

Original Research Article

Assessment of postoperative analgesia after intraperitoneal instillation of lornoxicam in laparoscopic appendectomy: a randomized study

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ABSTRACT

Background: The laparoscopic surgeries though results in less postoperative pain it is not a pain-free procedure and early postoperative pain is the most dominant complaint which requires strong analgesia. This study assessed post-operative analgesia after intraperitoneal instillation of lornoxicam in laparoscopic appendectomy.

Methods: This single blind randomized controlled trial was done in a tertiary care Centre of Patna from January 2016 to December 2016. A total of 60 patients scheduled for laparoscopic appendectomy were randomly assigned into two groups of 30 each (Group A and B) using computer generated random numbers. Patients in group A received intraperitoneal instillation of 8 mg lornoxicam (Diluted in 100 ml of normal saline) and in group B patients received 100 ml of intraperitoneal normal saline. During the post-operative period pain and requirement of analgesia were assessed.

Results: The demographic characteristics, clinical presentation and preoperative evaluation for vitals was comparable in group A and B. The mean VAS score was significantly low in group A compared to group B at fourth, sixth, eighth and twelfth hour interval ($p < 0.050$). In patients with group B, the requirement of analgesia was high (53.33%) compared to group A (33.33%) ($p = 0.118$).

Conclusions: The intraperitoneal instillation of lornoxicam is simple analgesic technique that reduces the pain without adverse effects compared to normal saline.

Keywords: Intraperitoneal instillation, Laparoscopic appendectomy, Lornoxicam

INTRODUCTION

Acute appendicitis is one of the most common clinical presentations that requires emergent surgery, with a lifetime incidence of about 8%. Since its first description by Fitz in 1886, much has been documented about the inflamed vermiform appendix and the need for prompt intervention to prevent the morbid consequences of perforation. In the 1880s, Billroth was credited with pioneering the field of abdominal surgical intervention in Vienna, opening the door for procedures to resect

diseased appendices. McBurney's muscle splitting incision standardized this approach to an appendectomy upon its publication in 1894.

Since then, mortality associated with acute appendicitis has been reduced to nearly 0.1% due to further improvements in medical and surgical management. Surgical operations have evolved over the decades from open appendectomies to increasingly minimally invasive procedures. Surgical advancement in the management of appendicitis has evolved dramatically in the last 120

years, from McBurney's simple large incision, to minimally invasive LA, to barely noticeable incisions after SILA. Depending on the clinical situation and the experience of the surgeon, each of the techniques can be effective.¹

Laparoscopic appendectomy is now considered the gold standard for appendectomy, even in complicated appendicitis.² Studies have shown significant advantages of this LA approach. Patients undergoing LA experience a reduction in wound infections, require less interoperative and postoperative pain medication, stay less time in hospital, have quickened return of normal bowel function, and improved cosmetic outcome, avoiding a large laparotomy scar.¹ Although laparoscopic surgeries results in less postoperative pain and/or reduced analgesic consumption compared with open surgeries, it is not a pain-free procedure. Early postoperative pain is the most prevalent and dominant complaint that requires strong analgesia including opiates after elective laparoscopic surgeries. For that reason, many efforts have been made to improve postoperative analgesia, but postoperative pain, however, does not completely disappear and several studies have shown that visceral pain is the major component. Nonetheless, pain may be moderate or even severe for some patients during the first 24 postoperative hours and has frequently been treated with nonsteroid anti-inflammatory drugs (NSAIDs) or opioid treatment.³

The exact etiology of pain after laparoscopic surgeries is still unclear, however, it appears to be multifactorial and the causes include, abdominal wall trauma by trochar entrances, diaphragmatic irritation secondary to CO₂ insufflation and pneumoperitoneum, type and temperature of insufflated gas and intraabdominal pH, residual intraperitoneal gas, intraabdominal trauma, microruptures of the parietal peritoneum due to abdominal distension, chemical irritation of the peritoneum, etc. Therefore, multimodal analgesic techniques are necessary. For the decreased postoperative pain after the laparoscopy, some methods such as rectus cover block, intraabdominal drain placement in order to throw out CO₂ pneumoperitoneum, intraabdominal instillation of local anesthetics, intraperitoneal infiltration of the local anesthetics or opioids, the use of intramuscular morphine injections, patient-controlled analgesia, and injection of local anesthetics into the port sites are suggested.³

