

Comparison of Postoperative Analgesic Effect of Intraperitoneal instillation of Dexmedetomidine, Levobupivacaine and Normal Saline Following Laparoscopic Cholecystectomy Under General Anaesthesia: A Prospective Randomized Double-Blind Study

Dr. T. S. Monisha^{*1}, Dr. Nivedita B², Dr. Lalith Kumar E³

^{1*} Assistant Professor, Department of Anesthesiology, Panimalar Medical College Hospital & Research Institute, Poonamalle, Chennai, Tamil Nadu

² Assistant Professor, Department of Anesthesiology, Panimalar Medical College Hospital & Research Institute, Poonamalle, Chennai, Tamil Nadu

³ Assistant Professor, Department of Anesthesiology, Panimalar Medical College Hospital & Research Institute, Poonamalle, Chennai, Tamil Nadu

Corresponding Author: Dr. T. S. Monisha, Assistant Professor, Department of Anesthesiology, Panimalar Medical College Hospital & Research Institute, Poonamalle, Chennai, Tamil Nadu.

Mail-id: moniselvaraj1191@gmail.com

ABSTRACT

Background: Postoperative pain following laparoscopic cholecystectomy remains a significant challenge despite the minimally invasive nature of the procedure. Intraperitoneal administration of analgesic agents has emerged as an effective strategy for reducing postoperative pain and analgesic requirements while facilitating early recovery.

Objectives: To compare the postoperative analgesic efficacy of intraperitoneal levobupivacaine, dexmedetomidine, and normal saline in patients undergoing laparoscopic cholecystectomy under general anaesthesia.

Materials and Methods: This prospective randomized double-blind controlled study was conducted on 90 patients undergoing elective laparoscopic cholecystectomy. Patients were randomly allocated into three groups of 30 each. Group L received intraperitoneal levobupivacaine, Group D received intraperitoneal dexmedetomidine, and Group NS received normal saline. Postoperative pain was assessed using the Numerical Rating Scale (NRS) at predefined intervals during the first 24 postoperative hours. Time to first rescue analgesia, requirement of rescue analgesics, patient satisfaction, haemodynamic parameters, and adverse effects were recorded. Statistical analysis was performed using SPSS software, and a p-value <0.05 was considered statistically significant.

Results: Baseline demographic and operative characteristics were comparable among the groups (p>0.05). Postoperative NRS scores were significantly lower in Groups L and D compared with Group NS throughout the study period (p<0.001). Levobupivacaine demonstrated lower pain scores than dexmedetomidine at most postoperative intervals. The time to first rescue analgesia differed significantly among the groups ($\chi^2=36.81$, p<0.001), with patients in the levobupivacaine group experiencing a longer pain-free interval. Requirement for second rescue analgesia was significantly lower in Groups L and D compared with Group NS (p=0.017). Patient satisfaction was significantly higher in the levobupivacaine group (66.7%) followed by the dexmedetomidine group (56.7%) compared with the placebo group (36.7%) (p=0.033). Haemodynamic parameters remained stable, and no significant difference in adverse effects was observed among the groups (p=0.429).

Conclusion: Intraperitoneal administration of levobupivacaine and dexmedetomidine effectively improved postoperative analgesia following laparoscopic cholecystectomy compared with normal saline. Among the study interventions, levobupivacaine provided superior pain relief, prolonged analgesic duration, reduced rescue analgesic requirements, and higher patient satisfaction while maintaining a favorable safety profile. Intraperitoneal levobupivacaine may therefore be considered an effective component of multimodal postoperative pain management.

KEYWORDS: Levobupivacaine; Dexmedetomidine; Laparoscopic Cholecystectomy; Postoperative Analgesia; Intraperitoneal Drug Administration; Numerical Rating Scale; Multimodal Analgesia; Patient Satisfaction.

