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Evaluating the Impact of Perioperative Lidocaine Infusion on Postoperative Pain Management in Upper Abdominal Surgery

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Abstract

Background: Postoperative pain management is crucial in anesthesia, particularly for fast-track surgeries. Effective pain management is essential for patient comfort, satisfaction, early mobilization, and recovery. It can also reduce postoperative cognitive impairment, chronic pain, and clinical expenses. As postoperative analgesia, Lidocaine has anti-nociceptive, antihyperalgesic, and anti-inflammatory properties that make it effective in various settings, including the ICU and surgical wards. Lidocaine may reduce pain and postoperative nausea and vomiting (PONV). Despite its benefits, concerns about its therapeutic window and toxicity persist.

Aim of the study: This study aimed to determine the efficacy of perioperative intravenous lidocaine infusion on postoperative pain intensity and analgesic requirements in patients undergoing upper abdominal surgery.

Methods: This prospective case-control study was conducted at the Department of Anaesthesia and Pain Medicine, Anwer Khan Modern Medical College, Dhaka, Bangladesh, over one year. It involved 108 patients scheduled for upper abdominal surgery under general anesthesia, divided into two groups: 54 patients in the study group received lidocaine, and 54 in the control group received saline. Inclusion criteria included patients aged 18-60 undergoing elective upper abdominal surgery, excluding those with specific health conditions. Pain was measured using the Visual Analogue Scale (VAS). Statistical analysis used SPSS, with significant results defined as $P < 0.05$.

Result: The study compared demographic and clinical characteristics between the two groups. The study group had a higher mean age (41.65±11.75 years) and more females (85.19%) than the control group (38.42±10.21 years; 75.93% females). Both groups had comparable weights (53.09±10.11kg vs. 50.79±9.67kg) and ASA classifications, with a higher percentage of ASA Type I in the control group (85.19%). Surgery durations and anesthesia times were similar, but extubation was faster in the control group (7.21±1.69 vs. 14.82±3.3 minutes). The study group required less post-operative analgesic (145.36±38.64mg vs. 189.42±41.58mg) and experienced delayed onset of pain relief needs. Pain levels fluctuated less in the study group.

Conclusion: The study shows that perioperative intravenous lidocaine infusion reduces postoperative pain and analgesic needs in upper abdominal surgery patients. Lidocaine group patients had lower pain levels and required less diclofenac without needing rescue medication. Despite higher nausea and vomiting rates, lidocaine infusion proves beneficial for multimodal pain management.

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Rahman R, et al., Anesth Crit Care
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Keywords: Postoperative Pain; lidocaine Infusion; Analgesic Requirement; Upper Abdominal Surgery; Visual Analogue Scale.

