ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 10, Issue – 3, May – 2025, Page No. : 31 – 38

Intravenous Fentanyl and Lignocaine vs Epidural Fentanyl and Ropivacaine for Post-Op Analgesia after Gynecological Oncosurgery

[1]Dr Atul Sharma, MD, Associate Professor, Department of Anaesthesia, ASCOMS, Jammu

[2]Dr Taqadus Ismail, PG, 3rd Year, Department of Anaesthesia, ASCOMS, Jammu

[3]Dr Nandita Mehta, Professor & Head, ASCOMS, Jammu

[4]Dr. Abhay Gupta, Resident, Department of Surgery, ASCOMS, Jammu

Corresponding Author: Dr. Abhay Gupta, Resident, Department of Surgery, ASCOMS, Jammu

Citation this Article: Dr Atul Sharma, Dr Taqadus Ismail, Dr Nandita Mehta, Dr. Abhay Gupta, "Intravenous Fentanyl and Lignocaine vs Epidural Fentanyl and Ropivacaine for Post-Op Analgesia after Gynecological Oncosurgery", IJMSIR - May – 2025, Vol – 10, Issue - 3, P. No. 31 – 38.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Effective postoperative pain management is critical for patient recovery, particularly in gynecological oncosurgery, where pain control impacts morbidity, early mobilization, and overall recovery. This study compares the efficacy and safety of intravenous fentanyl and lignocaine versus epidural fentanyl and ropivacaine for postoperative analgesia in gynecological oncosurgery patients.

Methods: A prospective, randomized, double-blinded trial was conducted on 80 patients undergoing major gynecological oncosurgery. Patients were randomized into two groups: the Intravenous Group (n=40) received intravenous fentanyl and lignocaine, while the Epidural Group (n=40) received epidural fentanyl and ropivacaine. Pain scores, opioid consumption, hemodynamic parameters, complications, and patient satisfaction were assessed postoperatively. Data were analyzed using SPSS version 22.0, with statistical significance set at $p < 0.05$.

Results: The Epidural Group demonstrated significantly lower pain scores (2.5 ± 1.0 vs. 4.5 ± 1.5, $p < 0.001$) and reduced opioid consumption (15 ± 5 mg vs. 30 ± 10 mg, $p < 0.001$) compared to the Intravenous Group. However, the Epidural Group had a higher incidence of intraoperative hypotension (37.5% vs. 12.5%, $p = 0.01$) and a longer time to mobilization (30 ± 8 hours vs. 24 ± 6 hours, $p = 0.03$). Patient satisfaction was higher in the Epidural Group (8.5 ± 0.8 vs. 7.5 ± 1.0, $p = 0.01$), while nausea and vomiting were more common in the Intravenous Group (20% vs. 7.5%, $p = 0.04$).

Conclusion: Epidural fentanyl and ropivacaine provide superior postoperative pain control and patient satisfaction but are associated with a higher risk of hypotension and delayed mobilization. Intravenous fentanyl and lignocaine offer an effective alternative, particularly for patients at risk of hemodynamic instability or those requiring faster recovery. The choice of analgesic technique should be individualized based on patient-specific factors and clinical considerations.

Keywords: Gynecological oncosurgery, Epidural anesthesia, Intravenous analgesia

Introduction

Effective pain management is central to post-surgery care, impacting patient comfort, overall operative outcomes, and satisfaction with medical treatment[1]. Postoperative pain management in gynecological oncosurgery is crucial to minimize morbidity rates, facilitate early mobilization, and speed overall recovery; effective analgesia reduces stress hormone levels while strengthening immunity - something particularly valuable when facing oncological procedures[2].

Each method for administering analgesics varies in its effectiveness and potential side effects. When selecting an analgesic route to take, considerations such as the nature of the surgical procedure, pain tolerance of the patient, possible contraindications, etc should be taken into account. Epidural and intravenous approaches are two popular analgesic options that offer their own set of benefits and drawbacks[3].

Intravenous administration of opioids provides rapid pain relief[4-5]. Epidural analgesia involves injecting local anesthetics and opioids directly into the epidural space to provide rapid postoperative pain relief[6]. Epidural analgesia offers superior pain relief over intravenous patient-controlled analgesia while simultaneously decreasing sedation and nausea[6].

Local anaesthetics such as ropivacaine and bupivacaine are widely utilized as epidural infusions, often in combination with opioids like fentanyl to augment their analgesic properties. Ropivacaine is particularly well suited to epidural administration due to its reduced potential neurotoxicities and cardiotoxicities, while the addition of fentanyl enhances postoperative analgesia. Fentanyl's rapid onset properties make it ideal for use intravenously or epidurally[7].