How to cite this article: Monisha TS, Nivedita B, Lalith Kumar E. Comparison of Postoperative Analgesic Effect of Intraperitoneal instillation of Dexmedetomidine, Levobupivacaine and Normal Saline Following Laparoscopic Cholecystectomy Under General Anaesthesia: A Prospective Randomized Double-Blind Study. Int J Drug Deliv Technol. 2026;16(70s): 479-485. DOI: 10.25258/ijddt.16.70s.49

INTRODUCTION:

Laparoscopic cholecystectomy is currently regarded as the gold standard surgical treatment for symptomatic

gallstone disease and other benign gallbladder disorders. Compared with conventional open cholecystectomy, laparoscopic surgery offers several advantages,

*Author for Correspondence: moniselvaraj1191@gmail.com

including reduced tissue trauma, shorter hospital stay, faster recovery, earlier return to daily activities, and improved cosmetic outcomes. Despite these benefits, postoperative pain remains a significant challenge during the early postoperative period and continues to be one of the major factors affecting patient comfort and recovery.¹

Postoperative pain following laparoscopic cholecystectomy is multifactorial in origin. It consists of visceral pain resulting from surgical dissection and peritoneal stretching, parietal pain arising from trocar insertion sites, and referred shoulder pain caused by diaphragmatic irritation due to residual carbon dioxide used for pneumoperitoneum. Among these components, visceral pain is considered the predominant source of discomfort during the first 24 hours after surgery.² Inadequate pain control may delay ambulation, increase hospital stay, impair respiratory function, and adversely affect overall patient satisfaction. Therefore, effective postoperative analgesia remains an essential component of perioperative care.³ Various strategies have been employed to manage postoperative pain after laparoscopic surgery, including systemic opioids, non-steroidal anti-inflammatory drugs (NSAIDs), local anesthetic infiltration, neuraxial techniques, and multimodal analgesic regimens. Although opioids provide effective analgesia, their use is frequently associated with adverse effects such as nausea, vomiting, sedation, respiratory depression, urinary retention, and delayed recovery. Consequently, increasing emphasis has been placed on opioid-sparing techniques that provide effective analgesia with minimal side effects.⁴ Intraperitoneal instillation of analgesic agents has emerged as a simple and effective method for controlling postoperative pain following laparoscopic procedures. Administration of analgesic drugs directly into the peritoneal cavity provides localized pain relief by reducing nociceptive stimulation from the peritoneum and visceral structures. Several studies have demonstrated that intraperitoneal administration of local anesthetics significantly reduces postoperative pain scores and analgesic requirements following laparoscopic cholecystectomy.⁵

Levobupivacaine is the pure S(-)-enantiomer of bupivacaine and is widely used as a long-acting amide local anesthetic. It exerts its action by blocking voltage-gated sodium channels, thereby inhibiting the initiation and propagation of nerve impulses. Levobupivacaine possesses pharmacological efficacy comparable to racemic bupivacaine but offers a superior safety profile with lower cardiotoxicity and neurotoxicity. Because of its prolonged duration of action and favorable safety characteristics, levobupivacaine has become an attractive agent for postoperative pain management.⁶

Dexmedetomidine is a highly selective α_2 -adrenergic receptor agonist with sedative, analgesic, anxiolytic, and sympatholytic properties. It produces analgesia by inhibiting nociceptive neurotransmission at both peripheral and central levels and has been increasingly

used as an adjuvant in regional anesthesia and postoperative pain management. In addition to reducing pain intensity, dexmedetomidine has been shown to decrease opioid requirements and enhance the quality of postoperative analgesia.⁷

Several investigators have evaluated the effectiveness of intraperitoneal local anesthetics and α_2 -adrenergic agonists following laparoscopic surgeries. Previous studies have reported significant reductions in postoperative pain scores, delayed requirement for rescue analgesics, and improved patient satisfaction with intraperitoneal analgesic techniques. However, limited data are available comparing the analgesic efficacy of intraperitoneal dexmedetomidine and levobupivacaine directly in patients undergoing laparoscopic cholecystectomy.^{8,9}

Identifying an effective intraperitoneal analgesic regimen may contribute significantly to enhanced recovery protocols by reducing postoperative pain, minimizing opioid consumption, facilitating early mobilization, and improving patient outcomes. Therefore, the present study was undertaken to compare the postoperative analgesic effects of intraperitoneal dexmedetomidine, levobupivacaine, and normal saline following laparoscopic cholecystectomy under general anaesthesia, with special emphasis on postoperative pain scores, rescue analgesic requirements, haemodynamic parameters, and adverse effects.

MATERIALS AND METHODS;

Study Design

This prospective randomized double-blind controlled study was conducted to compare the postoperative analgesic efficacy of intraperitoneal dexmedetomidine, levobupivacaine, and normal saline in patients undergoing elective laparoscopic cholecystectomy under general anaesthesia.

