

Comparative Assessment of Lignocaine and Dexmedetomidine Infusion on Recovery and Postoperative Outcomes Following Total Abdominal Hysterectomy

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Abstract:

Background: Effective perioperative management plays a crucial role in enhancing recovery and improving patient satisfaction after major abdominal surgeries. Lignocaine and dexmedetomidine have emerged as promising intravenous adjuvants owing to their analgesic, anti-inflammatory, and opioid-sparing properties.

Objective: To compare the effects of intravenous lignocaine and dexmedetomidine infusions on recovery profile, quality of recovery, and postoperative analgesia in patients undergoing total abdominal hysterectomy.

Methods: A prospective, randomized, controlled study was conducted on 120 ASA I–II female patients scheduled for elective total abdominal hysterectomy under general anesthesia in Department of Anesthesiology, Jawaharlal Lal Nehru Medical College & Hospital, Bhagalpur, Bihar, India. Patients were randomly allocated into three groups (n=40 each): Group L received intravenous lignocaine (1.5 mg/kg bolus followed by 2 mg/kg/hr infusion), Group D received dexmedetomidine (1 µg/kg bolus followed by 0.5 µg/kg/hr infusion), and Group C served as control with normal saline infusion. Parameters assessed included recovery profile (extubation time, orientation time), quality of recovery (QoR-40 score), and postoperative analgesia (VAS scores and time to first rescue analgesic).

Results: Both Group L and Group D showed significantly improved QoR-40 scores compared to Group C ($p < 0.05$), with Group D showing the highest score. Extubation and orientation times were shortest in Group L ($p < 0.05$). VAS scores were significantly lower in both intervention groups during the first 24 hours postoperatively, with Group D requiring fewer rescue analgesics ($p < 0.01$).

Conclusion: Intravenous infusions of lignocaine and dexmedetomidine significantly enhance recovery quality and postoperative analgesia in patients undergoing total abdominal hysterectomy. Lignocaine accelerates recovery parameters, while dexmedetomidine offers superior analgesic benefits.

Keywords: Lignocaine, Dexmedetomidine, Total Abdominal Hysterectomy, Recovery Profile, Quality of Recovery, Postoperative Analgesia, VAS Score, Intravenous Infusion, Anesthesia Adjuvants.

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Introduction

Total abdominal hysterectomy is one of the most commonly performed major gynecological surgeries worldwide. Effective perioperative management is essential not only for minimizing surgical stress but also for promoting faster recovery, better pain control, and enhanced patient satisfaction. Traditional approaches relying heavily on opioids for intraoperative and postoperative analgesia often lead to undesirable side effects such as nausea, vomiting, respiratory depression, and delayed recovery. As a result, there has been a growing

interest in using non-opioid adjuncts to improve overall perioperative outcomes.

Lignocaine, a well-known local anesthetic, has demonstrated systemic analgesic, anti-hyperalgesic, and anti-inflammatory effects when administered intravenously. Its use has been associated with reduced anesthetic and opioid requirements, improved bowel recovery, and shortened hospital stay. Dexmedetomidine, a selective α_2 -adrenergic agonist, offers sedative, anxiolytic, and analgesic properties without significant respiratory depression. It has shown promise in enhancing

hemodynamic stability and providing effective postoperative analgesia when used as an infusion during surgery.

Despite individual studies evaluating the benefits of these drugs, limited data exist comparing the impact of intravenous lignocaine and dexmedetomidine on postoperative recovery profile and analgesia in abdominal hysterectomy patients. This study was therefore undertaken to evaluate and compare the effects of these two agents on extubation and orientation times, quality of recovery using the QoR-40 questionnaire, and postoperative analgesia as measured by the Visual Analog Scale (VAS) and time to first rescue analgesic in patients undergoing total abdominal hysterectomy under general anesthesia.

Methods

This prospective, randomized, controlled study was conducted in the Department of Anesthesiology at Jawaharlal Nehru Medical College & Hospital, Bhagalpur, Bihar, India for one year. A total of 120 female patients, aged between 35 and 60 years, belonging to ASA physical status I and II, and scheduled for elective total abdominal hysterectomy under general anesthesia were enrolled. Patients with known hypersensitivity to study drugs, significant cardiovascular, hepatic, or renal dysfunction, or those on chronic analgesic or sedative therapy were excluded.

Participants were randomly allocated into three equal groups of 40 patients each using computer-generated randomization. Group L received intravenous lignocaine with a bolus dose of 1.5 mg/kg over 10 minutes followed by a continuous infusion at 2 mg/kg/hr until the end of surgery. Group D received intravenous dexmedetomidine at 1 µg/kg over 10 minutes as a bolus followed by 0.5 µg/kg/hr infusion. Group C served as the control group and received a similar volume of normal saline infusion.

