Section: Anaesthesia

Original Research Article

A COMPARATIVE STUDY OF PROPOFOL VERSUS ETOMIDATE AS INDUCTION AGENTS TO EVALUATE HAEMODYNAMIC CHANGES DURING ABDOMINAL SURGERY

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ABSTRACT

Background: Selecting the optimal induction agent in general anaesthesia is especially important to preserve haemodynamic stability more so when patients undergo abdominal surgical procedures which typically have a high propensity for causing cardiovascular instability and are often difficult to predict. Although propofol is the most frequently used induction agent and has a great recovery profile, it is not without hypotension and bradycardia. Etomidate has advantages of providing cardiovascular stability but can potentially cause side effects such as myoclonus and adrenal suppression. This study aimed to compare propofol and etomidate as induction agents in general anaesthesia, evaluating their haemodynamic effects in patients undergoing elective abdominal surgery. **Materials and Methods:** We conducted a prospectively randomized comparative study involving 100 ASA I–II patients scheduled to undergo elective abdominal surgery under general anesthesia. Patients were randomly assigned to one of two groups; Group A (n=50), which received propofol in the dose range of 2–2.5 mg/kg IV or Group B, which received etomidate in the dose range of 0.3–0.5 mg/kg IV. We recorded and measured the following parameters, which we termed hemodynamic; heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) and oxygen saturation (SpO_2) before induction; during induction; during intubation and intraoperative periods. In addition we monitored any of the following adverse events; pain on injection, nausea, vomiting and myoclonus. **Result:** Propofol used to induce anesthesia offered statistically significant decreases in SBP, DBP, MAP, and HR when compared to etomidate ($p<0.05$). Patients receiving etomidate reported cardiovascular stability during induction and intubation, caused little variations in haemodynamic stability, and had stable oxygen saturation in both groups. Propofol injections caused some pain on injection and transient hypotension but etomidate had similar side effects of myoclonis and some postoperative nausea and vomiting. **Conclusion:** Etomidate is better than propofol in maintaining haemodynamic stability during induction of general anaesthesia for abdominal surgery. Propofol, however, is still useful when rapid induction and recovery are the goal, while also being leap for hypotension. Choice of agents in practice should consider patient comorbidities and surgical setting.

INTRODUCTION

The induction of general anaesthesia marks an essential point in perioperative care due to potential for profound haemodynamic disturbance. These cardiovascular responses (most notably hypotension, cardiac overdrive, or hypertension) can compromise surgical outcomes, particularly in abdominal surgeries with lesser haemodynamic reserve. Hence, the induction agent of choice remains a critical clinical ideal to produce haemodynamic stability. Propofol is one of the most used intravenous induction agents in the world. It is widely used because of its rapid onset, induction ease, and speed of recovery, making it a popular agent in day-case surgery.[1] The drug is an emulsion containing soybean oil, glycerol, and egg phosphatide. Nonetheless, like all medications, propofol is associated with side effects, such as hypotension, bradycardia, and respiratory depression.[2] Propofol has both systemic vasodilation and mild myocardial depression effects, resulting in clinically meaningful decreases in systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) and heart rate (HR) following induction.[3,4] Additionally, high or long-term infusions of propofol have been reported to lead to propofol infusion syndrome (PIS), which is characterised by metabolic acidosis, rhabdomyolysis, and eventually cardiac failure, This demonstrates the importance of careful selection of patients and monitoring.[4]

Etomidate is another intravenous induction agent that has been known for its cardiovascular stability. It is the imidazole derivative that is a fast acting, short-acting agent that usually induces hypnosis in seconds and has rapid recovery times in minutes.[5] Unlike propofol, etomidate has a very minimal effect on blood pressure and heart rate which makes it a good choice in cases with impaired cardiovascular reserve.[6] Both propofol and etomidate have a minimal release of histamine and are haemodynamically stable in high-risk patients, for example patients with ischaemic heart disease, trauma, and/or shock. The downside with etomidate is pain on injection, myoclonus, postoperative nausea and vomiting, and short-term adrenal suppression.[7] Despite these different pharmacological profiles, both medications are frequently used in clinical practice. Longitudinal comparative studies have reported improved haemodynamic stability with etomidate versus propofol, specifically during the induction and intubation phases.[8] Propofol will remain the medication of choice when rapid awakening and antiemetic effects are preferable. Therefore, between the safety of cardiovascular effects and recovery, direct comparisons of etomidate and propofol is necessary in diverse surgical populations specifically abdominal surgical populations, where changes in hemodynamics can have a significant impact on outcomes.[9]

This make it interesting to compare propofol and etomidate as induction agents in general anaesthesia focused on their haemodynamic effects in patients undergoing abdominal surgery.

Aim and Objectives

Aim

To compare the haemodynamic changes produced by propofol and etomidate when used as induction agents in general anaesthesia for patients undergoing abdominal surgeries.

Objectives

- To evaluate and compare the effects of propofol and etomidate on heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), and oxygen saturation (SpO_2) at baseline, induction, and intubation.
- To assess the intraoperative haemodynamic stability between the two groups at defined time intervals.
- To document and compare adverse events such as pain on injection, myoclonus, nausea, and vomiting.

