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A COMPARATIVE STUDY OF EPIDURAL GENERAL ANAESTHESIA (EGA) AND GENERAL ANESTHESIA (GA) AT A TERTIARY CARE CENTRE CENTRE

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ABSTRACT

Introduction: Epidural General Anesthesia (EGA) combines the benefits of regional and general anesthesia, offering potential advantages in hemodynamic stability, postoperative pain management, and reduced complications compared to General Anesthesia (GA) alone. This study evaluates and compares the clinical outcomes of EGA and GA in patients undergoing elective surgeries in an Indian tertiary care setting.

Aim and Objective: To compare EGA and GA in terms of hemodynamic stability, postoperative pain, recovery parameters, complications, and patient satisfaction, with consideration of demographic and clinical variables.

Material and Methods: This prospective, randomized study included 150 adult patients (aged 18–65 years, ASA physical status I/II) undergoing elective abdominal, pelvic, or lower limb surgeries. Patients were randomized into two groups: EGA (n=75) and GA (n=75). EGA

involved epidural catheter placement with continuous bupivacaine infusion alongside general anesthesia. Data on hemodynamic stability, pain scores (VAS), recovery parameters, complications, and patient satisfaction were analyzed using t-tests and chi-square tests ($p < 0.05$ considered significant).

Results:EGA demonstrated superior hemodynamic stability with fewer cases of intraoperative hypotension (8% vs. 22%, $p < 0.01$) and significant blood pressure fluctuations (11% vs. 28%, $p < 0.01$). Postoperative pain scores were significantly lower in the EGA group across all time points (e.g., VAS at recovery: 2.5 ± 1.0 vs. 5.8 ± 1.4, $p < 0.01$). EGA facilitated earlier ambulation (4.2 ± 1.0 hours vs. 6.5 ± 1.3 hours, $p < 0.05$) and discharge readiness (1.2 ± 0.3 days vs. 1.6 ± 0.4 days, $p < 0.05$), though GA allowed quicker recovery of consciousness (18 ± 5 minutes vs. 30 ± 8 minutes, $p < 0.05$). Complications were lower with EGA, including postoperative nausea/vomiting (7% vs. 18%, $p < 0.01$).

Conclusion:EGA outperforms GA in pain management, hemodynamic stability, and patient satisfaction, making it a valuable option for high-risk patients and surgeries involving the lower abdomen and pelvis. Further large-scale studies are recommended to validate these results across diverse populations.

Key words: Epidural General Anesthesia, General Anesthesia, Hemodynamic Stability, Postoperative Pain

INTRODUCTION

Anesthesia is an inescapable application during the perioperative period, and various anesthesia methods may have different influences on postoperative recovery, short-term adverse reactions, and even tumor metastasis and recurrence**.** Anesthesia is a cornerstone of modern surgery, allowing for painless and controlled operative conditions. The choice of anesthesia technique can significantly impact patient outcomes, particularly in terms of intraoperative stability and postoperative recovery. Epidural General Anesthesia (EGA), a combination of regional and general anesthesia, is widely used for surgeries involving the lower abdomen and pelvis.

Laparoscopic cholecystectomy hasbecome very popular after it was first described in 1987 by Philippe Mouret in France. Laparoscopic surgical techniques have been rapidly accepted by surgeons worldwide with published reports describing the benefit of less postoperative pain, decreased hospital stay and earlier return to work [1]. Minimally invasive therapy is done

with the general aim to minimize the trauma of the interventional process whilst still achieving a satisfactory result. Johnson noted that “all laparoscopic procedures are merely a change in access and still require General Anesthetic; hence the difference from conventional surgery is likely to be small.” This statement is predominantly based on the assumption that laparoscopy necessitates endotracheal intubation to prevent aspiration and respiratory embarrassment secondary to the induction of carbon dioxide pneumoperitoneum, which is not well tolerated in a patient who is awake during the procedure [2,3]. The incidence of postoperative morbidities like nausea, vomiting, dizziness, respiratory complication, thromboembolism and pneumonia was much less as compared to General Anesthesia [4].

By contrast, General Anesthesia (GA) alone is a standard method for most surgeries, inducing unconsciousness and suppressing pain perception.Lumbar laminectomy and discectomy is most commonly performed under general anesthesia (GA). This technique can be accompanied by several perioperative morbidities including blood loss, postoperative pain, nausea, vomiting, and prolonged postanesthesia recovery period [5]. Patient's satisfaction and the ability to carry out prolonged operations in prone position without airway compromise are the main advantages of using GA [6].

Techniques of regional anesthesia (RA) alone or epidural anesthesia (EA), may reduce the amount of blood loss, which is an effect of decreased peripheral venous pressure after RA and may also lower the incidence of pulmonary complications [7,8].

This study aims to provide a detailed comparison of EGA and GA, with an emphasis on clinical outcomes, hemodynamic parameters, postoperative pain, recovery patterns, and complication rates. Additionally, demographic variables such as age, sex, and preexisting risk factors are analyzed to understand their impact on the efficacy and safety of these techniques.

