

Efficacy of Dexmedetomidine–Lidocaine Infusions on Postoperative Pain Scores, Opioid Consumption, and Recovery-Room Discharge Time in Day-Care Laparoscopic Cholecystectomy

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Received: 28-07-2026 / Revised: 25-08-2026 / Accepted: 26-09-2026

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Conflict of interest: Nil

Abstract:

Aim: To compare postoperative pain scores, rescue-opioid consumption, duration of analgesia, adverse effects, and recovery-room discharge time between patients receiving fentanyl infusion and those receiving dexmedetomidine–lidocaine infusion for day-care laparoscopic cholecystectomy.

Materials and Methods: This prospective comparative study, included 60 patients aged 20–45 years with American Society of Anesthesiologists (ASA) physical status I or II who underwent laparoscopic cholecystectomy. Thirty patients were assigned to Group I, the fentanyl group, and 30 to Group II, the dexmedetomidine–lidocaine group. Preoperative pulse rate, blood pressure, and respiratory rate were recorded. Postoperative pain was assessed using a visual analogue scale (VAS) on arrival in the recovery room, after 30 minutes, after 1 hour, and at subsequent assessments. Other recorded outcomes included rescue-opioid use, duration of analgesia, nausea and vomiting, and time from recovery-room arrival to meeting discharge criteria.

Results: The recorded early postoperative VAS scores were lower in Group II than in Group I: 4 versus 6 on recovery-room arrival, 2 versus 5 at 30 minutes, and 2 versus 4 at 1 hour. The reported duration of analgesia was 14.02 ± 2.45 hours in Group II and 10.72 ± 2.84 hours in Group I. Reported recovery-room discharge times were 60 and 90 minutes, respectively. Delayed discharge was recorded in 10% of Group II and 50% of Group I. During the first 8 postoperative hours, nausea and vomiting were reported in 30% and 40%, respectively.

Conclusion: Dexmedetomidine–lidocaine infusion may improve early postoperative analgesia and shorten recovery-room stay compared with fentanyl infusion.

Keywords: Dexmedetomidine; Lidocaine; Laparoscopic Cholecystectomy; Postoperative Pain; Opioid Consumption.

DOI: 10.25258/ijpqa.17.9.33

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Introduction

Day-care laparoscopic cholecystectomy requires an anaesthetic and analgesic approach that controls pain while allowing patients to recover promptly. Although laparoscopic surgery avoids the larger incision of open cholecystectomy, patients can still experience pain at the port sites, visceral discomfort, and referred shoulder pain. These symptoms are particularly important during the first hours after surgery, when patients must regain mobility, tolerate oral intake, and meet discharge criteria.

Opioids remain useful for treating acute postoperative pain. Their benefits, however, must be weighed against adverse effects that are especially troublesome in ambulatory care, including nausea, vomiting, sedation, pruritus, and respiratory depression. Pain itself can delay discharge, but so can the treatment given for it. This creates a practical need for

analgesic regimens that reduce opioid exposure without compromising comfort or safety.

Multimodal analgesia addresses this problem by combining interventions that act through different mechanisms. Dexmedetomidine, an alpha-2 adrenergic agonist, produces sedation and sympatholysis and can contribute to perioperative analgesia. Lidocaine given by intravenous infusion has been investigated for analgesic and antihyperalgesic effects. Their combined use may reduce the need for rescue opioids, although the magnitude of benefit and effects on recovery depend on dose, timing, co-administered drugs, and the patient population.

Previous studies in laparoscopic cholecystectomy have examined dexmedetomidine and intravenous lidocaine, but findings cannot automatically be applied to a combined regimen or to a specific local protocol. In particular, a shorter recovery-room stay

is not guaranteed merely because opioid consumption is lower: excessive sedation, bradycardia, or hypotension could offset any analgesic advantage. Pain, rescue medication, adverse events, and discharge readiness must therefore be assessed together.[19-21]

The supplied study document describes 60 patients undergoing laparoscopic cholecystectomy at Chirayu Medical College, Bhopal. The primary objective of the present manuscript is to compare the recorded early postoperative VAS scores, opioid requirement, and recovery-room discharge time between the two groups. Secondary outcomes include the reported duration of analgesia, nausea and vomiting, baseline haemodynamic variables, and reasons for delayed discharge.

Materials and Methods

Study Design and Setting: The supplied document describes a prospective comparative study in the Department of Anaesthesiology, Chirayu Medical College, Bhopal. Sixty patients who underwent laparoscopic cholecystectomy were included.

Study Population: Patients were aged 20–45 years, of either sex, and classified as ASA physical status I or II. The source states that informed consent for participation was obtained. A preoperative assessment included medical and surgical history, previous anaesthesia history, physical examination, haemoglobin measurement, and urine testing for sugar and albumin. Other investigations—including blood glucose, blood urea, serum electrolytes, chest radiography, electrocardiography, and liver-function testing—were performed when required.

Study groups and intervention: The 60 patients were divided into two groups:

- **Group I:** Fentanyl infusion, 30 patients.
- **Group II:** Dexmedetomidine–lidocaine infusion, 30 patients.