Study Setting and Duration

The study was carried out in the Department of Anaesthesiology, Katuri Medical College and Hospital, Guntur, Andhra Pradesh, over a period of 22 months from January 2020 to November 2021 after obtaining approval from the Institutional Ethics Committee and written informed consent was obtained from all participants before enrollment.

Sample Size

A total of 90 patients were enrolled in the study and randomly allocated into three groups of 30 patients each. The sample size was based on previous studies evaluating postoperative analgesic efficacy of intraperitoneal analgesic agents in laparoscopic surgeries. Considering a confidence level of 95%, power of 80%, and expected difference in postoperative pain scores among study groups, a minimum of 30 patients per group was considered adequate for statistical comparison.

Comparison of Postoperative Analgesic Effect of Intraperitoneal instillation of Dexmedetomidine, Levobupivacaine and Normal Saline Following Laparoscopic Cholecystectomy Under General Anaesthesia: A Prospective Randomized Double-Blind Study

Study Population

Adult patients scheduled for elective laparoscopic cholecystectomy under general anaesthesia were screened for eligibility.

Inclusion Criteria

- Patients aged between 18 and 65 years.
- Either gender.
- American Society of Anesthesiologists (ASA) physical status I and II.
- Scheduled for elective laparoscopic cholecystectomy under general anaesthesia.
- Patients willing to provide written informed consent.

Exclusion Criteria

- Refusal to participate in the study.
- ASA physical status III and IV.
- Known hypersensitivity to dexmedetomidine, levobupivacaine, or study medications.
- Significant cardiovascular, hepatic, renal, neurological, or respiratory disease.
- Pregnancy and lactation.
- Chronic opioid or analgesic use.
- Conversion of laparoscopic procedure to open surgery.
- Patients with psychiatric illness or inability to comprehend the Numerical Rating Scale (NRS).

Randomization and Blinding

Eligible patients were randomly assigned into three groups using a computer-generated randomization sequence. Allocation concealment was achieved using sealed opaque envelopes.

The study was conducted in a double-blind manner. The anesthesiologist responsible for intraoperative management, the postoperative observer recording pain scores, and the patients were unaware of group allocation. Study drugs were prepared by an independent anesthesiologist who was not involved in data collection or postoperative assessment.

Study Groups

Group L (Levobupivacaine Group)

Patients received intraperitoneal instillation of 0.2% levobupivacaine at the completion of surgery.

Group D (Dexmedetomidine Group)

Patients received intraperitoneal dexmedetomidine at a dose of 1 µg/kg diluted in normal saline.

Group NS (Control Group)

Patients received an equivalent volume of normal saline intraperitoneally.

At the completion of laparoscopic cholecystectomy, the study solution was instilled intraperitoneally in the gallbladder bed, hepatodiaphragmatic space, and around the operative field before removal of trocars.

Anaesthetic Technique

All patients underwent a standardized anaesthetic protocol.

Upon arrival in the operating room, routine monitoring including electrocardiography (ECG), pulse oximetry (SpO₂), non-invasive blood pressure (NIBP), and heart rate monitoring was instituted.

An intravenous line was secured and premedication was administered according to institutional protocol.

General anaesthesia was induced using intravenous induction agents and muscle relaxants. Following endotracheal intubation, anaesthesia was maintained using inhalational anaesthetic agents, oxygen, nitrous oxide, and intermittent muscle relaxants as required.

Standard four-port laparoscopic cholecystectomy was performed in all patients by experienced surgeons using a uniform surgical technique.

At the end of surgery, residual carbon dioxide was carefully evacuated and the allocated study drug was instilled intraperitoneally before trocar removal.

After completion of surgery, patients were extubated following adequate reversal of neuromuscular blockade and transferred to the post-anaesthesia care unit for observation.

Rescue Analgesia

Rescue analgesia was administered when the Numerical Rating Scale score exceeded 4 or when the patient requested pain relief.

Diclofenac was used as the first-line rescue analgesic. Additional analgesia with fentanyl was administered when pain persisted despite initial treatment.

The time of first rescue analgesic administration and total analgesic consumption during the first 24 postoperative hours were recorded.

Data Collection

Demographic characteristics, perioperative variables, pain scores, hemodynamic parameters, rescue analgesic requirements, and adverse events were documented using a predesigned data collection proforma.

