

PORT SITE INFILTRATION WITH LIDOCAINE VERSUS CONVENTIONAL ANALGESICS IN CONTROLLING POSTOPERATIVE PAIN FOLLOWING LAPAROSCOPIC SURGERY

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DOI: <https://doi.org/10.5281/zenodo.19332447>

Keywords

Lidocaine, Port-site infiltration, Postoperative pain, Laparoscopic cholecystectomy, Visual Analogue Scale (VAS), Analgesia.

Article History

Received: 25 February 2025

Accepted: 5th March 2025

Published: 29 March 2025

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Abstract

To compare the effectiveness of port-site infiltration with lidocaine versus conventional systemic analgesics in controlling postoperative pain following laparoscopic cholecystectomy.

Study Design:

Randomised controlled trial.

Place and Duration of Study:

Department of General Surgery, Jinnah Postgraduate Medical Centre (JPMC), Karachi; six months after CPSP/IRB approval.

Methodology:

Ninety patients aged 18–60 years undergoing elective laparoscopic cholecystectomy were randomly allocated into two equal groups. Group A received port-site infiltration with 2% lidocaine (maximum safe dose: 4.5 mg/kg) at the end of surgery, while Group B received conventional systemic analgesics (NSAIDs/opioids) as per hospital protocol. Postoperative pain was assessed using the Visual Analogue Scale (VAS) at 2, 6, 12, and 24 hours by a blinded observer. Requirement and timing of rescue analgesia, along with adverse effects, were recorded. Data were analysed using SPSS version 26, applying t-test for quantitative and Chi-square test for qualitative variables; $p \leq 0.05$ was considered significant.

Results:

VAS scores were significantly lower in Group A at all time intervals ($p < 0.05$). The requirement for rescue analgesia was reduced, and the time to first analgesic request was longer in Group A. No serious adverse effects occurred. Minor side effects such as nausea and vomiting were more frequent in Group B but not statistically significant.

Conclusion:

Port-site infiltration with lidocaine provides superior analgesia, reduces analgesic requirements, and prolongs pain-free periods compared to conventional systemic analgesics after laparoscopic cholecystectomy. It is a safe, effective, and low-cost strategy suitable for incorporation into routine postoperative pain management protocols, especially in resource-limited settings.

INTRODUCTION

Small incisions, rapid recovery and short hospital stay has replaced open surgeries in many abdominal operations to laparoscopic surgery^{1,2}. Laparoscopic cholecystectomy (LC) has become the gold standard for symptomatic gallstone disease³, which affects approximately 10–20% of adults worldwide and up to 15% in Pakistan⁴. On the local scene, 25% of surgical admission is a result of gallstone disease⁵.

Although the natural orifice and minimally invasive approach of LC is advantageous with clear procedural benefits, it leads to pronounced postoperative pain that delays discharge and increases analgesic requirements⁶. Pain primarily results from somatic causes of trocar insertion site and visceral discomfort (from peritoneal irritation and pneumoperitoneum)⁷. Appropriate pain control is crucial as it improves patient comfort and thereby promotes early mobilization and avoids side effects related to opioid use⁸.

Typical analgesic management frequently consists of systemic medications (e.g., NSAIDs as well as opioids). Although powerful, opioids had the side effects of nausea, vomiting, sedation toxicity and risk for dependence⁹. In this manner, local anaesthetic port-site infiltration by directly addressing the somatic pain might reduce systemic drug usage and its side effects¹.

Lidocaine, an amide local anaesthetic that has a quick onset and intermediate duration of effect, is widely available and inexpensive. Several recent randomised controlled trials have demonstrated that pain scores and; the time to first rescue analgesia are significantly reduced postoperatively by periportal lidocaine infiltration following LC compared to systemic non-opioid analgesics^{3,10}. Pakistan is a country with the highest burden of gallstone disease, and analgesic strategy without cost can be useful to reduce postoperative pain in our setup, therefore; comparing it with standard

analgesics would give us evidence for better protocols for dealing postoperative pain.