The postoperative analgesic effect of intraperitoneal administration of local anesthesia after laparoscopic surgeries has proved to be effective and safe. However, there is lack of consensus regarding the drug, dose, concentration, site, and route of administration and there is scanty data on the effect of the same procedure during laparoscopic appendectomy. Therefore, we designed this single blind placebo-controlled trial to assess postoperative analgesia after intraperitoneal instillation of lornoxicam in laparoscopic appendectomy.

METHODS

This randomized controlled trial was carried out in the Department of Surgery of a tertiary care centre situated in Patna from January 2016 to December 2016. Applying thumb rule, a total of 60 patients scheduled for laparoscopic appendectomy divided into two groups of 30 each of either sex with age more than 14 years were included in the study.

Exclusion criteria

- Patients not fit for general anaesthesia and
- other comorbid conditions including diabetes mellitus and hypertension were excluded from the study.

Prior to the commencement, the ethical clearance was obtained from the Institutional Ethics Committee. The selected patients were briefed about the nature of study and a written informed consent was obtained prior to the enrolment.

Patients satisfying selection criteria were interviewed and the demographic data such as age and sex, presenting complaints were noted. Further the patients were subjected to clinical and systemic examination and the findings were noted on a predesigned and pretested proforma. Patients were randomly assigned to one of the two groups using computer generated random numbers. Both the groups were given Fentanyl 100 µg IV with general anaesthesia.

- Group A (n=30): Patients in this group received intraperitoneal instillation of 8mg lornoxicam (diluted in 100 ml of normal saline).
- Group B (n=30): Patients in this group received 100 ml of intraperitoneal normal saline.

In group A, 8 mg of lornoxicam was mixed with 100 mL of normal saline and 50 mL was instilled at the stump of the appendix. Of the 50 mL remaining 25 mL each was instilled into the both the side of the diaphragm. Postoperatively patients were extubated and shifted to recovery room where outcome variable including pain, requirement of analgesia and complications were observed and recorded by the surgeon.

Outcome variables

Pain: Pain was assessed using Visual Analogue Score ranging from 0 to 10 considering 0 as no pain and 10 as maximum pain. Visual analogue scale of 0 to 10 was explained to patient during pre op visit, considering zero as no pain, 1 to 3 mild pain, 4 to 7 moderate pain and 7 to 10 severe pain. A score of below 4 out of ten was considered satisfactory. The assessment of pain was done immediate post op, 15 minutes, 30 minutes, 60 minutes, 4 hours, 8 hours, 12 hours, 16 hours and 24 hours. Patients

with VAS greater than or equal to 4 were given inj. Diclofenac sodium 75mg im as a rescue analgesic. The surgeon monitoring post operatively was blinded to the analgesia provided.

Statistical Analysis

The data obtained was coded and entered in Microsoft Excel Spreadsheet (Annexure III). The data was analysed using IBM SPSS version 20.0 statistical software. The categorical data was expressed as rates, ratios, percentages and comparison was done using Fishers exact test and chi-square test. Continuous data was expressed as mean ± standard deviation and the comparison was done using independent sample t test. A probability ('p' value) of less than or equal to 0.05 at 95% CI was considered as statistically significant.

RESULTS

In the present study 70% of the patients in group A were males compared to 50% in group B.

Table 1: Sex distribution.

Sex	Group A (n=30)		Group B (n=30)	
	N	%	N	%
Male	21	70.00	15	50.00
Female	9	30.00	13	50.00
Total	30	100.00	30	100.00

Table 2: Age distribution.

Age group (years)	Group A (n=30)		Group A (n=30)	
	N	%	N	%
20 or less	9	30.00	7	23.33
21 to 30	9	30.00	12	40.00
31 to 40	9	30.00	4	13.33
41 to 50	2	6.67	5	16.67
51 to 60	0	0.00	1	3.33
61 to 70	1	3.33	1	3.33
Total	30	100.00	30	100.00

Table 3: Clinical presentation.