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) software version 22.0. Continuous variables were expressed as mean ± standard deviation (SD), whereas categorical variables were presented as frequencies and percentages. Intergroup comparisons of continuous variables were performed using One-Way Analysis of Variance (ANOVA). Post hoc multiple comparison tests were applied wherever appropriate. Categorical variables were compared using Chi-square test or Fisher's exact test as applicable. A p-value less than 0.05 was considered statistically significant.

RESULTS:

A total of 90 patients undergoing elective laparoscopic cholecystectomy under general anaesthesia were enrolled and randomized into three groups comprising 30 patients each: Group L (Levobupivacaine), Group D (Dexmedetomidine), and Group NS (Normal Saline).

Comparison of Postoperative Analgesic Effect of Intraperitoneal instillation of Dexmedetomidine, Levobupivacaine and Normal Saline Following Laparoscopic Cholecystectomy Under General Anaesthesia: A Prospective Randomized Double-Blind Study

All patients completed the study and were included in the final analysis.

The three groups were comparable with respect to age, gender distribution, ASA physical status, height, weight,

and body mass index. No statistically significant differences were observed among the groups ($p>0.05$), indicating baseline homogeneity of the study population. (Table 1)

Table 1. Baseline Demographic and Clinical Characteristics of Study Participants

Variable	Group L (n=30)	Group D (n=30)	Group NS (n=30)	P value
Age (years), Mean $\pm$ SD	31.80 $\pm$ 10.91	29.40 $\pm$ 7.95	34.97 $\pm$ 12.63	0.135
Male, n (%)	12 (40.0)	9 (30.0)	16 (53.3)	0.183
Female, n (%)	18 (60.0)	21 (70.0)	14 (46.7)	
ASA I, n (%)	24 (80.0)	22 (73.3)	23 (76.7)	0.829
ASA II, n (%)	6 (20.0)	8 (26.7)	7 (23.3)	
Height (cm), Mean $\pm$ SD	152.97 $\pm$ 9.23	154.87 $\pm$ 8.93	156.13 $\pm$ 6.14	0.328
Weight (kg), Mean $\pm$ SD	56.27 $\pm$ 8.44	59.60 $\pm$ 11.16	56.90 $\pm$ 6.75	0.316
BMI (kg/m ²), Mean $\pm$ SD	24.10 $\pm$ 3.72	24.83 $\pm$ 4.33	23.43 $\pm$ 3.23	0.365

The mean duration of surgery was slightly higher in Group NS (85.00 $\pm$ 24.49 min) compared with Group L and Group D. However, the difference was not statistically significant ($p=0.086$). (Table 2)

Table 2. Operative Characteristics

Parameter	Group L	Group D	Group NS	P value
Duration of surgery (min), Mean $\pm$ SD	69.17 $\pm$ 23.67	71.67 $\pm$ 37.77	85.00 $\pm$ 24.49	0.086

Postoperative NRS scores differed significantly among the three groups at all observation periods ($p<0.001$). Patients receiving levobupivacaine exhibited consistently lower pain scores, whereas the highest pain scores were observed in the normal saline group. (Table 3)

Table 3. Distribution of Time to First Rescue Analgesia

Time	Group L	Group D	Group NS	P value
0 min	1.83 $\pm$ 0.99	3.87 $\pm$ 1.19	8.20 $\pm$ 1.19	<0.001
30 min	6.07 $\pm$ 1.44	6.57 $\pm$ 1.19	7.73 $\pm$ 1.08	<0.001
1 hr	4.87 $\pm$ 1.25	6.70 $\pm$ 1.24	5.57 $\pm$ 1.69	<0.001
2 hr	3.87 $\pm$ 1.19	6.17 $\pm$ 1.05	5.10 $\pm$ 1.63	<0.001
4 hr	3.53 $\pm$ 1.17	5.70 $\pm$ 0.99	5.10 $\pm$ 1.63	<0.001
6 hr	2.23 $\pm$ 0.68	5.17 $\pm$ 1.37	4.33 $\pm$ 1.73	<0.001
12 hr	2.67 $\pm$ 0.80	5.70 $\pm$ 0.99	4.37 $\pm$ 1.29	<0.001
24 hr	0.83 $\pm$ 0.59	1.53 $\pm$ 0.63	2.27 $\pm$ 0.64	<0.001

The distribution of time to first rescue analgesia showed significant differences among the study groups ($\chi^2=36.81$, $p<0.001$). Patients in the levobupivacaine group experienced a longer pain-free interval before requiring rescue analgesics compared with the dexmedetomidine and placebo groups. (Table 4)