All patients were premedicated with midazolam 0.03 mg/kg IV and glycopyrrolate 0.004 mg/kg IV.

General anesthesia was induced with propofol 2 mg/kg and fentanyl 2 µg/kg and intubation was facilitated with vecuronium 0.1 mg/kg. Anesthesia was maintained with isoflurane in oxygen and nitrous oxide along with intermittent doses of vecuronium as required. The study drug infusion was continued until the completion of skin closure. Intraoperative monitoring included ECG, non-invasive blood pressure, pulse oximetry, capnography, and temperature.

At the end of surgery, residual neuromuscular blockade was reversed using neostigmine and glycopyrrolate, and patients were extubated upon meeting standard recovery criteria. The recovery profile was assessed by recording the extubation time (from discontinuation of anesthetic to extubation) and orientation time (time to respond appropriately to verbal commands). Quality of recovery was evaluated at 24 hours postoperatively using the 40-item QoR-40 questionnaire. Postoperative pain was assessed using the Visual Analog Scale (VAS) at 2, 4, 8, 12, and 24 hours post-surgery. The time to first rescue analgesia and the total analgesic requirement within 24 hours were also recorded. Data were statistically analyzed using SPSS software version 25.0. Continuous variables were expressed as mean \pm standard deviation and compared using ANOVA, while categorical data were analyzed using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

Results

Out of the 120 patients enrolled, all completed the study and were analyzed. The demographic characteristics were comparable among the three groups. Patients receiving lignocaine and dexmedetomidine infusions demonstrated better recovery profiles and higher QoR-40 scores compared to the control group. Dexmedetomidine provided superior postoperative analgesia, while lignocaine facilitated faster recovery times.

Table 1: Comparison of Demographic Profile Across Study Groups

Parameter	Group L (n=40)	Group D (n=40)	Group C (n=40)	p-value
Age (years)	44.3 \pm 5.2	43.7 \pm 5.6	45.1 \pm 4.9	0.52
Weight (kg)	58.9 \pm 6.4	59.3 \pm 5.9	58.1 \pm 6.7	0.68
Height (cm)	157.4 \pm 4.8	158.1 \pm 5.1	156.9 \pm 4.6	0.59
ASA Grade I : II	26 : 14	27 : 13	25 : 15	0.93
Duration of surgery (min)	95.2 \pm 10.4	96.1 \pm 9.6	94.8 \pm 11.2	0.81

Table 2: Recovery Profile (Extubation and Orientation Times)

Parameter	Group L (Lignocaine)	Group D (Dexmedetomidine)	Group C (Control)	p-value
Extubation time (min)	6.8 ± 1.2	8.4 ± 1.6	9.2 ± 1.5	<0.001
Orientation time (min)	8.3 ± 1.5	10.6 ± 2.1	11.4 ± 2.0	<0.001

Table 3: Quality of Recovery Scores (QoR-40) at 24 Hours Postoperative

QoR-40 Domain	Group L	Group D	Group C	p-value
Physical Comfort	44.5 ± 3.2	45.8 ± 3.1	40.2 ± 3.5	<0.001
Emotional State	37.9 ± 2.8	39.1 ± 2.6	34.3 ± 3.1	<0.001
Physical Independence	35.2 ± 3.0	35.6 ± 3.2	32.7 ± 2.8	0.002
Pain	38.4 ± 2.7	40.5 ± 2.9	33.6 ± 3.0	<0.001
Psychological Support	33.1 ± 2.5	34.2 ± 2.6	30.2 ± 2.9	<0.001
Total Score	189.1 ± 9.4	195.2 ± 8.7	170.9 ± 10.3	<0.001

Table 4: Postoperative Pain Scores (VAS) at Various Time Intervals

Time Post-op (hrs)	Group L	Group D	Group C	p-value
2	2.8 ± 0.7	2.1 ± 0.6	4.3 ± 0.8	<0.001
4	3.2 ± 0.9	2.3 ± 0.7	4.7 ± 0.7	<0.001
8	3.8 ± 1.0	2.6 ± 0.8	5.1 ± 0.9	<0.001
12	3.5 ± 0.8	2.4 ± 0.7	4.6 ± 0.8	<0.001
24	3.0 ± 0.7	2.2 ± 0.6	4.1 ± 0.7	<0.001

Table 5: Time to First Rescue Analgesic (in Hours)

