endosc Percutaneous Tech*. 2008; 18(4):344–7.

23. Anil Gupta. Local anesthesia for pain relief after laparoscopic cholecystectomy. *Clinical Anesthesiology*, June 2005, 19(2):275–292.