Complaints	Fever	Group A (n=30)		Group A (n=30)		P value
		N	%	N	%	
Fever	Present	6	20	3	10	0.469
	Absent	24	80	27	90	
	Total	30	100	30	100	
Loose	Present	0	0	0	0	
Stools	Absent	30	100	30	100	
	Total	30	100	30	100	

The male to female ratio in group A was 2.33:1 compared to 1:1 in group B but the difference was statistically not significant (p=0.114) (Table 1). The age distribution of the patients in group A and B was comparable (p=0.402)

(Table 2). The mean age in group A was 28.40±11.60 years compared to 29.93±11.67 in group B (p=0.612) suggesting that, the mean age was comparable in both the groups. With regard to clinical presentation no statistically significant difference was noted between group A and B (p>0.050) (Table 3).

Table 4: Vitals.

Variables	Group A (n=30)		Group A (n=30)		P value
	Mean	SD	Mean	SD	
Pulse rate (/minutes)	84.37	7.82	85.53	3.92	0.469
Respiratory rate(/minutes)	19.23	3.31	19.23	2.18	1.000
Systolic BP (mm HG)	113.73	6.10	116.40	6.67	0.112
Diastolic BP (mm HG)	74.07	5.95	76.53	5.80	0.146
Temperature (°F)	98.00	0.79	98.63	2.11	0.132

Table 4 shows comparison of mean pulse rate, respiratory rate, systolic blood pressure, diastolic blood pressure and temperature. It was observed that all these vitals were comparable in group A and B (p>0.050).

Table 5: VAS scores.

Interval (hours)	Group A (n=30)		Group A (n=30)		P value
	Mean	SD	Mean	SD	
0.5	2.00	2.27	1.80	1.52	0.693
1	1.90	1.71	2.40	1.22	0.198
2	1.90	1.49	2.38	1.27	0.188
4	1.87	1.63	2.97	1.54	0.010
6	2.30	1.76	3.90	1.73	0.001
8	2.27	1.76	3.37	1.88	0.023
12	2.13	1.53	3.13	2.13	0.041
24	2.57	1.83	1.77	1.48	0.068

In the present study among the patients with group A mean VAS score was 2.00±2.27 which decreased till fourth hour duration to 1.87±1.63 and later increased to 2.30±1.76 at sixth hour which was 2.27±1.76 and 2.13±1.53 at eighth and twelfth hour. The maximum pain scores were noted at 24 hours interval. In group B, the mean VAS score was 1.80±1.52 at 30 minutes interval which gradually increased with its peak to 3.90±1.54 at six hours and reduced to 1.77±1.48 at 24 hours. The mean VAS score was significantly low in group A compared to group B at fourth, sixth, eight and twelfth hour interval (Table 5).

The requirement of analgesia was high in group B (53.33%) compared to group A (33.33%) the difference was statistically not significant (p=0.118).

Table 6: Requirement of analgesia.

Requirement	Group A (n=30)		Group B (n=30)	
	N	%	N	%
Yes	10	33.33	16	53.33
No	20	66.67	14	46.67
Total	30	100.00	30	100.00

DISCUSSION

Beginning with its initial description by Fitz in the 19th century, acute appendicitis has been a significant long-standing medical challenge; today it remains the most common gastrointestinal emergency in adults. Already in 1894, McBurney advocated for the surgical removal of the inflamed appendix and is credited with the initial description of an Open Appendectomy (OA). With the introduction of minimally invasive surgery, this classic approach evolved into a procedure with multiple, smaller incisions; a technique termed Laparoscopic Appendectomy (LA). Laparoscopic approaches to surgery have increased dramatically over the past several years. Reasons for their popularity are improved postoperative pain and improved healing time as compared to open techniques, which can result in earlier recovery and discharge from the hospital.⁴

Laparoscopic surgeries results in less postoperative pain and/or reduced analgesic consumption as well as morphine as compared with open surgeries. So, it is thus logical to suggest that returning to normal daily activities is also more rapid with laparoscopy. Postoperative pain, however, does not completely disappear after laparoscopic surgeries and, in the early postoperative period, severe pain and nausea may occur and a strong analgesia may be necessary.⁵⁻⁷

In the presents study distribution of patients based on demographic characteristics including age and sex were comparable in both the groups. Further, both the groups did not differ significantly with regard to clinical presentation and preoperative evaluation for vitals. These findings rule out the possible bias which would have influenced the results.