Group	Time to First Analgesia (hrs)	p-value
Group L (Lignocaine)	4.8 ± 1.1	
Group D (Dexmedetomidine)	6.2 ± 1.3	<0.001
Group C (Control)	2.7 ± 0.9	

Table 6: Total Postoperative Analgesic Requirement (mg Tramadol Equivalent)

Group	Total Dose (mg)	p-value
Group L	94.5 ± 12.8	
Group D	68.7 ± 11.2	<0.001
Group C	134.1 ± 14.9	

Table 7: Intraoperative Hemodynamic Parameters (Mean ± SD)

Parameter	Group L	Group D	Group C	p-value
HR (bpm)	75.4 ± 6.2	68.1 ± 5.9	82.3 ± 7.5	<0.001
MAP (mmHg)	84.2 ± 5.7	78.6 ± 6.1	91.5 ± 6.4	<0.001

Table 8: Postoperative Sedation Score (Ramsay Score) at 2 Hours

Group	Sedation Score (mean)	p-value
Group L	2.2 ± 0.5	
Group D	3.4 ± 0.6	<0.001
Group C	1.9 ± 0.4	

Table 9: Incidence of Postoperative Nausea and Vomiting

Group	Nausea (%)	Vomiting (%)	p-value
Group L	12.5	5.0	
Group D	7.5	2.5	0.014
Group C	25.0	12.5	

Table 10: Incidence of Adverse Events

Adverse Event	Group L (%)	Group D (%)	Group C (%)	p-value
Bradycardia	2.5	5.0	0.0	0.19
Hypotension	2.5	7.5	0.0	0.08
Headache	5.0	2.5	10.0	0.22
Dizziness	2.5	2.5	5.0	0.72

Discussion

This prospective randomized study evaluated and compared the effects of intravenous lignocaine and dexmedetomidine infusions on recovery profile, quality of recovery, and postoperative analgesia in patients undergoing total abdominal hysterectomy. Our findings indicate that both lignocaine and dexmedetomidine offer significant benefits over placebo in enhancing recovery quality, reducing postoperative pain, and minimizing analgesic consumption. However, dexmedetomidine demonstrated superior analgesic efficacy, longer duration of postoperative pain relief, and better QoR-40 scores, albeit with slightly delayed emergence compared to lignocaine.

Lignocaine, as an intravenous anesthetic adjunct, has shown favorable effects on reducing inflammatory response, attenuating nociceptive input, and accelerating recovery. In our study, the lignocaine group had significantly faster extubation and orientation times than both the control and dexmedetomidine groups, reaffirming its role in facilitating early recovery. This is consistent with prior studies which support lignocaine's ability to enhance early cognitive recovery and discharge readiness, especially in surgeries involving visceral pain components such as abdominal hysterectomy.

Dexmedetomidine, a selective α_2 -adrenergic agonist, was associated with the most profound analgesic effect. Patients in the dexmedetomidine group reported the lowest VAS scores at all postoperative intervals, required the least rescue analgesia, and had the highest QoR-40 scores, particularly in domains assessing pain, emotional well-being, and psychological support. These effects can be attributed to dexmedetomidine's central sympatholytic action, inhibition of nociceptive transmission, and opioid-sparing properties. The increased sedation noted in the early postoperative period remained within a safe and arousable range and did not result in adverse outcomes.

Postoperative nausea and vomiting were also reduced in both intervention groups compared to control, with the lowest incidence observed in the dexmedetomidine group, supporting its known antiemetic properties. Hemodynamic stability was better preserved in the dexmedetomidine group, although minor bradycardia and hypotension were reported in a few cases—consistent with the known pharmacological profile of α_2 agonists. Importantly, no serious adverse events occurred in any group, highlighting the safety of both agents when used in recommended dosages.

Our findings align with recent evidence advocating the use of lignocaine and dexmedetomidine as part of multimodal analgesia and enhanced recovery

protocols. While lignocaine is preferred when rapid recovery is desired, dexmedetomidine is more effective in providing longer-lasting analgesia and improving overall recovery experience.

Conclusion

Both intravenous lignocaine and dexmedetomidine infusions significantly improve the recovery profile, quality of recovery, and postoperative analgesia in patients undergoing total abdominal hysterectomy when compared to standard care. Lignocaine is particularly effective in promoting faster emergence and early recovery, making it suitable when rapid discharge is a priority. Dexmedetomidine, on the other hand, offers superior postoperative pain relief, reduced analgesic consumption, and better overall quality of recovery, with the added benefit of hemodynamic stability and minimal adverse effects. Thus, both agents can be safely incorporated into perioperative protocols, with the choice tailored according to clinical priorities—either rapid recovery or prolonged analgesia.

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