Introduction

Postoperative pain management is a crucial topic in anesthesia, especially in the expanding specialty of fast-track surgery [1,2]. The study of practical techniques for postoperative pain management has remained a subject of ongoing clinical research because of its uniqueness and associated complicated physiological implications with somatic, autonomic, and behavioral manifestations [3]. Optimal postoperative pain treatment is required not only for patients' comfort and satisfaction but also to allow early mobilization and recovery. Furthermore, excellent postoperative pain treatment has been associated with decreased postoperative cognitive impairment, higher quality of life, reduced risk of chronic/persistent postsurgical pain, better overall outcome, and reduced clinical expenses [4-9]. Lidocaine (formerly Xylocaine®, and previously lignocaine) was developed in the early half of the twentieth century, and the US Food and Drug Administration approved its use in humans in 1948 [10,11]. In 1958, clinical practice used intravenous (i.v) lidocaine infusions to offer postoperative analgesia [12]. Later research supported the analgesic and antihyperalgesic benefits of intravenous lidocaine [13,14]. Currently, i.v. Lidocaine is utilized as a perioperative analgesic in a wide range of places, including the operating theatre, recovery room, intensive care unit (ICU), and surgical ward [15]. Lidocaine possesses anti-nociceptive, antihyperalgesic, and anti-inflammatory activities, possibly explaining the apparent lasting impact hours after an infusion has been completed [15-18]. Given the negative short and long-term consequences of opioids, multimodal analgesic methods are an essential part of postoperative pain management [19,20]. Recent research suggests that intravenous lidocaine may have perioperative benefits. It may help to reduce both pain and postoperative nausea and vomiting (PONV), which are two of the most prevalent problems following surgery and anesthesia. As a result, it may prove helpful in improving postoperative pain and recovery outcomes [21]. However, concerns have long existed regarding the small therapeutic window and toxicity of lidocaine, whether when given i.v. or as part of a regional anesthetic approach [22-24]. Systemic lidocaine is now more commonly used to treat chronic pain disorders. Its use for neuropathic pain therapy became popular because of its ability to suppress spontaneous ectopic discharges of a damaged nerve in animal models and the practicality of oral preparations like mexiletine for long-term treatment [25]. Bailey et al. found that perioperative lidocaine infusions decreased the presence of procedure-related pain three months or longer after surgery in a systematic literature search of evidence relating lidocaine infusions with chronic postsurgical pain [26]. Although lidocaine infusion is thought to be an effective treatment for persistent chronic neuropathic pain [9,27,28], its role in acute postoperative pain management has yet to be proven and standardized. Furthermore, lidocaine infusion is an appealing subject for clinical research due to its accessibility, low cost, simplicity of administration, and safety. This study aimed to determine the efficacy of perioperative intravenous lidocaine infusion on postoperative pain intensity and analgesic requirements in patients undergoing upper abdominal surgery (gastric, hepatic, and pancreatic) in a community-based hospital setting.

Methodology & Materials

This prospective case-control study was conducted at the Department of Anaesthesia and Pain Medicine, Anwer Khan Modern Medical College, Dhaka, Bangladesh. 108 patients scheduled for upper abdominal surgery under general anesthesia were enrolled in the study over one year, from January 2024 to December 2024. During the pre-anesthetic check-up visit, all patients were briefed about the research and allowed to familiarize themselves with the procedures. Written informed consent was obtained from each participant before data collection. The study population was randomly divided into two groups, each containing 54 patients:

Group A (N=54): Study group (Patients managed with Lidocaine)

Group B (N=54): Control group (Patients managed with normal Saline)

Inclusion Criteria:

- Patients of both genders aged 18 to 60 years.
- Patients underwent upper abdominal surgery.
- Open and laparoscopic abdominal surgery

Exclusion Criteria:

- Patients underwent emergency surgery.
- Patients with known hepatic or renal dysfunction.
- Patients with cardiac dysrhythmias or atrioventricular block.
- Patients with an anticipated surgery duration exceeding 3 hours.
- Patients with known hypersensitivity or allergy to the study medication.

The physical status of the patients was assessed using the ASA (American Society of Anesthesiologists) classification system, with all patients falling into ASA status I or II. Pain levels were measured using the Visual Analogue Scale (VAS), where 0 indicated "no pain" and 10 indicated "worst imaginable pain." Patients were pre-medicated with oral diazepam at a dose of 0.2 mg/kg, administered both the night before and 2 hours prior to surgery. During the procedure,

Rahman R, et al., Anesth Crit Care
2025 DOI:10.26502/acc.077

patients were connected to a monitor for continuous tracking of ECG, pulse rate, non-invasive blood pressure (NIBP), and pulse oximetry.

In the study group, patients received an intravenous bolus injection of lidocaine at 1.5 mg/kg administered slowly over 10 minutes, 30 minutes before the skin incision, followed by a continuous IV infusion at a rate of 1.5 mg/kg/h using an infusion pump (B-BRAUN). The control group received an equal volume of 0.9% normal saline administered similarly. This infusion continued throughout the surgery and was terminated 60 minutes after skin closure. Anesthesia induction for all patients involved an injection of Fentanyl at 2.0 mg/kg and pethidine at 1.0 mg/kg, followed by an intravenous dose of vecuronium at 0.1 mg/kg to facilitate laryngoscopy and orotracheal intubation. Post-intubation, anesthesia was maintained with isoflurane in oxygen, supplemented with intermittent intravenous boluses of vecuronium at 1 mg as needed. No local anesthetics were used during the surgery.

