



RESEARCH ARTICLE

Comparison of Analgesic Efficacy between Intraperitoneal Instillation of Tramadol and Bupivacaine for Postoperative Pain Relief Following Laparoscopic Appendectomy

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ABSTRACT

Postoperative pain management is crucial for patient recovery following laparoscopic appendectomy. This study aims to compare the analgesic efficacy of intraperitoneal instillation of tramadol and bupivacaine for postoperative pain relief. A total of 120 patients undergoing laparoscopic appendectomy were randomized into two groups: Group A received intraperitoneal tramadol (100 mg), and Group B received bupivacaine (0.25%, 50 mL) postoperatively. Pain intensity was assessed using the Visual Analog Scale (VAS) at 1, 6, 12, and 24 hours postoperatively. The total analgesic consumption and any adverse effects were also recorded. Results indicated that both groups achieved significant pain relief, but patients in the bupivacaine group reported lower VAS scores at 6 and 12 hours post-surgery and required fewer rescue analgesics. Tramadol showed similar efficacy at 1 and 24 hours but with a higher incidence of nausea. Overall, bupivacaine provided superior pain control in the early postoperative period. Intraperitoneal instillation of bupivacaine may be more effective for postoperative pain management after laparoscopic appendectomy.

Keywords: Intraperitoneal instillation, tramadol, bupivacaine, postoperative pain, laparoscopic appendectomy, analgesic efficacy.

INTRODUCTION:

Postoperative pain is a significant concern following laparoscopic appendectomy, with inadequate pain management potentially delaying recovery, increasing hospital stay, and reducing patient satisfaction (1). Effective pain control facilitates early mobilization, reduces the incidence of postoperative complications, and enhances overall outcomes (2). Various analgesic techniques have been explored to manage postoperative pain, with intraperitoneal administration of analgesics gaining popularity due to its effectiveness in targeting visceral pain (3).

Tramadol, a synthetic opioid, acts on the central nervous system by inhibiting serotonin and norepinephrine reuptake, providing both analgesic and anti-inflammatory effects. It has been widely used for moderate to severe postoperative pain (4). However, tramadol is associated with certain side effects, including nausea, dizziness, and potential for respiratory depression (5). Bupivacaine, a long-

acting local anesthetic, is commonly used for regional and local anesthesia. It blocks sodium channels and provides extended pain relief without affecting consciousness or respiratory function, making it a preferred choice in many surgical settings (6).

Previous studies have demonstrated the effectiveness of intraperitoneal instillation of local anesthetics like bupivacaine for managing postoperative pain in abdominal surgeries (7). Similarly, tramadol, when administered intraperitoneally, has been shown to reduce pain in laparoscopic procedures (8). However, limited data exist comparing the analgesic efficacy of intraperitoneal tramadol and bupivacaine in laparoscopic appendectomy.

This study aims to compare the analgesic effects of intraperitoneal instillation of tramadol versus bupivacaine for postoperative pain relief following laparoscopic appendectomy. The primary objective is to evaluate the differences in pain intensity over 24 hours, while secondary outcomes include total

analgesic consumption and the incidence of adverse effects.

Aim and Objectives:

Aim:

To compare the analgesic efficacy of intraperitoneal instillation of tramadol and bupivacaine for postoperative pain relief following laparoscopic appendectomy.

Objectives:

- To assess postoperative pain intensity at different time intervals (1, 6, 12, and 24 hours) using the Visual Analog Scale (VAS).
- To compare the total consumption of rescue analgesics and the incidence of adverse effects between the two groups.

Materials and Methods:

This prospective, randomized, double-blind study was conducted in a tertiary care hospital on patients undergoing elective laparoscopic appendectomy. A total of 120 patients, aged 18–60 years, were randomly allocated into two groups. Group A (n=60) received intraperitoneal tramadol (100 mg diluted in 50 mL of normal saline), while Group B (n=60) received intraperitoneal bupivacaine (0.25%, 50 mL) at the end of the procedure.

Inclusion Criteria:

- Patients aged 18–60 years undergoing elective laparoscopic appendectomy.
- ASA grade I and II patients.
- Patients willing to participate and provide informed consent.