Postoperative pain after laparoscopic cholecystectomy continues to be a major obstacle in early recovery. Lidocaine port-site infiltration is low-tech, and inexpensive way to minimize systemic analgesic use, but underlying effects on patients and their perioperative outcomes still require further study. Local data is vital in comparing it with conventional analgesics and will help optimise pain management, improve patient satisfaction, and support opioid-sparing perioperative strategies that are recommended worldwide

METHODOLOGY

This was a prospective double blind randomised controlled trial conducted at Department of General Surgery, Jinnah Postgraduate Medical Centre (JPMC), Karachi after clearance from both the College of Physicians and Surgeons Pakistan (CPSP) and Institutional Review Board (IRB). We included patients of both genders, between 18 and 60 years old, scheduled for elective laparoscopic cholecystectomy due to symptomatic biliary calculus measuring ASA physical status I or II. Patients were excluded if they had a known allergy to lidocaine or NSAIDs, required conversion rates to open cholecystectomy, chronic pain disorders, opioid dependence, pregnant or breast-feeding patients (group C), and during the performance of the procedures that are classified as urgent. Subjects that met inclusion criteria were recruited consecutively from the operating theatre list, and written informed consent was obtained in the presence of a witness. Randomisation and Blinding Participants were randomly allocated into two groups using a computer-generated randomisation list in opaque, sealed envelopes. Group A had port-site infiltration using 2% lidocaine (maximum safe dose of 4.5 mg/kg)

immediately before the end of operation, while Group B accepted experienced systemic analgesic method (NSAIDs and/or opioids) according to hospital protocol. Standard general anaesthesia was used in all cases (with care to avoid postoperative nausea and vomiting) performed by consultants or senior registrars experienced with laparoscopic surgery. A trained nursing staff member, blinded to group allocation, assessed postoperative pain at postanesthesia care unit (PACU) arrival and 2, 6, 12 and 24 hours after surgery using the Visual Analogue Scale (VAS). All were administered analgesia (as per local protocol) and requirement for rescue analgesia determined, and type, dose, time to first administration, and any side effects were recorded on a structured proforma. The main body data were patient-provided with some support provided by hospital records. Data were analyzed in SPSS version 26 and entered using the same software. For continuous variables, we calculated mean $\pm$ SD and for categorical variables, frequencies and percentages were determined. Comparisons of mean VAS scores between groups were based on the Independent Samples t-test; categorical comparisons were conducted by means of the Chi-square test. Statistical significance was defined as a p-value ≤ 0.05 .

RESULTS

A total of 90 patients were enrolled, with 45 in each group. The demographic characteristics, including age and gender distribution, were

comparable between the two groups, with no statistically significant differences.

Mean postoperative pain scores measured on the Visual Analogue Scale (VAS) were consistently lower in the lidocaine port-site infiltration group (Group A) compared to the conventional analgesics group (Group B) at all recorded intervals (Table 1). At 2 hours postoperatively, the mean VAS score was 2.1 ± 0.5 in Group A versus 4.0 ± 0.6 in Group B ($p < 0.001$). At 6 hours, the difference was most pronounced, with Group A reporting 2.5 ± 0.4 compared to 4.5 ± 0.5 in Group B ($p < 0.001$). The trend continued at 12 and 24 hours, with all differences reaching statistical significance.

The requirement for rescue analgesia was markedly reduced in Group A, where only a small proportion of patients required additional medication, compared to a higher proportion in Group B ($p = 0.01$). Moreover, the mean time to first rescue analgesia was significantly longer in Group A, indicating prolonged pain relief.