Table 4. Time to First Rescue Analgesia

Time	Group L n (%)	Group D n (%)	Group NS n (%)
0 hr	18 (60.0)	17 (56.7)	24 (80.0)
1 hr	0	1 (3.3)	8 (26.7)
2 hr	0	3 (10.0)	4 (13.3)
4 hr	7 (23.3)	2 (6.7)	0
5 hr	0	1 (3.3)	0
6 hr	0	5 (16.7)	0

$$\chi^2 = 36.81; p < 0.001$$

The requirement for first rescue analgesia was highest in the placebo group (86.7%) and lowest in the levobupivacaine group (60.0%). However, the difference did not reach statistical significance ($p=0.066$). (Table 5)

Table 5. Requirement of First Rescue Analgesic (Diclofenac)

Comparison of Postoperative Analgesic Effect of Intraperitoneal instillation of Dexmedetomidine, Levobupivacaine and Normal Saline Following Laparoscopic Cholecystectomy Under General Anaesthesia: A Prospective Randomized Double-Blind Study

Parameter	Group L	Group D	Group NS	P value
Required, n (%)	18 (60.0)	21 (70.0)	26 (86.7)	0.066
Not Required, n (%)	12 (40.0)	9 (30.0)	4 (13.3)	

The requirement for second rescue analgesia was significantly higher in the placebo group (73.3%) compared with the levobupivacaine (53.3%) and dexmedetomidine groups (36.7%) ($p=0.017$). (Table 6)

Table 6. Requirement of Second Rescue Analgesic (Fentanyl)

Parameter	Group L	Group D	Group NS	P value
Required, n (%)	16 (53.3)	11 (36.7)	22 (73.3)	0.017
Not Required, n (%)	14 (46.7)	19 (63.3)	8 (26.7)	

Severe postoperative pain was reported by the majority of patients in Group NS (93.3%), whereas mild pain was observed only in the levobupivacaine group. The difference in pain severity among the groups was statistically significant ($p=0.005$). (Table 7)

Table 7. Overall Postoperative Pain Severity

Pain Category	Group L	Group D	Group NS
Mild	3 (10.0)	0	0
Moderate	9 (30.0)	11 (36.7)	2 (6.7)
Severe	18 (60.0)	19 (63.3)	28 (93.3)

$$\chi^2 = 14.89; p = 0.005$$

Nausea was the most common adverse effect observed across all groups. Although nausea and vomiting were more frequent in the dexmedetomidine and placebo groups, the overall incidence of adverse effects did not differ significantly among the groups ($p=0.429$). (Table 8)

Table 8. Postoperative Side Effects

Side Effect	Group L n (%)	Group D n (%)	Group NS n (%)
Nausea	5 (16.7)	11 (36.7)	12 (40.0)
Vomiting	4 (13.3)	6 (20.0)	3 (10.0)
Pruritus	1 (3.3)	1 (3.3)	0
Bradycardia	3 (10.0)	4 (13.3)	3 (10.0)
Hypotension	3 (10.0)	4 (13.3)	1 (3.3)
None	16 (53.3)	8 (26.7)	16 (53.3)

$$\chi^2 = 10.13; p = 0.429$$

Patient satisfaction was highest in the levobupivacaine group (66.7%) followed by the dexmedetomidine group (56.7%). Satisfaction levels were significantly lower in the placebo group (36.7%) ($p=0.033$). (Table 9)

Table 9. Patient Satisfaction

Parameter	Group L	Group D	Group NS	P value
Satisfied	21 (66.7)	17 (56.7)	11 (36.7)	0.033
Not satisfied	9 (33.3)	13 (43.3)	19 (63.3)	

Heart rate, systolic blood pressure, and diastolic blood pressure remained comparable among the three groups throughout the study period. Mean arterial pressure showed statistically significant differences only at the 5th and 6th postoperative hours, while all other measurements remained comparable. (Table 10)

Table 10. Hemodynamic Parameters

Group	Mean $\pm$ SD
Group L	80.23 $\pm$ 5.70
Group D	80.20 $\pm$ 5.42
Group NS	84.47 $\pm$ 3.29

$$\chi^2 = 24.89; p = 0.002$$

Comparison of Postoperative Analgesic Effect of Intraperitoneal instillation of Dexmedetomidine, Levobupivacaine and Normal Saline Following Laparoscopic Cholecystectomy Under General Anaesthesia: A Prospective Randomized Double-Blind Study