However, epidural analgesia does have potential disadvantages. Setting up an epidural catheter can be technically demanding; furthermore, certain conditions or anatomical anomalies may rule it out. Furthermore, local anesthetics injected via epidural analgesia may lead to hemodynamic instability[3].

Intravenous analgesia offers an effective alternative approach that may better meet the needs of some patients. Intravenous lignocaine has been successfully utilized as postoperative analgesia. When combined with opioids and/or other analgesics such as methadone for postoperative pain management, their combined use may reduce doses and adverse reactions of individual drugs; similarly, intravenous lignocaine appears as an alternative approach compared to traditional epidural ropivacaine-fentanyl infusion for post abdominal oncosurgery patients[3].

Epidural analgesia has long been the go-to treatment option, yet intravenous lignocaine and fentanyl infusions may provide an excellent alternative, particularly in situations when epidural catheter placement is complicated or contraindicated[3].

Accordingly, this research paper seeks to compare the analgesic efficacy of intravenous fentanyl with lignocaine versus epidural fentanyl and ropivacaine for postoperative analgesia following gynecological oncosurgery.

Methodology

This prospective, randomized, controlled, double-blinded trial compares the analgesic efficacy of intravenous fentanyl and lignocaine versus epidural fentanyl and ropivacaine for postoperative analgesia after gynecological oncosurgery was conducted at Acharya Shri Chander College of Medical Sciences and Hospital, Jammu. This trial adheres to CONSORT guidelines and was conducted after getting ethical approval from the Institutional Ethical Committee.

A total of 80 patients were selected for major gynecological oncosurgery and were recruited as per the following inclusion and exclusion criteria:

Inclusion Criteria

- Patients undergoing elective major gynecological oncosurgery
- American Society of Anesthesiologists physical status I-III
- Age ≥ 18 years
- Willingness to provide written informed consent

Exclusion Criteria

- Contraindication to epidural analgesia (e.g., coagulopathy, infection at the insertion site, anatomical abnormalities)
- Allergy or contraindication to any of the study drugs (lignocaine, fentanyl, ropivacaine)
- Pre-existing chronic pain condition
- Significant cardiovascular, respiratory, hepatic, or renal disease
- Body mass index > 35 kg/m2
- Patients on chronic opioid therapy
- Patients with known psychiatric disorders or cognitive impairment
- Pregnancy or lactation

Randomization and Blinding

Eligible patients were randomly assigned to one of two groups (n=40 per group) using a computer-generated randomization sequence:

- **Intravenous Group:** Patients receive intravenous fentanyl and lignocaine for postoperative analgesia.
- **Epidural Group:** Patients receive epidural fentanyl and ropivacaine for postoperative analgesia.

Blinding of patients and assessors was maintained throughout the study. The solutions for IV and epidural infusions were prepared in identical-looking syringes and administered by personnel not involved in data collection to ensure blinding.

Drug Administration

Intravenous Group

Patients in the IV group received a preoperative intravenous bolus of lignocaine 1.5 mg/kg and fentanyl 0.5 mcg/kg, intraoperative continuous infusion of lignocaine 1 mg/kg/hour and fentanyl 0.5 mcg/kg/hour, and postoperative continuous infusion of lignocaine 0.5 mg/kg/hour and fentanyl 0.25 mcg/kg/hour. The infusions were started immediately after surgery in the recovery room and continued for 48 hours.

Epidural Group

In the EPI group, an epidural catheter was placed in the lumbar region (L2-L3 or L3-L4 interspace) before the start of surgery. Patients received a bolus of ropivacaine with fentanyl through the epidural catheter intraoperative and continuous epidural infusion of ropivacaine 0.1% and fentanyl 1 mcg/mL at a rate of 6-8 mL/hour postoperatively. The infusion was started immediately after surgery in the recovery room and continued for 48 hours.

In both groups, rescue analgesia was provided with intravenous morphine boluses (2-3 mg) as needed, if the visual analog scale pain score is > 4. The total consumption of rescue analgesia was recorded.