After one hour of observation, the patient was transferred from the PACU to the ward. Pain intensity and any adverse effects of lidocaine were monitored every 4 hours for 24 hours and managed as necessary. The total number of diclofenac and tramadol injections administered during the study period was recorded. If any signs of systemic toxicity or hypersensitivity to the drug were detected, the patient was treated and excluded from the study.

Statistical Analysis:

After collecting all the data, the study medication was decoded. Statistical analyses were conducted using SPSS (Version 26.0) on Windows. Continuous parameters were presented as mean ± SD, while categorical parameters were expressed as frequency and percentage. Group comparisons for continuous parameters were made using the student's t-test, and categorical parameters were compared using the Chi-Square test. Results were considered statistically significant, with a P-value of <0.05.

Results

The demographic characteristics of both the study and control groups are summarized in Table 1. The age distribution shows that the largest proportion of the study group (46.30%) is over 50 years old, compared to 29.63% in the control group. Both groups have identical proportions of participants aged 41-50 (29.63%). The mean age is slightly higher in the study group (41.65±11.75 years) than in the control group (38.42±10.21 years). In terms of gender, the study group has a higher percentage of females (85.19%) compared to the control group (75.93%). The mean weight is comparable between the groups 53.09±10.11kg (study group) vs. 50.79±9.67kg (control group) and no statistical significance. Figure 1 illustrates the distribution of patients' physical status according to the ASA classification between the two groups. The Study Group shows that 74.07% of patients were classified as ASA Type I, while 25.93% were classified as ASA Type II. In the Control Group, 85.19% of patients were ASA Type I, and 14.81% were ASA Type II. Both groups have a higher percentage of patients classified as ASA Type I, with the Control Group having a larger proportion in this category compared to the Study Group. The comparison of surgical characteristics between the study and control groups, as presented in Table 2, shows that both groups had similar durations of anesthesia (64.23±18.88 vs. 71.21±24.02 minutes) and infusion times (158.0±24.85 vs. 164.12±25.32 minutes), with no statistically significant differences between them. The amount of pethidine and propofol used was also comparable between the two groups. However, the control group had a much faster extubation time, with a mean of 7.21±1.69 minutes compared to 14.82±3.3 minutes in the study group, suggesting a more rapid recovery in the control group. In terms of the type of surgery, both groups had nearly identical distributions, as shown in Table 3. The vast majority of patients in both the study and control groups underwent open cholecystectomy (85.19%), with a smaller proportion undergoing open cholecystectomy with common bile duct exploration (14.81% vs. 11.11%). Only the control group had two cases of partial gastrectomy (3.70%). Table 4 highlights significant post-operative differences. The study group required their first dose of analgesic (diclofenac) much later than the control group (64.68±19.32 vs. 18.36±8.64 minutes), indicating the delayed onset of pain relief needs. The total amount of diclofenac required was also lower in the study group (145.36±38.64 mg vs. 189.42±41.58 mg), reflecting reduced post-operative pain. Additionally, none of the study group patients required rescue medication (tramadol), while 61.11% of the control group needed tramadol either within 30 minutes (44.44%) or after 4 hours (14.81%). Post-operative symptoms of nausea and vomiting were much more prevalent in the study group (35.19%) compared to the control group (5.56%), which may indicate a side effect of the anesthesia or analgesia used in the study group. Figure 2 illustrates the pain assessment of two groups. Study Group (blue line) and Control Group (orange line) over 24 hours, measured at intervals from 0 to 24 hours using the Visual Analog Scale (VAS). Initially, the Control Group reported higher pain levels (VAS score of 4) compared to the Study Group (VAS score of 1.5). The Control Group experienced fluctuating pain levels, peaking at 4 hours with a score of 5.9, followed by a gradual decline. In contrast, the Study Group exhibited relatively lower pain levels throughout the observation period, with an initial increase up to 60 minutes (VAS score of 3.8) and a peak at 4 hours (VAS score of 5.12). The pain scores in both groups show a pattern of decline after the 4-hour mark, though the Study Group's pain levels remained more stable with fewer fluctuations compared to the Control Group.