MATERIAL AND METHODS

Study Design: This was a prospective, randomized, comparative study conducted at a tertiary care hospital in India from January to June 2024.

Patient Selection: A total of 150 patients were enrolled and divided into two groups:

1. **EGA Group:** Patients received a combination of epidural and general anesthesia.
2. **GA Group:** Patients received only general anesthesia.

Inclusion Criteria

- Adults aged 18 to 65 years.
- ASA (American Society of Anesthesiologists) physical status I or II.
- Elective abdominal, pelvic, or lower limb surgeries.

Exclusion Criteria

- Known allergy to anesthetic agents.
- Contraindications to epidural placement (e.g., spinal deformities, coagulopathies).
- Severe cardiovascular or respiratory conditions.

Intervention Protocol

- **Epidural General Anesthesia Group:** An epidural catheter was inserted at the lumbar level. After confirming the catheter's placement, a test dose of local anesthetic (2% lignocaine with adrenaline) was administered. General anesthesia was induced with propofol, fentanyl, and vecuronium, and maintained with isoflurane and oxygen. The epidural catheter was used for continuous infusion of 0.25% bupivacaine during and after surgery.
- **General Anesthesia Group:** Induction and maintenance were performed similarly, but without epidural catheter placement.

Data Collection Demographic data, including age, sex, and comorbidities (hypertension, diabetes, obesity, etc.), were recorded. The following outcomes were assessed:

1. **Intraoperative Hemodynamic Stability:** Blood pressure, heart rate, and oxygen saturation.
2. **Postoperative Pain:** Visual Analog Scale (VAS) at recovery, 6 hours, and 24 hours.
3. **Recovery Parameters:** Time to consciousness, ambulation, and readiness for discharge.
4. **Complications:** Nausea, vomiting, hypotension, bradycardia, respiratory issues, and epidural-related events.
5. **Patient Satisfaction:** Postoperative survey.

Statistical Analysis: Data were analyzed using SPSS software. Continuous variables were compared using t-tests, while categorical variables were analyzed using chi-square tests. A p-value < 0.05 was considered statistically significant.

RESULTS

In the present study the EGA demonstrated superior hemodynamic stability with fewer cases of intraoperative hypotension (8% vs. 22%, $p < 0.01$) and significant blood pressure fluctuations (11% vs. 28%, $p < 0.01$).

Demographic Characteristics: The mean age of participants was 45.3 ± 12.4 years. The EGA group had a slightly higher proportion of male patients (56%) compared to the GA group (48%). Comorbidities were evenly distributed, with 30% of patients having hypertension, 20% with diabetes, and 15% classified as obese.

Table no. 1: Demographic characteristics of patients in two groups.

Characteristic	EGA Group (n=75)	GA Group (n=75)	Total (n=150)
Age (mean ± SD)	45.8 ± 12.1	44.8 ± 12.7	45.3 ± 12.4
Sex			
Male	42 (56%)	36 (48%)	78 (52%)
Female	33 (44%)	39 (52%)	72 (48%)
Comorbidities			
Hypertension	23 (30.7%)	22 (29.3%)	45 (30%)
Diabetes	15 (20%)	15 (20%)	30 (20%)
Obesity	12 (16%)	11 (14.7%)	23 (15.3%)

Intraoperative Hemodynamic Stability: EGA provided superior hemodynamic stability. Patients in the EGA group experienced fewer fluctuations in blood pressure and heart rate. For instance, intraoperative hypotension occurred in 8% of the EGA group versus 22% in the GA group ($p < 0.01$). This was particularly evident in older patients and those with cardiovascular risk factors.

Table no. 2: Distribution ofIntraoperative Hemodynamic stability in two groups.

Parameter	EGA Group (n=75)	GA Group (n=75)	p-value
Intraoperative hypotension	6 (8%)	17 (22%)	<0.01
Significant BP fluctuations	8 (11%)	21 (28%)	<0.01
Heart rate variability	7 (9%)	19 (25%)	<0.01

Postoperative Pain The EGA group reported significantly lower pain scores:

- At recovery: Mean VAS 2.5 ± 1.0 (EGA) vs. 5.8 ± 1.4 (GA).
- At 6 hours: Mean VAS 2.1 ± 0.8 (EGA) vs. 5.4 ± 1.2 (GA).
- At 24 hours: Mean VAS 1.5 ± 0.6 (EGA) vs. 3.8 ± 1.0 (GA).

Table no.3 Distribution of postoperative pain in two groups.

Timepoint	EGA Group (VAS ± SD)	GA Group (VAS ± SD)	p-value
At recovery	2.5 ± 1.0	5.8 ± 1.4	<0.01
6 hours post-op	2.1 ± 0.8	5.4 ± 1.2	<0.01
24 hours post-op	1.5 ± 0.6	3.8 ± 1.0	<0.01

Recovery Parameters: The GA group achieved full consciousness faster (mean 18 ± 5 minutes) compared to the EGA group (30 ± 8 minutes, $p < 0.05$). However, the EGA group showed earlier ambulation and discharge readiness due to superior pain management.