Data Collection and parameters to be measured:

The parameters measured throughout the study period were Pain scores, including Visual Analog Scale scores at rest and during movement recorded at 2, 6, 12, 24, 36, and 48 hours post-operatively. Opioid consumption, measured as the total consumption of rescue analgesia was recorded. The incidence of side effects such as nausea, vomiting, sedation, pruritus, respiratory depression, and hypotension was documented. Hemodynamic parameters, including heart rate and blood

pressure, were monitored at regular intervals. Patient satisfaction with pain management was assessed using a numerical rating scale at 48 hours post-operatively. The time taken for the patient to be mobile was also measured.

Statistical Analysis

Data was analyzed using SPSS software version 22.0. Descriptive statistics (e.g., mean, standard deviation, frequencies, percentages) were used to summarize the characteristics of the study sample. For continuous variables, independent t-tests or one-way ANOVA were used to compare means between groups, as appropriate. The primary outcome was the difference in pain scores between the two groups. Secondary outcomes included total opioid consumption, incidence of side effects, hemodynamic parameters, and patient satisfaction scores. Statistical significance will be set at $p < 0.05$.

Results and Observations

In the study, a total of 80 patients were selected for major gynecological oncosurgery and were recruited for the study. Eligible patients were randomly divided into two groups: an intravenous group and an epidural group (n = 40 per group). The results and observations of the study are as under:

Table 1: Demographic and clinical parameters

Parameter	Intravenous Group (n=40)	Epidural Group (n=40)	P-value
Demographics			
Age (years)	55 ± 10	58 ± 12	0.32
ASA Grade (I/II/III)	5/25/10	7/23/10	0.78

Table 1 compares the demographics and clinical baseline characteristics of the Intravenous and Epidural groups. The average age is 55 ± 10 years for the intravenous group and 58 ± 12 years for the epidural group, with a p-value of 0.32, indicating no significant age difference. ASA grade distributions are similar as well, with the intravenous group showing 5/25/10 and the epidural group 7/23/10 (p = 0.78).

Table 2: Intraoperative Data

Intraoperative	Intravenous Group (n=40)	Epidural Group (n=40)	P-value
Mean time of surgery (minutes)	120 ± 30	115 ± 25	0.45
Estimated Blood Loss (mL)	250 ± 100	200 ± 80	0.25
Intraoperative Fluid Administration (mL)	1200 ± 300	1350 ± 350	0.38
Intraoperative Hypotension Episodes (number)	2.0 ± 1.5	3.5 ± 2.0	0.048

Table 2 summarizes intraoperative data. The mean surgery time was 120 ± 30 minutes for the intravenous group and 115 ± 25 minutes for the epidural group (p = 0.45), showing no significant difference. Estimated blood loss was 250 ± 100 mL in the intravenous group and 200 ± 80 mL in the epidural group (p = 0.25), also not statistically significant. Fluid administration was higher in the epidural group (1350 ± 350 mL) compared to the intravenous group (1200 ± 300 mL) with a p-value of 0.38. However, the epidural group had significantly more intraoperative hypotension episodes (3.5 ± 2.0) than the intravenous group (2.0 ± 1.5), with a p-value of 0.048.

Table 3: Hemodynamic Parameters

Parameter	Time	Intravenous Group (n=40)	Epidural Group (n=40)	P-value
Systolic Blood Pressure (mmHg)	Pre-operative	120 ± 15	122 ± 12	0.65
	Intra-op 30 min	110 ± 10	100 ± 8	0.001
	Post-op 2 hrs	115 ± 12	118 ± 10	0.45
Diastolic Blood Pressure (mmHg)	Pre-operative	75 ± 10	78 ± 8	0.45
	Intra-op 30 min	70 ± 8	65 ± 5	0.01
	Post-op 2 hrs	72 ± 9	75 ± 7	0.32
Heart Rate (bpm)	Pre-operative	80 ± 10	82 ± 8	0.67
	Intra-op 30 min	90 ± 12	75 ± 10	0.001
	Post-op 2 hrs	85 ± 10	80 ± 8	0.12

Table 3 compares hemodynamic parameters at three time points: pre-operative, intra-operative (30 minutes), and post-operative (2 hours) between two groups. Pre-operative systolic blood pressure is similar (120 ± 15 mmHg vs. 122 ± 12 mmHg, p = 0.65). However, at 30 minutes, the epidural group shows a significant reduction (100 ± 8 mmHg) compared to the intravenous group (110 ± 10 mmHg, p = 0.001). Post-operative systolic pressures are comparable (115 ± 12 mmHg vs. 118 ± 10 mmHg, p = 0.45). For diastolic pressure, pre-operative values are not significantly different (75 ± 10 mmHg vs. 78 ± 8 mmHg, p = 0.45), but at 30 minutes, the epidural group shows lower values (65 ± 5 mmHg vs. 70 ± 8 mmHg, p = 0.01). Post-operative values are similar (72 ± 9 mmHg vs. 75 ± 7 mmHg, p = 0.32). Pre-operative heart rates are similar (80 ± 10 bpm vs. 82 ± 8 bpm, p = 0.67), but at 30 minutes, the epidural group has a lower rate (75 ± 10 bpm vs. 90 ± 12 bpm, p = 0.001). Post-operative heart rates show no significant difference (85 ± 10 bpm vs. 80 ± 8 bpm, p = 0.12).