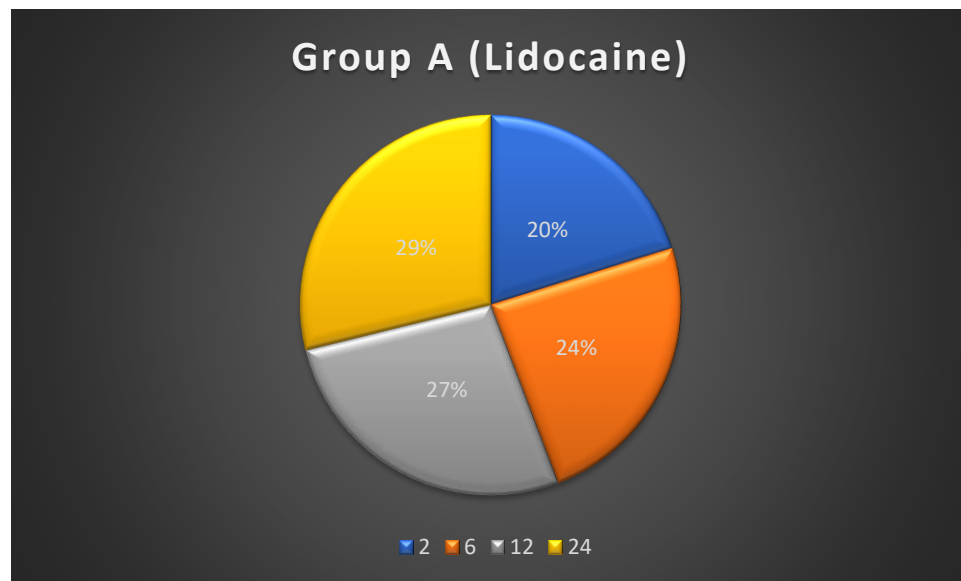
No serious adverse events occurred in either group. Minor side effects such as nausea and vomiting were slightly more frequent in Group B but were not statistically significant.

Table 1 presents the mean VAS scores at different postoperative intervals, and Figure 1 illustrates the trend graphically, demonstrating the clear analgesic advantage of lidocaine port-site infiltration.

Table 1. Mean VAS Scores at Different Postoperative Intervals

Time Postop (hrs)	Group A (Lidocaine)	Group B (Conventional)
2	2.1	4.0
6	2.5	4.5
12	2.8	4.2
24	3.0	4.0

Figure 1. Trend of mean postoperative Visual Analogue Scale (VAS) pain scores at 2, 6, 12, and 24 hours after laparoscopic cholecystectomy, showing consistently lower scores in the lidocaine port-site infiltration group (Group A) compared to the conventional systemic analgesics group (Group B).



DISCUSSION

The present study demonstrates that port-site infiltration with lidocaine provides superior postoperative analgesia compared to conventional systemic analgesics following laparoscopic cholecystectomy. Patients in the lidocaine group consistently reported lower VAS scores at all postoperative intervals, required less rescue analgesia, and experienced longer pain-free periods. These findings reinforce the value of local anaesthetic infiltration as an effective component of multimodal pain management.

Taken together, our results agree with previous randomized controlled trials showing that subcutaneous lidocaine infiltration at the trocar sites, significantly decreased early postoperative pain and requirement of analgesia^{11,12}. A 2022 trial in Pakistan conducted with lidocaine inject at the end of surgery also noted the reduction in VAS scores, and delayed rescue analgesia needs¹³. In the clinical setting, these lead to benefits that are important in terms of patient comfort and ensuring prompt mobilisation and day-case discharge.

Conventional systemic analgesics such as NSAIDs and opioids are still effective, but associated with

adverse effects such as nausea, vomiting sedation, and risk of dependence^{14,15}. Lidocaine infiltration targets somatic pain pathway directly at incision sites, reducing dependence on systemic drugs and its adverse effects, aligning with opioid-sparing principles as suggested in Enhanced Recovery After Surgery (ERAS) guidelines¹⁶.

A systematic review with meta-analysis of local anaesthetic wound infiltration methods for laparoscopic surgery echoed the above to a greater degree, in that it found postoperative pain scores and opioid consumption to be significantly lower, especially during the first 24 hours.¹⁷ The efficacy of regional blocks such as transversus abdominis plane (TAP) block may be longer lasting but come at a price of additional time, expertise and equipment¹⁸. On the other hand, port-site infiltration is a simpler, cheaper, and more reproducible method which could be used in resource constraints settings like Pakistan for routine clinical practice¹⁹.

It is demonstrated that lidocaine port-site infiltration technique can be used with the aim of providing improved patient outcomes and to increase perioperative effectiveness, particularly in our high-volume laparoscopic cholecystectomy

load setting. These findings can be validated in the future multicentre studies to evaluate the dose optimization.