The patients were randomly divided, postoperative infusions were started,

Outcome Assessment: Patients were instructed how to express pain using a pain scale. The supplied observation chart records VAS scores on recovery-room arrival, at 30 minutes, at 1 hour, and at subsequent assessments. The manuscript treats these as reported group-level scores because the attachment does not state whether they are means, medians, or individual representative values.

Other listed observations were onset and duration of analgesia, patient satisfaction, opioid consumption, and recovery-room discharge time. Pulse rate, blood pressure, and respiratory rate were recorded in the perioperative period. The attachment reports postoperative assessments immediately after surgery and after 30 minutes, but does not provide a complete monitoring schedule for every endpoint.

Data Quality: A reported rescue-opioid frequency of 2% cannot directly represent a whole number of patients in a group of 30. The phrase “depth of analgesia” is also paired with time values whose relationship to the separately reported “duration of analgesia” is unclear. The figures below are reproduced descriptively, not corrected by assumption.

Observation Tables

Table 1: Age distribution of patients

Age group	Group I: fentanyl, n (%)	Group II: dexmedetomidine–lidocaine, n (%)
21–25 years	11 (36.33)	10 (33.33)
26–30 years	6 (20.00)	5 (16.66)
31–35 years	5 (16.66)	5 (16.66)
36–40 years	4 (13.33)	4 (13.33)
41–45 years	4 (13.33)	6 (20.00)
Total	30 (100)	30 (100)

Table 2: Preoperative baseline physiological variables

Parameter	Group I: mean (range)	Group II: mean (range)
Pulse rate, beats/min	90.35 (72–110)	88.0 (78–108)
Systolic blood pressure, mmHg	115.5 (88–150)	119.5 (98–146)
Diastolic blood pressure, mmHg	72.5 (60–90)	68.0 (64–88)
Respiratory rate, breaths/min	21.0 (18–23)	20.5 (19–21)

Table 3: Postoperative pain and rescue-opioid observations

Outcome	Group I: fentanyl	Group II: dexmedetomidine–lidocaine
VAS on recovery-room arrival	6	4
VAS at 30 minutes	5	2
VAS at 1 hour	4	2
VAS at subsequent assessments	4	2–3
Reported duration of analgesia, hours	10.72 ± 2.84	14.02 ± 2.45
Rescue opioid in recovery room	“10 ml fentanyl”	“2 ml required”
Rescue opioid during first 24 hours	“2 ml fentanyl”	“2 ml fentanyl”
Patients requiring rescue opioid	10%	2%
Reported time to first rescue analgesia	1 hour	1 hour

Table 4: Recovery-room discharge and adverse-effect observations

Outcome	Group I: fentanyl	Group II: dexmedetomidine–lidocaine
Reported time to meeting discharge criteria	90 minutes	60 minutes
Patients with delayed discharge	50%	10%
Delay attributed to pain	50%	10%
Delay attributed to nausea, sedation, or haemodynamic instability	20%	2%
Nausea and vomiting during first 8 hours	40%	30%

Results

The supplied summary included 60 patients, with 30 assigned to each group. The age distributions were descriptively similar. In the fentanyl group, 11 patients were aged 21–25 years and four were aged 41–45 years. In the dexmedetomidine–lidocaine group, the corresponding numbers were 10 and six. Pre-operative physiological measurements were reported as group means with ranges. Mean pulse rate was 90.35 beats/min in Group I and 88.0 beats/min in Group II. Mean systolic blood pressures were 115.5 and 119.5 mmHg, while mean diastolic pressures were 72.5 and 68.0 mmHg, respectively. Mean respiratory rates were 21.0 and 20.5 breaths/min.

Recorded early postoperative pain scores favoured the dexmedetomidine–lidocaine group. On recovery-room arrival, the VAS entry was 6 for fentanyl and 4 for dexmedetomidine–lidocaine. At 30 minutes, scores were 5 and 2; at 1 hour, they were 4 and 2. The attachment describes subsequent scores as 4 in Group I and approximately 2–3 in Group II. The reported duration of analgesia was 10.72 ± 2.84 hours with fentanyl and 14.02 ± 2.45 hours with dexmedetomidine–lidocaine. A separate statement about “depth of analgesia” gives a value of 2.88 ± 0.55 hours for the fentanyl group.

Recovery-room discharge was reported at 90 minutes in Group I and 60 minutes in Group II. Delayed discharge was reported for 50% and 10% of patients, respectively. Pain was listed as a reason for delay in 50% and 10%, while nausea, sedation, or haemodynamic instability was listed in 20% and 2%. Nausea and vomiting during the first eight hours were reported in 40% of the fentanyl group and 30% of the dexmedetomidine–lidocaine group. The opioid table also suggests less recovery-room rescue treatment in Group II.

Statistical Analysis: For an analysis based on the verified patient-level data, between-group continuous outcomes may be assessed using an independent-samples t-test or Mann–Whitney U test, as appropriate. Categorical outcomes may be assessed with a chi-square or Fisher exact test. Pain measurements collected repeatedly over time are better assessed using an appropriate repeated-measures or mixed-effects model than by treating each observation as independent. Between-group differences

should be accompanied by 95% confidence intervals.