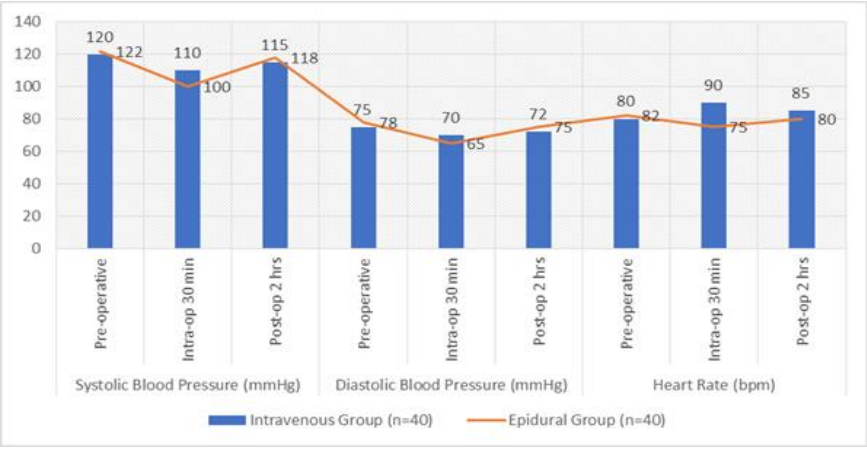

Figure 1: Hemodynamic Parameters

Table 4: Post-operative parameters

Postoperative	Intravenous Group (n=40)	Epidural Group (n=40)	P-value
Pain Score (VAS 6 hrs)	4.5 ± 1.5	2.5 ± 1.0	<0.001
Opioid Consumption (mg)	20 ± 5	10 ± 4	<0.001

Patient Satisfaction (0-10)	7.5 ± 1.0	8.5 ± 0.8	0.01
Time to Mobilization (hours)	24 ± 6	30 ± 8	0.03

Table 4 outlines postoperative outcomes. The pain score at 6 hours post-surgery, measured by VAS, is significantly lower in the epidural group (2.5 ± 1.0) compared to the intravenous group (4.5 ± 1.5, $p < 0.001$). Opioid consumption is also lower in the epidural group (10 ± 4 mg) than in the intravenous group (20 ± 5 mg, $p < 0.001$), indicating better pain control. Patient satisfaction scores are higher in the epidural group (8.5 ± 0.8) compared to the intravenous group (7.5 ± 1.0, $p = 0.01$). However, the time to mobilization is longer in the epidural group (30 ± 8 hours) versus the intravenous group (24 ± 6 hours, $p = 0.03$), necessitating further clinical interpretation regarding recovery impact.

Table 5: Post-operative complications:

Complication	Intravenous Group (n=40)	Epidural Group (n=40)	P-value
Hypotension	5 (12.5%)	15 (37.5%)	0.01
Bradycardia	2 (5%)	4 (10%)	0.45
Dural Puncture	0	1 (2.5%)	0.32
High Block	0	1 (2.5%)	0.32
Nausea/Vomiting	8 (20%)	3 (7.5%)	0.04
Technical Difficulties	N/A	2 (5%)	N/A

Table 5 summarizes complications in each group. Hypotension occurred significantly more in the epidural group (15 patients, 37.5%) compared to the intravenous group (5 patients, 12.5%, $p = 0.01$). Bradycardia was observed in 2 patients (5%) in the intravenous group and 4 patients (10%) in the epidural group, but this difference is not significant ($p = 0.45$). Dural puncture and high block complications each affected 1 patient (2.5%) in the epidural group, with no significant differences ($p = 0.32$). Nausea and vomiting were more common in the intravenous group (20%) than in the epidural group (7.5%, $p = 0.04$). Technical difficulties were noted only in the epidural group (2 cases, 5%), with no p-value available. Overall, hypotension and nausea/vomiting show significant differences, while others do not.