In patients with group A mean VAS score were slightly high (2.00 ± 2.27) compared to group B (1.80 ± 1.52) at 30 minutes interval but the difference was statistically not significant ($p=0.693$) but at 30 minutes and two hours interval the mean VAS scores in group A were low compared to group B but again the difference was statistically not significant ($p>0.050$). At fourth to twelve hours the mean VAS scores were significantly low in patients with group A compared to group B ($p<0.050$) suggesting significant pain relief in patients who underwent laparoscopic appendectomy with intraperitoneal instillation of lornoxicam.

However, at 24 hours duration though the mean pain scores were slightly high. The maximum pain scores

were noted at 24 hours interval. In group B, the mean VAS score was 1.80 ± 1.52 at 30 minutes interval which gradually increased with its peak to 3.90 ± 1.54 at six hours and reduced to 1.77 ± 1.48 at 24 hours. The mean VAS score was significantly low in group A compared to group B at fourth, sixth, eight and twelfth hour interval. The mean pain scores remained <3 throughout 24 hours postoperatively in group A which indicates no administration of post-operative rescue analgesia. Despite, in group B, though maximum patients required rescue analgesia (53.33%) compared to group A (33.33%), the difference was statistically not significant ($p=0.118$).

A multimodal approach to pain management involving the use of non-steroidal anti-inflammatory drugs, opioids, and local anesthetic infiltration has been suggested as the optimal combination for laparoscopic surgery.⁴ There are a variety of local anesthetic techniques available which have been investigated in order to find out their potential analgesic benefits in laparoscopic surgery. Likewise injecting local anesthetic into the peritoneum through the ports created either before the start of surgery or prior to closure over the visceral peritoneum through the trocar site or into the surgical bed after the excision of the organ or under the diaphragm is reported to decrease shoulder pain after laparoscopic surgery.⁸ Several studies have utilized this method of analgesia. Bupivacaine, levobupivacaine, lidocaine and ropivacaine have been used intraperitoneally in varying doses to achieve analgesia in various laparoscopic surgeries.⁹⁻¹²

In the studies, after the laparoscopic surgeries, the intraperitoneal local anesthetics are found to be very effective for the decrease in postoperative pain.¹³ This non-invasive method has a minimum risk and it can be easily applied. Besides, there are studies showing that the application of intraperitoneal anesthetic administration is not useful for the prevention of postoperative pain.¹⁴ Because laparoscopic surgery, a minimally invasive technique, is associated with reduced surgical trauma, the use of local anesthetic infiltration for efficacious postoperative analgesia should allow widespread use of laparoscopic day-case surgery.³ Consistent to this literature the present study showed that, the intraperitoneal instillation of 8 mg lornoxicam results in lower pain compared to placebo till 24 hours post laparoscopic appendectomy though the requirement of analgesia was comparable in both the groups which could be attributed to the smaller sample size of the study population. However, no data is available on the analgesic effect of lornoxicam in laparoscopic appendectomy.