Exclusion Criteria:

- Known allergy to tramadol or bupivacaine.
- Patients with chronic pain conditions or those on long-term analgesics.
- Pregnancy or lactation.
- Patients with significant comorbidities (e.g., cardiac, hepatic, renal dysfunction).
- History of opioid addiction or abuse.

Postoperative pain was assessed using the Visual Analog Scale (VAS) at 1, 6, 12, and 24 hours after surgery. The total dose of rescue analgesic (intravenous paracetamol) required in the first 24 hours was recorded. Any adverse effects, such as nausea, vomiting, or allergic reactions, were also noted. Statistical analysis was performed using SPSS software, with a p-value of <0.05 considered significant.

Results:

Table 1: Comparison of Postoperative Pain (VAS Scores) Between Tramadol and Bupivacaine Groups

Time (hours)	Tramadol Group (Mean ± SD)	Bupivacaine Group (Mean ± SD)	p-value
1 hour	3.5 ± 0.8	3.2 ± 0.7	0.07
6 hours	4.2 ± 0.9	3.5 ± 0.6	0.02
12 hours	4.5 ± 0.7	3.3 ± 0.8	0.001
24 hours	3.0 ± 0.6	2.9 ± 0.5	0.08

Table 2: Comparison of Total Rescue Analgesic Consumption and Adverse Effects

Parameter	Tramadol Group (n=60)	Bupivacaine Group (n=60)	p-value
Total rescue analgesic (mg)	550 ± 120	400 ± 90	0.01
Nausea (%)	20 (33%)	8 (13%)	0.03
Vomiting (%)	8 (13%)	3 (5%)	0.05

Description:

Patients in the bupivacaine group had significantly lower VAS scores at 6 and 12 hours postoperatively compared to the tramadol group. The bupivacaine group also required significantly less rescue analgesic (400 mg vs. 550 mg of paracetamol) and reported fewer adverse effects, such as nausea and vomiting.

Discussion:

This study demonstrates that intraperitoneal instillation of bupivacaine provides superior postoperative pain relief compared to tramadol in patients undergoing laparoscopic appendectomy. The significant reduction in VAS scores at 6 and 12 hours postoperatively in the bupivacaine group suggests its

longer-lasting analgesic effect compared to tramadol. Bupivacaine, as a local anesthetic, blocks sodium channels and prevents the propagation of pain signals at the surgical site, contributing to its superior efficacy in reducing early postoperative pain (9).

Tramadol, on the other hand, acts centrally as an opioid agonist and inhibits norepinephrine and serotonin reuptake, offering pain relief. However, its effectiveness as an intraperitoneal analgesic was less pronounced than that of bupivacaine, particularly at 6 and 12 hours postoperatively. Additionally, patients in the tramadol group experienced higher rates of nausea and vomiting, consistent with the known side effects of opioids (10).

The reduction in total rescue analgesic consumption in the bupivacaine group further supports its role in providing sustained pain relief. This finding aligns with previous studies that have demonstrated the efficacy of local anesthetics, including bupivacaine, for intraperitoneal analgesia in laparoscopic surgeries (11). Bupivacaine's prolonged duration of action, minimal systemic side effects, and its ability to target visceral pain make it a favorable option for postoperative pain management (12).

Limitations of the study include its relatively small sample size and the subjective nature of pain assessment. Future studies should focus on larger patient populations and include a more diverse range of laparoscopic procedures to generalize the findings. Additionally, investigating multimodal analgesia approaches, combining local anesthetics with non-opioid analgesics, may yield even better postoperative pain control outcomes.

Conclusion:

Intraperitoneal instillation of bupivacaine provides superior postoperative pain relief compared to tramadol in patients undergoing laparoscopic appendectomy. Bupivacaine is associated with lower pain scores, reduced need for rescue analgesics, and fewer side effects. These findings suggest that bupivacaine may be the preferred analgesic for intraperitoneal administration following laparoscopic procedures. Further research is warranted to explore the potential benefits of combining bupivacaine with other analgesic agents for enhanced postoperative pain management.

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