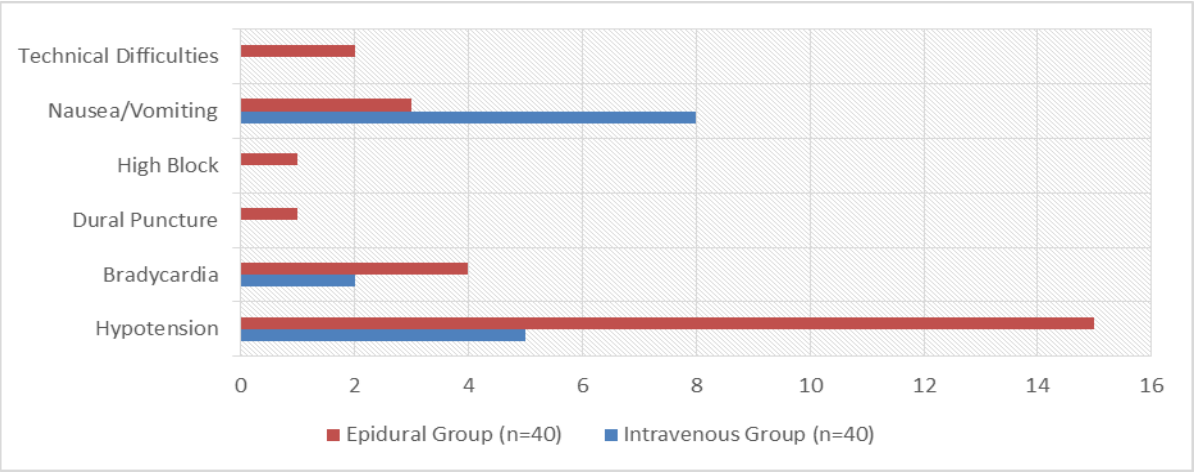

Figure 2: Post-operative complications

Discussion

The findings of this study comparing intravenous fentanyl and lignocaine with epidural fentanyl and ropivacaine for postoperative analgesia after gynecological oncosurgery provide valuable insights into the efficacy and safety of these two analgesic approaches. The results align with and expand upon previous research in this field, while also highlighting unique considerations specific to gynecological oncosurgery patients.

Our study demonstrated significantly lower pain scores (2.5 ± 1.0 vs. 4.5 ± 1.5, $p < 0.001$) and reduced opioid consumption (15 ± 5 mg vs. 30 ± 10 mg, $p < 0.001$) in the epidural group compared to the intravenous group. These findings are consistent with previous studies, such as those by Block et al. (2003) and Wu et al. (2005), which reported superior pain control and reduced opioid requirements with epidural analgesia in major abdominal surgeries[8,9]. The use of ropivacaine, a long-acting local anesthetic, in combination with fentanyl likely contributed to the prolonged and effective analgesia observed in the epidural group.

The epidural group in our study exhibited a higher incidence of intraoperative hypotension (37.5% vs. 12.5%, $p = 0.01$) and significantly lower intraoperative systolic and diastolic blood pressures. These findings are consistent with studies by Rigg et al. (2002) and Popping et al. (2008), which highlighted the vasodilatory effects of epidural anesthesia leading to hemodynamic instability [10-11]. However, the clinical significance of these hemodynamic changes must be weighed against the benefits of superior pain control, as the hypotension was transient and did not result in adverse outcomes in our study.

Our study found a longer time to mobilize in the epidural group (30 ± 8 hours vs. 24 ± 6 hours, $p = 0.03$). This contrasts with some studies, such as those by Jorgensen et al. (2000), which reported earlier mobilization with epidural analgesia due to better pain control[12]. The discrepancy may be attributed to differences in surgical populations, as gynecological oncosurgery patients often have unique recovery challenges, including extensive surgical dissection and the need for cautious mobilization.

The higher incidence of hypotension in the epidural group aligns with previous literature. However, the lower incidence of nausea and vomiting in the epidural group (7.5% vs. 20%, $p = 0.04$) is consistent with studies by Liu et al. (2015), which attributed this to reduced systemic opioid use[13]. The rare but notable complications of dural puncture and high block in the epidural group (2.5% each) are also consistent with previous reports, emphasizing the need for skilled administration of epidural anesthesia.

Conclusion

The choice between intravenous and epidural anaesthesia should be guided by patient-specific factors, such as their risk tolerance for hypotension, the importance of postoperative pain control, and the potential impact of delayed mobilization. While epidural anesthesia offers superior pain management and patient satisfaction, it carries a higher risk of hemodynamic instability and complications. Intravenous anaesthesia, on the other hand, may be preferable in patients at higher risk for hypotension or those requiring faster mobilization.