Rahman R, et al., Anesth Crit Care
2025 DOI:10.26502/acc.077

Table 1: Demographical characteristics of the study groups.

Variables	Study Group (N=54)		Control Group (N=54)		p-value
	n	%	n	%	
Age range (in years)					
18-30	5	9.26	8	14.81	NS
31-40	8	14.81	14	25.93	
41-50	16	29.63	16	29.63	
>50	25	46.3	16	29.63	
Mean±SD	41.65±11.75		38.42±10.21		
Gender					
Male	8	14.81	13	24.07	NS
Female	46	85.19	41	75.93	
Weight (kg)					
Mean±SD	53.09±10.11		50.79±9.67		NS

NS: Non-significant

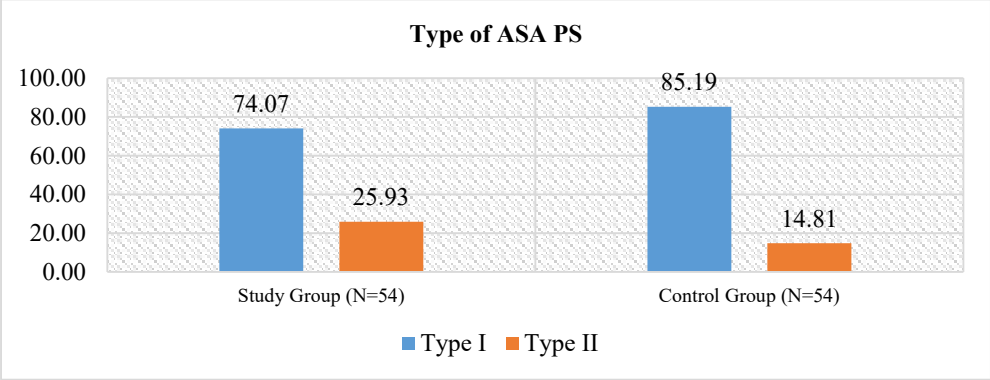

Figure 1: Distribution of patient's physical status according to ASA.

Table 2: Comparison of surgical characteristics between the two groups.

Variables	Study Group (N=54)	Control Group (N=54)	p-value
	Mean±SD	Mean±SD	
Duration of Anaesthesia (min)	64.23±18.88	71.21±24.02	NS
Duration of infusion (min)	158.0±24.85	164.12±25.32	
Pethidine used (mg)	50.08±8.92	50.62±7.68	
Propofol used (mg)	103.84±19.66	104.41±23.89	
Time of extubation (min)	14.82±3.3	7.21±1.69	

Table 3: Distribution of both groups based on type of surgery.

Type of surgery	Study Group (N=54)		Control Group (N=54)		p-value
	n	%	n	%	
Open cholecystectomy	46	85.19	46	85.19	NS
Open Cholecystectomy + CBD exploration	8	14.81	6	11.11	
Partial gastrectomy	0	0	2	3.7	

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Rahman R, et al., Anesth Crit Care
2025 DOI:10.26502/acc.077

Table 4: Comparison of post-operative characteristics between the two groups.