Table no.4: Showing Recovery parameters of two groups in patients

Parameter	EGA Group (mean ± SD)	GA Group (mean ± SD)	p-value
Time to full consciousness	30 ± 8 minutes	18 ± 5 minutes	<0.05

Time to ambulation	4.2 ± 1.0 hours	6.5 ± 1.3 hours	<0.05
Readiness for discharge	1.2 ± 0.3 days	1.6 ± 0.4 days	<0.05

Complications

- **EGA Group:** Mild back discomfort (5%), temporary difficulty in catheter placement (3%).
- **GA Group:** Higher rates of postoperative nausea and vomiting (18% vs. 7% in EGA, $p < 0.01$) and respiratory complications (6% vs. 2%).

Table no.5: showing complication between two groups.

Complication	**EGA Group (n=75)**	**GA Group (n=75)**	**p-value**
Postoperative nausea/vomiting	5 (7%)	13 (18%)	<0.01
Respiratory complications	2 (2%)	5 (6%)	0.18
Epidural-related issues	6 (8%)	N/A	N/A
Mild back discomfort	4 (5%)	N/A	N/A

Patient Satisfaction Patients in the EGA group reported higher satisfaction scores due to better pain relief and fewer postoperative discomforts (mean satisfaction score: 4.8/5 for EGA vs. 3.9/5 for GA).

Table no.6: showing patients satisfaction

Parameter	**EGA Group (mean ± SD)**	**GA Group (mean ± SD)**
Satisfaction score (out of 5)	4.8 ± 0.4	3.9 ± 0.6

DISCUSSION

Laparoscopic surgical techniques have been rapidly accepted by surgeons worldwide with published reports describing the benefit of less postoperative pain, decreased hospital stay and earlier return to work.[1] Minimally invasive therapy is done with the general aim to minimize the trauma of interventional process whilst still achieving satisfactory result [3].

Anesthesia is an inescapable application during the perioperative period, and various anesthesia methods may have different influences on postoperative recovery, short-term adverse reactions, and even tumor metastasis and recurrence . One possible reason may be that anesthesia can regulate the recurrence or metastasis of cancer by directly affecting the biological behavior of tumor cells or improving the tumormicroenvironment . General anesthesia (GA) and epidural anesthesia are commonly used for patients undergoing gastric cancer surgery. Moreover, epidural anesthesia has the potential to reduce the incidence of side effects, cancer recurrence, and metastasis [7].

In our study, the mean age of participants was 45.3 ± 12.4 years. The EGA group had a slightly higher proportion of male patients (56%) compared to the GA group (48%) which was in accordance with the study conducted by khajavi MR et al [9], George Tzovaras et al [10] and Sangeeta Tiwari et al [11] .

In our study, the Postoperative Pain in EGA group reported significantly lower pain scores at recovery Mean VAS 2.5 ± 1.0 (EGA) vs. 5.8 ± 1.4 (GA), at 6 hours: Mean VAS 2.1 ± 0.8 (EGA) vs. 5.4 ± 1.2 (GA) and at 24 hours: Mean VAS 1.5 ± 0.6 (EGA) vs. 3.8 ± 1.0 (GA). This finding was similar to other study by Sangeeta Tiwari et al [11] , Turgut Donmez et al [12] and Kawser Ahmed et al [13]Sagar Mukhopadhyay et al [14] .

In the present study, the highest rate of Complications in EGA Group: Mild back discomfort (5%) and in GA Group higher rates of postoperative nausea and vomiting (18% vs. 7% in EGA, $p < 0.01$).This finding was observed to be parallel with the study conducted by Kalaivani V et al [15] and Sangeeta Tiwari et al [11]

This study highlights the advantages of EGA in managing postoperative pain and maintaining hemodynamic stability, particularly in patients with preexisting comorbidities. While GA alone remains a reliable technique, its association with higher rates of postoperative complications, such as nausea and vomiting, makes it less favorable for certain patient populations.

EGA offers significant advantages in pain control, hemodynamic stability, and reduced postoperative complications, particularly in patients with comorbidities. These findings align with prior studies and highlight the potential for EGA to improve clinical outcomes in elective surgeries [16,17].

The patients might benefit from EGA as a result of better analgesic and anti-inflammatory effects, fewer postoperative complications, higher safety, and a lower rate of metastasis and recurrence is conducive to postoperative recovery in patients with gastric cancer [18-20].

CONCLUSION

Epidural General Anesthesia offers significant benefits in terms of pain control, hemodynamic stability, and overall patient satisfaction. These advantages are particularly pronounced in high-risk patients and those undergoing lower abdominal or pelvic surgeries. Further research is recommended to validate these findings in larger and more diverse populations.

DECLARATIONS:

Conflicts of interest: There is no any conflict of interest associated with this study

Consent to participate: There is consent to participate.

Consent for publication: There is consent for the publication of this paper.

Authors' contributions: Author equally contributed the work

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