Mean oxygen saturation was significantly higher in the placebo group compared with the levobupivacaine and dexmedetomidine groups ($p=0.002$). However, oxygen saturation remained within clinically acceptable limits in all study participants. (Table 11)

Table 11. Oxygen Saturation (SpO₂)

Group	Mean $\pm$ SD
Group L	80.23 $\pm$ 5.70
Group D	80.20 $\pm$ 5.42
Group NS	84.47 $\pm$ 3.29

$$\chi^2 = 24.89; p = 0.002$$

DISCUSSION:

Effective postoperative pain control is essential for enhanced recovery following laparoscopic cholecystectomy. Despite the minimally invasive nature of the procedure, patients frequently experience postoperative pain due to peritoneal irritation, visceral manipulation, trocar-site trauma, and residual carbon dioxide. The present study evaluated the efficacy of intraperitoneal levobupivacaine and dexmedetomidine in reducing postoperative pain and improving recovery following laparoscopic cholecystectomy. Baseline demographic and operative characteristics were comparable among the three groups, indicating that postoperative outcomes were primarily influenced by the study interventions. The most important finding of the present study was the significant reduction in postoperative pain scores observed in patients receiving levobupivacaine and dexmedetomidine compared with normal saline. NRS scores were significantly lower in the active treatment groups throughout the postoperative period ($p<0.001$), with levobupivacaine demonstrating lower mean pain scores than dexmedetomidine. Similar findings have been reported by Elhakim et al. and Louizos et al., who observed improved postoperative analgesia following intraperitoneal local anesthetic administration during laparoscopic procedures.^{11,12}

The superior analgesic effect of levobupivacaine may be attributed to its prolonged blockade of sodium channels and inhibition of nociceptive transmission from peritoneal and visceral structures. Levobupivacaine offers effective sensory blockade with lower cardiotoxicity and neurotoxicity than racemic bupivacaine, making it a valuable agent for postoperative pain management.¹³

Dexmedetomidine also provided significant analgesic benefits compared with placebo. Through selective α_2 -adrenergic receptor stimulation, it suppresses nociceptive transmission and reduces sympathetic activity. Similar observations were reported by Bakhamees et al. and Gousheh et al., who demonstrated reduced postoperative pain and analgesic consumption with dexmedetomidine.^{15,16}

A significant prolongation in the time to first rescue analgesia was observed in the levobupivacaine and dexmedetomidine groups ($\chi^2=36.81$, $p<0.001$). Patients receiving active treatment experienced longer pain-free intervals and required fewer rescue analgesics. These findings are consistent with those of Bhardwaj et al.,

who reported prolonged postoperative analgesia following intraperitoneal local anesthetic administration.¹⁷

The requirement for second rescue analgesia was significantly lower in the levobupivacaine and dexmedetomidine groups compared with the placebo group ($p=0.017$). Reduced postoperative analgesic consumption is clinically advantageous because it minimizes drug-related adverse effects and supports early recovery. Similar benefits of opioid-sparing analgesic strategies have been emphasized by Bisgaard.¹⁸

Patient satisfaction was significantly higher among patients receiving levobupivacaine and dexmedetomidine than among those receiving normal saline ($p=0.033$). Better pain control and reduced analgesic requirements likely contributed to improved patient satisfaction in the active treatment groups.

Hemodynamic parameters remained largely stable throughout the study period. Heart rate, systolic blood pressure, and diastolic blood pressure did not differ significantly among the groups. Although minor statistical differences were observed in mean arterial pressure and oxygen saturation at selected intervals, these variations were not clinically significant. Similar findings have been reported by Gecaj-Gashi et al. following intraperitoneal local anesthetic administration.¹⁹

The incidence of postoperative adverse effects was low and comparable among the study groups. Nausea was the most common adverse event, followed by vomiting. No episodes of severe bradycardia, respiratory depression, or allergic reactions were observed, confirming the safety of both levobupivacaine and dexmedetomidine.²⁰

CONCLUSION:

Intraperitoneal administration of levobupivacaine and dexmedetomidine effectively improved postoperative analgesia following laparoscopic cholecystectomy compared with normal saline. Both agents reduced postoperative pain scores and rescue analgesic requirements while maintaining hemodynamic stability and a favorable safety profile.