Variables	Study Group (N=54)		Control Group (N=54)		p-value
	Mean±SD		Mean±SD		
Analgesic requirements					
First dose (Time in minutes)	64.68±19.32		18.36±8.64		<0.05
Analgesic (diclofenac) Requirement (mg)	145.36±38.64		189.42±41.58		
Rescue medicine					
Tramodol	0	0	33	61.11	<0.05
In 30 minutes	0	0	24	44.44	
After 4 hours	0	0	8	14.81	
Post-operative symptoms					
Nausea and vomiting	19	35.19	3	5.56	<0.05
Light headache	5	9.26	0	0	

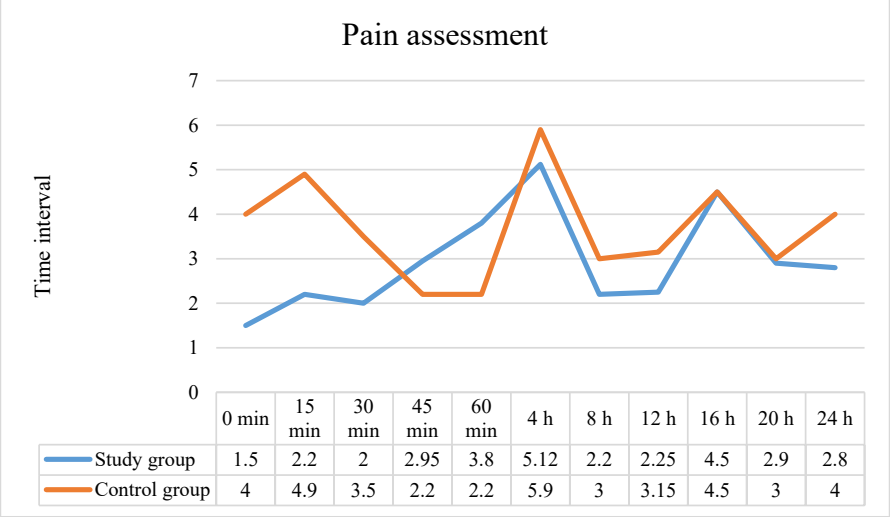

Figure 2: Pain assessment of study patients using VAS scoring.

Discussion

The present study indicates that perioperative intravenous administration of non-toxic doses of lidocaine effectively reduces postoperative pain intensity and decreases the need for analgesics without causing significant adverse effects in patients undergoing upper abdominal surgery. Although the age distribution between the two groups showed notable differences, none were statistically significant. Specifically, 46.30% of the study group participants were over 50 years of age, compared to 29.63% in the control group. The mean age was also slightly higher in the study group (41.65±11.75 years) than in the control group (38.42±10.21 years). This finding aligns with Bakr et al. (2018), who similarly reported an older study group, which may influence the generalizability of the results to younger populations [29]. Regarding gender, a higher proportion of females was observed in the study group (85.19%) compared to the control group (75.93%), though this difference was not statistically significant. Both Bakr et al. (2018) and Baral et al. (2010) also noted a female predominance in the lidocaine-treated groups [29,30]. The mean weight of participants was slightly higher in the study group, but this difference was likewise not statistically significant, consistent with the findings of Sun et al. (2023) [31]. In terms of ASA classification, Type I was more frequent in the control group, while Type II was higher in the study group, reflecting patterns observed in Bakr et al. (2018) [29]. The overall Visual Analog Scale (VAS) scores were lower in the lidocaine group than in the normal saline group, likely because most patients in the saline group had already received rescue analgesics at the time of assessment, corresponding to the peak effect of these drugs. This supports the findings of Sun et al. (2023), who also reported significant reductions in postoperative pain in lidocaine-treated patients compared to controls [31]. Additionally, our study found a significant reduction in total postoperative analgesic (diclofenac) use in the lidocaine group, with no patient requiring additional tramadol. These results further confirm the analgesic efficacy of perioperative lidocaine infusion, consistent with findings by Baral et al. (2010) [30]. All procedures in our