Lornoxicam (chlortenoxicam), a nonsteroidal anti-inflammatory drug (NSAID) of the oxicam class with analgesic, anti-inflammatory and antipyretic properties, is distinguished from established oxicams by a relatively short elimination half-life (3 to 5 hours), which may be advantageous from a tolerability standpoint. Data from

preliminary clinical trials suggest that lornoxicam is as effective as the opioid analgesics morphine, pethidine (meperidine) and tramadol in relieving postoperative pain following gynaecological or orthopaedic surgery, and as effective as other NSAIDs after oral surgery. Lornoxicam has a tolerability profile characteristic of an NSAID, with gastrointestinal disturbances being the most common adverse events. Limited clinical experience to date suggests that, as with a number of other NSAIDs, lornoxicam may provide a better-tolerated alternative or adjuvant to opioid analgesics for the management of moderate to severe pain. Lornoxicam has been successfully used in prevention and treatment of postoperative pain in patients undergoing gynecological operations. Studies showed that lornoxicam administered preemptively improved the quality of postoperative analgesia and opioid consumption.¹⁵ These preliminary findings require confirmation in further comparative and long-term studies.

CONCLUSION

This study showed that the intraperitoneal instillation of lornoxicam during laparoscopic appendectomy is simple analgesic technique that reduces the pain without adverse effects compared to normal saline.

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REFERENCES

- Switzer NJ, Gill RS, Karmali S. The evolution of the appendectomy: from open to laparoscopic to single incision. *Scientifica*. 2012;2012.
- Kim HO, Yoo CH, Lee SR, Son BH, Park YL, Shin JH, et al. Pain after laparoscopic appendectomy: a comparison of transumbilical single-port and conventional laparoscopic surgery. *J Korean Surg Soc*. 2012;82(3):172-8.
- Memedov C, Menteş Ö, Şimşek A, Can KE, Yağci G, Harlak A, et al. Comparison of analgesic effects of intraperitoneal lornoxicam and ropivacaine administration in laparoscopic cholecystectomy. *Balkan Med J*. 2010;2010(3):142-9.
- Ortiz J, Rajagopalan S. A review of local anesthetic techniques for analgesia after laparoscopic surgery. *J Minim Invasive Surg Sci*. 2014;3(2):e11310.
- Møiniche S, Mikkelsen S, Wetterslev J, Dahl JB. A qualitative systematic review of incisional local anaesthesia for postoperative pain relief after abdominal operations. *Br J Anaesthesia*. 1998;81(3):377-83.
- Kehlet H, Gray AW, Bonnet F, Camu F, Fischer HB, McCloy RF, et al. A procedure-specific systematic review and consensus recommendations for postoperative analgesia following laparoscopic cholecystectomy. *Surg Endosc*. 2005;19:1396-415.
- Narchi P, Benhamou D, Fernandez H. Intraperitoneal local anaesthetic for shoulder pain after day-case laparoscopy. *Lancet*. 1991;338(8782-8783):1569-70.
- Loughney AD, Sarma V, Ryall EA. Intraperitoneal bupivacaine for the relief of pain following day case laparoscopy. *Br J Obstet Gynaecol*. 1994;101(5):449-51.
- Papadima A, Lagoudianakis EE, Antonakis P, Filis K, Makri I, Markogiannakis H, et al. Repeated intraperitoneal instillation of levobupivacaine for the management of pain after laparoscopic cholecystectomy. *Surgery*. 2009;146(3):475-82.
- Williamson KM, Cotton BR, Smith G. Intraperitoneal lignocaine for pain relief after total abdominal hysterectomy. *Br J Anaesth*. 1997;78(6):675-7.
- Kaufman Y, Hirsch I, Ostrovsky L, Klein O, Shnaider I, Khoury E, et al. Pain relief by continuous intraperitoneal nebulization of ropivacaine during gynecologic laparoscopic surgery-a randomized study and review of the literature. *J Minim Invasive Gynecol*. 2008;15(5):554-8.
- Inan A, Sen M, Dener C. Local anesthesia use for laparoscopic cholecystectomy. *World J Surgery*. 2004;28(8):741-4.
- Raetzell M, Maier C, Schroder D, Wulf H. Intraperitoneal application of bupivacaine during laparoscopic cholecystectomy--risk or benefit?. *Anesthesia Analgesia*. 1995;81(5):967-72.
- Trampitsch E, Pipam W, Moertl M, Sadjak A, Dorn C, Sittl R, Likar R. Preemptive randomized, double-blind study with lornoxicam in gynecological surgery. *Schmerz (Berlin, Germany)*. 2003;17(1):4-10.

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