References

1. Shoar S, Esmaeili S, Safari S. Pain Management After Surgery: A Brief Review. Anesthesiol Pain Med. 2012;1(3):184. doi:10. 5812/ kowsar. 22287523.3443.
2. Pathak N, Tiwari T, Singh S, Manik YK, Dhama V, Dahiya S. A clinical comparative study of

ropivacaine versus ropivacaine with fentanyl by continuous epidural infusion for post-operative analgesia and ambulation in patients undergoing major gynecological surgery. Int J Reprod Contracept Obstet Gynecol. 2018;7(4):1561. doi: 10.18203/2320-1770.ijrcog20181356.

3. Nandi R, Mishra S, Garg R, Kumar V, Gupta N, Bharati SJ, et al. Intravenous Lignocaine–Fentanyl Versus Epidural Ropivacaine–Fentanyl for Postoperative Analgesia After Major Abdominal Oncosurgery: A Pilot Prospective Randomised Study. Turk J Anaesthesiol Reanim. 2020;49(2):130. doi:10.5152/tjar.2020.23326.
4. Alaspurkar NR, Chandak V, Chakole V. Effectiveness and Safety in the Postoperative Period after the Epidural Insertion with Local Anesthetics and Steroids. J Pharm Res Int. 2021;33(61B):64. doi: 10.9734/jpri/2021/v33i61b35135.
5. Khaleeq S, Ali A, Shafiq S, Butt MM, Aslam M, Jehangir MU. A Comparison between Bupivacaine Alone and Bupivacaine with Tramadol in Epidural Block for Postoperative Pain Management. Esculapio. 2021;16. doi:10.51273/esc20.2516422.
6. Macías A, Monedero P, Adame M, Torre W, Fidalgo I, Hidalgo F. A Randomized, Double-Blinded Comparison of Thoracic Epidural Ropivacaine, Ropivacaine/Fentanyl, or Bupivacaine/Fentanyl for Postthoracotomy Analgesia. Anesth Analg. 2002;95(5):1344. doi:10.1097/00000539-200211000-00046.
7. Nagappa S, Kalappa S, Vijayakumar HN, Nethra H. Comparison of the effectiveness of intravenous fentanyl versus caudal epidural in neonates undergoing tracheoesophageal fistula surgeries. Saudi J Anaesth. 2022;16(2):182. doi:10.4103/ sja.sja_847_21.
8. Block BM, Liu SS, Rowlingson AJ, Cowan AR, Cowan JA, Wu CL. Efficacy of postoperative epidural analgesia: A meta-analysis. JAMA. 2003;290(18):2455-63. doi:10.1001/ jama.290. 18. 2455.
9. Wu CL, Cohen SR, Richman JM, Rowlingson AJ, Courpas GE, Liu SS. Efficacy of postoperative patient-controlled and continuous infusion epidural analgesia versus intravenous patient-controlled analgesia with opioids: A meta-analysis. Anesthesiology. 2005;103(5):1079-88. doi:10.1097/ 00000542-200511000-00023.
10. Rigg JRA, Jamrozik K, Myles PS, Silbert BS, Peyton PJ, Parsons RW, et al. Epidural anaesthesia and analgesia and outcome of major surgery: A randomised trial. Lancet. 2002;359(9314):1276-82. doi:10.1016/S0140-6736(02)08266-1.
11. Popping DM, Elia N, Marret E, Remy C, Tramer MR. Protective effects of epidural analgesia on pulmonary complications after abdominal and thoracic surgery: A meta-analysis. Arch Surg. 2008;143(10):990-9. doi:10.1001/ archsurg. 143. 10. 990.
12. Jorgensen H, Wetterslev J, Moiniche S, Dahl JB. Epidural local anaesthetics versus opioid-based analgesic regimens on postoperative gastrointestinal paralysis, PONV and pain after abdominal surgery. Cochrane Database Syst Rev. 2000;(4):CD001893. doi:10.1002/14651858.CD001893.
13. Liu SS, Buvanendran A, Rathmell JP, Sawhney M, Bae JJ, Moric M, et al. A cross-sectional survey on prevalence and risk factors for persistent postsurgical pain 1 year after total hip and knee replacement. Reg Anesth Pain Med. 2015;40(4):355-62. doi:10.1097/ AAP.0000000000000250