study involved major upper abdominal surgeries, and no additional regional anesthesia was administered for pain relief. In such surgeries, extensive tissue damage triggers significant chemo nociceptor input to the central nervous system. Notably, mechanosensitive nociceptors, particularly in humans, are tonically activated by chemical stimuli [32]. Previous studies have typically administered intravenous lidocaine perioperatively during periods of high nociceptive input, with infusions continuing postoperatively for various durations. For example, Cassuto et al. (2006) initiated a small-dose regimen of lidocaine 30 minutes before surgery, extending 24 hours postoperatively [33]. In our study, lidocaine infusion was started 30 minutes prior to anesthesia and continued until one hour after surgery. Prolonging the infusion would have required extended PACU monitoring or transfer to a hospital bed with electrocardiogram facilities, increasing both the complexity and cost, thus limiting the practical use of prolonged IV lidocaine infusion. Lidocaine was administered at 1.5 mg/kg as a slow intravenous bolus, followed by a continuous infusion of 1.5 mg/kg/hour. Serum lidocaine levels were not measured, based on evidence from previous studies showing that plasma concentrations remain well below toxic levels (5 µg/mL) even at higher doses than used in this study [30]. The extubation time, marking the recovery of consciousness post-surgery, was significantly longer in the lidocaine group compared to the saline group. This is likely due to the enhanced depth of anesthesia and lidocaine's prevention of central hyperalgesia [3,30]. While this could be seen as a drawback, it is outweighed by the desirable analgesic effects of lidocaine. Sedation incidence in the lidocaine group was higher until one hour after surgery, which can be attributed to the drug's central nervous system depressant effects [30]. Five patients in the lidocaine group reported light-headedness, a finding not commonly noted by other researchers, potentially due to differences in demographic and patient characteristics [3]. Similar to previous studies, we found no significant differences in the incidence of nausea and vomiting between groups [31].

Limitations of the study: The study only included patients undergoing elective upper abdominal surgery, excluding those with emergency surgeries or certain health conditions, which may limit the applicability of the results to other surgical contexts. The absence of serum lidocaine level measurements also poses a limitation, as it prevents precise monitoring of potential toxicity. Furthermore, the follow-up period was limited to 24 hours postoperatively, which may not capture the long-term effects and potential delayed complications of perioperative lidocaine infusion.

Conclusion and Recommendations

The study demonstrates that perioperative intravenous lidocaine infusion effectively reduces postoperative pain and analgesic requirements in patients undergoing upper abdominal surgery. Patients in the lidocaine group experienced significantly lower pain levels and delayed the need for the first dose of analgesics compared to the control group. Additionally, the total amount of diclofenac required postoperatively was lower in the lidocaine group, and none of these patients needed rescue medication. Despite a higher incidence of nausea and vomiting in the lidocaine group, the overall benefits of reduced pain and analgesic use suggest that lidocaine infusion is a valuable component of multimodal postoperative pain management strategies.

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References

1. White PF, Kehlet H, Neal JM, et al., The role of the anesthesiologist in fast-track surgery: from multimodal analgesia to perioperative medical care. Anesthesia & Analgesia 104 (2007): 1380-1396.
2. Roediger L, Larbuisson R, Lamy M. New approaches and old controversies to postoperative pain control following cardiac surgery. European journal of Anaesthesiology 23 (2006): 539-550.
3. Kaba A, Laurent SR, Detroz BJ, et al., Intravenous lidocaine infusion facilitates acute rehabilitation after laparoscopic colectomy. The Journal of the American Society of Anesthesiologists 106 (2007): 11-18.
4. Oates JD, Snowdon SL, Jayson DW. Failure of pain relief after surgery: attitudes of ward staff and patients to postoperative analgesia. Anaesthesia 49 (1994):755-758.
5. Warfield CA, Kahn CH. Acute pain management: programs in US hospitals and experiences and attitudes among US adults. The Journal of the American Society of Anesthesiologists 83 (1995):1090-1094.
6. Power I, Noble DW, Douglas E, et al., Comparison of im ketorolac trometamol and morphine sulphate for pain relief after cholecystectomy. British journal of anaesthesia 65 (1990): 448-455.
7. Koppert W, Weigand M, Neumann F, et al., Perioperative intravenous lidocaine has preventive effects on postoperative pain and morphine consumption after major abdominal surgery. Anesthesia & Analgesia 98 (2004): 1050-1055.
8. Kehlet H, Wilmore DW. Multimodal strategies to improve surgical outcome. The American journal of surgery. 183 (2002): 630-641.
9. Kehlet H, Holte K. Effect of postoperative analgesia on surgical outcome. British journal of anaesthesia 87 (2001): 62-72.