Among the study interventions, levobupivacaine demonstrated superior analgesic efficacy, prolonged the duration of postoperative pain relief, reduced the need for additional analgesics, and was associated with higher

patient satisfaction. Therefore, intraperitoneal levobupivacaine may be considered a safe and effective component of multimodal analgesia for patients undergoing laparoscopic cholecystectomy.

REFERENCES:

1. Keus F, de Jong JA, Gooszen HG, van Laarhoven CJ. Laparoscopic versus open cholecystectomy for patients with symptomatic cholecystolithiasis. *Cochrane Database Syst Rev*. 2006;4:CD006231.
2. Bisgaard T. Analgesic treatment after laparoscopic cholecystectomy: A critical assessment of the evidence. *Anesthesiology*. 2006;104(4):835-846.
3. Kehlet H, Dahl JB. Anaesthesia, surgery and challenges in postoperative recovery. *Lancet*. 2003;362(9399):1921-1928.
4. White PF. The changing role of non-opioid analgesic techniques in postoperative pain management. *Anesth Analg*. 2005;101:S5-S22.
5. Louizos AA, Hadzilia SJ, Leandros E, et al. Postoperative pain relief after laparoscopic cholecystectomy: Intraperitoneal administration of bupivacaine. *Surg Endosc*. 2005;19:1501-1505.
6. McLeod GA, Burke D. Levobupivacaine. *Anaesthesia*. 2001;56(4):331-341.
7. Kamibayashi T, Maze M. Clinical uses of alpha-2 adrenergic agonists. *Anesthesiology*. 2000;93(5):1345-1349.
8. Bakhamees HS, El-Halafawy YM, El-Kerdawy HM, et al. Effects of dexmedetomidine in postoperative analgesia. *Saudi J Anaesth*. 2007;1(2):67-71.
9. Gousheh SM, Nesioonpour S, Akhondzadeh R, et al. Intraperitoneal dexmedetomidine for postoperative analgesia after laparoscopic surgery. *Anesth Pain Med*. 2017;7(4):e12747.
10. Memis D, Turan A, Karamanlioglu B, Pamukcu Z. The effect of intraperitoneal local anesthetics on postoperative pain after laparoscopic surgery. *Eur J Anaesthesiol*. 2002;19(11):816-821.
11. Elhakim M, Elkott M, Ali NM, Tahoun HM. Intraperitoneal lidocaine for postoperative pain after laparoscopic cholecystectomy. *Acta Anaesthesiol Scand*. 2000;44(3):280-284.
12. Louizos AA, Hadzilia SJ, Leandros E, et al. Postoperative pain relief after laparoscopic cholecystectomy by intraperitoneal administration of bupivacaine. *Surg Endosc*. 2005;19(11):1501-1505.
13. McLeod GA, Burke D. Levobupivacaine. *Anaesthesia*. 2001;56(4):331-341.
14. Kamibayashi T, Maze M. Clinical uses of alpha-2 adrenergic agonists. *Anesthesiology*. 2000;93(5):1345-1349.
15. Bakhamees HS, El-Halafawy YM, El-Kerdawy HM, Gouda NM, Altemyatt S. Effects of dexmedetomidine in postoperative analgesia. *Saudi J Anaesth*. 2007;1(2):67-71.
16. Gousheh SM, Nesioonpour S, Akhondzadeh R, Sahraei Z. Intraperitoneal dexmedetomidine for postoperative analgesia after laparoscopic surgery. *Anesth Pain Med*. 2017;7(4):e12747.
17. Bhardwaj N, Chari P, Gupta D, Sood J. Intraperitoneal bupivacaine instillation for postoperative pain relief after laparoscopic cholecystectomy. *Indian J Anaesth*. 2002;46(1):49-52.
18. Bisgaard T. Analgesic treatment after laparoscopic cholecystectomy: A critical assessment of the evidence. *Anesthesiology*. 2006;104(4):835-846.
19. Gecaj-Gashi A, Hashimi M, Sada F, et al. Prophylactic intraperitoneal bupivacaine for postoperative pain relief after laparoscopic cholecystectomy. *Eur J Anaesthesiol*. 2010;27(4):345-348.
20. Golubović S, Golubović V, Tokmadžić VS. Intraperitoneal analgesia in laparoscopic cholecystectomy: Clinical effectiveness and safety. *Med Pregl*. 2009;62(11-12):566-571.