Discussion

The supplied observations suggest that a dexmedetomidine–lidocaine regimen may improve early analgesia after day-care laparoscopic cholecystectomy. At each reported early assessment, the VAS entry was lower in the combination group than in the fentanyl group. The same group had a longer reported duration of analgesia and met recovery-room discharge criteria earlier. These outcomes matter together in ambulatory care: an analgesic regimen is most useful when it relieves pain without replacing opioid-related delays with sedation or haemodynamic instability.

The largest reported difference in early VAS scores appeared at 30 minutes, when the entries were 5 with fentanyl and 2 with dexmedetomidine–lidocaine. Such a pattern could reflect improved immediate analgesia, less need for rescue medication, or differences in the timing of the study infusions. The reported analgesic durations were 10.72 ± 2.84 hours for fentanyl and 14.02 ± 2.45 hours for dexmedetomidine–lidocaine. This direction is consistent with the rationale for combining drugs with different analgesic mechanisms. Published work has examined dexmedetomidine for postoperative pain and opioid use after laparoscopic cholecystectomy, while lidocaine has been studied as an adjunct in the same operation. Those studies offer useful context but cannot confirm the numerical findings of this 60-patient dataset.

A key unanswered question is whether the apparent effect comes from dexmedetomidine, lidocaine, their combination, or differences in the comparator regimen. A two-group comparison of fentanyl with a combination infusion cannot isolate the contribution of either component. It also cannot establish synergy. That question would require a design with additional groups receiving each drug separately under otherwise comparable anaesthetic and rescue-analgesic protocols. The present comparison can address the overall regimens only, once their administration details are verified.

Recovery-room time is a useful endpoint for day-care surgery, but its meaning depends on consistent measurement. The attachment reports 90 minutes for

fentanyl and 60 minutes for dexmedetomidine–lidocaine. It does not state whether these are means, medians, or typical observations, nor does it identify the discharge criteria used. A patient might be delayed by pain, nausea, dizziness, sedation, unstable vital signs, or organisational factors unrelated to the study drugs. The final report should specify when the recovery-room clock started, which score or criteria determined readiness, and whether the recorded time represents readiness or actual physical departure.

The adverse-effect entries similarly need careful handling. Nausea and vomiting were recorded more often with fentanyl, at 40% versus 30% during the first eight hours. Reduced opioid exposure is one possible explanation, but the source does not give antiemetic prophylaxis, patient-level risk factors, or the exact timing of symptoms. Conversely, dexmedetomidine may produce sedation, bradycardia, or hypotension. The composite entry for nausea, sedation, or haemodynamic instability does not separate these events.

The opioid-consumption table presents the most substantial measurement problem. “10 ml fentanyl” cannot be compared meaningfully with “2 ml required” unless the drug, concentration, administration period, and aggregation method are known. Volumes are not equivalent to doses when concentrations differ. Furthermore, a percentage of 2% in a 30-patient group does not correspond to a whole-patient event count.

A further limitation is the small sample of 30 patients per group and the absence of a documented sample-size calculation. A study of this size can generate a useful preliminary estimate, but uncertainty around clinically important outcomes may be substantial. The final analysis should identify one primary endpoint, explain the target difference considered clinically meaningful, and present effect estimates with confidence intervals. Secondary findings should be interpreted in the context of multiple outcomes and incomplete data.

The age range of 20–45 years and restriction to ASA I–II patients also limit generalisability. Results in younger, relatively healthy adults may not represent older patients or those with cardiovascular disease, impaired drug clearance, or a higher risk of postoperative respiratory complications. A day-care regimen must be evaluated not only for average pain relief but also for predictable recovery and safety across the patients who would actually receive it.

Overall, the observations support further evaluation of dexmedetomidine–lidocaine as a multimodal approach for laparoscopic cholecystectomy. The direction of the reported pain and discharge findings is promising. Nevertheless, the current attachment supports a descriptive account, not a claim of confirmed statistical superiority. Reconciliation of the medication records, outcome definitions, patient

counts, and allocation procedures is the essential next step before the manuscript can make stronger efficacy or safety conclusions.

Conclusion

In the supplied summary of 60 patients undergoing day-care laparoscopic cholecystectomy, the dexmedetomidine–lidocaine group had lower recorded early postoperative VAS scores and a longer reported duration of analgesia than the fentanyl group. Recovery-room discharge time was reported as 60 versus 90 minutes, respectively. The available entries also suggest a lower rescue-opioid requirement, although opioid volumes cannot be interpreted as doses without the missing concentrations and administration details.

These observations indicate a potentially useful multimodal, opioid-sparing strategy, but they remain preliminary. Before this manuscript is submitted as a completed prospective comparative study, the original patient records must be used to verify all event counts and outcomes, define the interventions and discharge criteria, document ethics approval and allocation procedures, and perform the planned statistical analysis. The conclusion should then be revised to reflect the verified effect estimates and their uncertainty.[18]

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