Rahman R, et al., Anesth Crit Care
2025 DOI:10.26502/acc.077

10. Gordh T. Xylocain–a new local analgesic. Anaesthesia 4 (1949): 4-9.

11. US Food and Drug Administration. Drugs@FDA: FDAApproved Drugs.

12. De Clive-Lowe SG, Desmond J, North J. Intravenous lignocaine anaesthesia. Anaesthesia 13 (1958):138-146.

13. Bartlett Ee, Hutaserani O. Xylocaine for the relief of postoperative pain. Anesthesia & Analgesia 40 (1961): 296-304.

14. Koppert W, Zeck S, Sittl R, et al., Low-dose lidocaine suppresses experimentally induced hyperalgesia in humans. The Journal of the American Society of Anesthesiologists 89 (1998): 1345-1353.

15. Dunn LK, Durieux ME. Perioperative use of intravenous lidocaine. Anesthesiology 126 (2017): 729-737.

16. Hermanns H, Hollmann MW, Stevens MF, et al., Molecular mechanisms of action of systemic lidocaine in acute and chronic pain: a narrative review. British journal of anaesthesia 123 (2019): 335-349.

17. Eipe N, Gupta S, Penning JJ. Intravenous lidocaine for acute pain: an evidence-based clinical update. Bja Education 16 (2016): 292-298.

18. Barreveld A, Witte J, Chahal H, et al., Preventive analgesia by local anesthetics: the reduction of postoperative pain by peripheral nerve blocks and intravenous drugs. Anesthesia & Analgesia 116 (2013):1141-1161.

19. Frauenknecht J, Kirkham KR, Jacot-Guillarmod A, et al., Analgesic impact of intra-operative opioids vs. opioid-free anaesthesia: a systematic review and meta-analysis. Anaesthesia 74 (2019):651-662.

20. Stevens J, Trimboli A, Samios P, et al., A sustainable method to reduce postoperative oxycodone discharge prescribing in a metropolitan tertiary referral hospital. Anaesthesia 74 (2019): 292-299.

21. Lee IW, Schraag S. The use of intravenous lidocaine in perioperative medicine: anaesthetic, analgesic and immune-modulatory aspects. Journal of clinical medicine 11 (2022): 3543.

22. Hunter AR. The toxicity of xylocaine. British Journal of Anaesthesia 23 (1951):153-161.

23. Bennett ED. A personal account of lignocaine overdosage. Survey of Anesthesiology 1 (1957): 519-522.

24. Christie LE, Picard J, Weinberg GL. Local anaesthetic systemic toxicity. Bja Education 15 (2015):136-142.

25. Mao J, Chen LL. Systemic lidocaine for neuropathic pain relief. Pain 87 (2000): 7-17.

26. Bailey M, Corcoran T, Schug S, et al., Perioperative lidocaine infusions for the prevention of chronic postsurgical pain: a systematic review and meta-analysis of efficacy and safety. Pain 159 (2018): 1696-1704.

27. Wu CT, Borel CO, Lee MS. The interaction effect of perioperative cotreatment with dextromethorphan and intravenous lidocaine on pain relief and recovery of bowel function after laparoscopic cholecystectomy. Anesth Analg 100 (2005): 448-453.

28. Kaba A, Detroz BJ, Laurent SR, et al., Acute rehabilitation program after laparoscopic colectomy using intravenous lidocaine. Acta Chirurgica Belgica 105 (2005): 53-58.

Citation: Rubaiyat Rahman, Fahmida Nargis, Md Mazharul Alam, Muhammad Shamsul Arefin, AKM Akhtaruzzaman. Evaluating the Impact of Perioperative Lidocaine Infusion on Postoperative Pain Management in Upper Abdominal Surgery. Anesthesia and Critical care 7 (2025): 10-16.