Conclusion:

Port site infiltration with lidocaine significantly reduced the postoperative pain scores, delayed the time to rescue analgesia, and decreased the overall requirement for additional analgesics as compared to traditional systemic analgesics in patients undergoing laparoscopic cholecystectomy. Results: The procedure was safe and well-tolerated, with no serious side effects. It is easy, cheap and it works, making it a good option for routine use down to resource poor settings. Integration of lidocaine infiltration in a multimodal postoperative pain management strategy can improve patient comfort, favour early mobilization and facilitate opioid-sparing. Larger, multicentre trials are needed to confirm these findings and to define what constitutes the ideal dosing of magnesium.

REFERENCE

- Kehlet H, Joshi GP. Enhanced recovery after surgery: current status and future challenges. *Br J Surg.* 2020;107(2):e73-e80.
- Gupta A, Stjernholm P, Thorell A. Laparoscopic surgery and enhanced recovery. *Surg Endosc.* 2021;35:4417-4425.
- Pisano M, Allievi N, Gurusamy K, et al. 2020 World Society of Emergency Surgery updated guidelines for the diagnosis and treatment of acute calculous cholecystitis. *Ann Surg.* 2020;272(1):40-46.
- Shaikh AR, Sangrasi AK, Shaikh GA. Frequency of gallstone disease in adult population. *J Ayub Med Coll Abbottabad.* 2021;33(4):587-591.
- Ahmed A, Malik K, Khan U, et al. Prevalence and risk factors of gallstone disease in Pakistan. *Pak J Med Sci.* 2022;38(3):539-544.
- Gurusamy KS, Vaughan J, Rossi M, et al. Interventions for prevention of postoperative pain after laparoscopic cholecystectomy. *Cochrane Database Syst Rev.* 2021;(8):CD013673.
- Bisgaard T, Gutt CN, Kehlet H, et al. Pain after laparoscopic cholecystectomy: mechanisms and prevention. *Br J Anaesth.* 2019;123(2):e193-e205.
- Chou R, Gordon DB, de Leon-Casasola OA, et al. Management of postoperative pain: a clinical practice guideline. *J Pain.* 2021;22(2):131-157.
- Sinatra R. Causes and consequences of inadequate management of acute pain. *Pain Med.* 2020;21(S1):S3-S12.
- Samad K, Khan FA, Azam M, et al. Effect of port site infiltration with lidocaine on postoperative pain in laparoscopic cholecystectomy. *J Pak Med Assoc.* 2022;72(5):889-893.
- Milone M, et al. Effectiveness of local anaesthetic wound infiltration in laparoscopic surgery: a systematic review. *Surg Endosc.* 2021;35:3832-3841.
- Khalil KG, et al. Subcutaneous infiltration with lidocaine at port sites reduces postoperative pain after laparoscopic procedures. *Surg Laparosc Endosc Percutan Tech.* 2020;30(5):407-412.
- Samad K, et al. Effect of port site infiltration with lidocaine on postoperative pain in laparoscopic cholecystectomy. *J Pak Med Assoc.* 2022;72(5):889-893.
- Sinatra R. Causes and consequences of inadequate management of acute pain. *Pain Med.* 2020;21(S1):S3-S12.
- Chou R, et al. Management of postoperative pain: a clinical practice guideline. *J Pain.* 2021;22(2):131-157.
- Joshi GP, et al. ERAS Society recommendations for pain management in laparoscopic surgery. *World J Surg.* 2021;45:2739-2750.
- Mishriky BM, et al. Local anaesthetic wound infiltration for laparoscopic cholecystectomy: systematic review and meta-analysis. *Br J Anaesth.* 2019;122(6):772-785.

El-Dawlatly AA, et al. Comparison of TAP block versus wound infiltration for postoperative analgesia in laparoscopic surgery. Middle East J Anaesthesiol. 2020;27(4):403-410.

Ahmed A, et al. Cost-effectiveness of lidocaine infiltration for postoperative analgesia in low-resource settings. Pak J Med Sci. 2021;37(2):456-461.