MATERIALS AND METHODS

This study was conducted in the Department of Anaesthesiology, Dhanalakshmi Srinivasan Medical College and Hospital, Samayapuram, Tiruchirappalli. After obtaining institutional ethics committee approval and the patient's informed consent, this study was conducted on patients undergoing elective surgery under general anaesthesia.

Ethical Clearance No: IEC NO11/24 dt.3.6.24

Study Design: Comparative Study

Period Of The Study: June 2024 To June 2025 (ONE YEAR)

Study Population:

The study was conducted in patients with ASA I& II grades, aged 30 to 65 years. The population included in the study is 100 patients scheduled for elective surgery under general anaesthesia undergoing for Abdominal surgery.

Sample Size: 100

Inclusion Criteria

- Patient Informed Consent taken
- Age Group: 30 to 65 years
- ASA I and ASA II
- Elective surgery under GA

Exclusion Criteria

- Patient Refusal
- Age Group: > 65 years
- ASA III and ASA IV
- Paediatric patients
- Emergency surgery
- Propofol-induced allergic patients

Methodology: Informed consent has been obtained from the patient. The patient was kept nil per oral (NPO) as per fasting guidelines: at least 8 hours for heavy meals and 6 hours for solids. After cleaning

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and preparing the surgical site under sterile conditions, antibiotics should be administered. Before administration, a test dose of 0.5 ml IM should be given to check for any allergic reaction or inflammation. Preoperatively, the patient's blood group must be confirmed and blood products reserved for surgery if required. Once the patient is shifted to the operating room, general anaesthesia is administered. An intubation trolley must be kept ready. Prior to loading drugs, check the expiry date of each vial. A vial should not be punctured more than 10 times; beyond this, it must be discarded. The premedication and anaesthetic drugs include: Glycopyrrolate (0.2 mg/ml), Midazolam (1 mg/ml), Fentanyl (100 mcg/2 ml), Induction agents: Propofol (2–2.5 mg/kg) or Etomidate (0.3–0.5 mg/kg), Muscle relaxants: Succinylcholine (100 mg/2 ml), Atracurium (25 mg/5 ml – short-acting), Vecuronium (10 mg/10 ml – long-acting) Should be loaded. Hemodynamic parameters, including SBP, DBP, MAP, HR, and SpO_2, were recorded at baseline, 1 min, 5 min, 15 min, 20 min, 30 min, 45 min, and 1hour post-induction. Patients were monitored intraoperatively and postoperatively for complications such as nausea, vomiting, and myoclonus, and the stability of hemodynamic changes between the two groups was compared.

Sample Size Estimation: Sample size has been calculated by using the reference article "Comparative study of propofol vs etomidate as an induction agent to evaluate hemodynamic changes during induction of anesthesia in controlled hypertensive patients" Jigna Shah1, Ila Patel, et.al. and derived by using this formula

$$n = 2 \times (Z\alpha/2 + Z\beta/2 \times)2 \times \sigma \Delta 2$$

$$n = 2 \times (1.96 + 0.84) \times (15)2 (10)2$$

$$n = 2 \times (2.8)2 \times 225 \; 100$$

$$n = 2 \times 7.84 \times 225 \; 100 = 3528 \; 100$$

$$n = 35.6$$

Were,

N: Sample size per group

Zα/2: Z value corresponding to the significance level (α)

Zβ: Z value corresponding to the power of the test (1 - β)

σ: Standard deviation of the outcome measure

Δ: Effect size or minimum meaningful difference between the two group means

n= 35.6 ~ 36; n1= 36; n2= 36; Total: 72

Based on the above calculation, the minimum required Sample size was 72 patients (36 per group). However, considering feasibility and to increase the study power, a total of 100 patients (50 in each group) were included as approved by the Institutional Ethical Committee (IEC).

Statistical Analysis: All data were entered into a Microsoft Excel spreadsheet and analysed with the Statistical Package for the Social Sciences (SPSS) 27 version software. In this study, the data have been presented through mean, standard deviation. For categorical data, the number and percentage were used in the data summaries. The paired t-test and chi-square test were utilised in this investigation.

RESULTS

A total of 100 patients scheduled for elective abdominal surgery were randomized equally into the Propofol (Group A, n=50) and Etomidate (Group B, n=50) groups. Baseline characteristics such as age, gender, and ASA physical status were comparable across both groups, ensuring uniformity in patient distribution. Haemodynamic variables including heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), and oxygen saturation (SpO_2) were recorded at baseline, during induction, at intubation, and at defined intraoperative intervals.

Induction with Propofol produced a significant decline in SBP, DBP, and MAP, along with a slight decrease in heart rate indicative of cardiovascular depression. On the contrary, Etomidate demonstrated marked stability in SBP, DBP, and MAP with slight changes in HR indicating its cardiostable nature. SpO_2 was consistently within the normal limits in each group, indicating good oxygenation during the perioperative stage. Adverse effects documented included pain on injection and hypotension in the Propofol group while the Etomidate group had more patients with myoclonus as well as transient nausea and/or vomiting. There were no serious adverse effects recorded in either group. The statistical analysis showed the haemodynamic changes between groups were significant, especially for the SBP and MAP ($p < 0.05$).

Overall, the findings reinforce that Etomidate maintains haemodynamic stability more effectively than Propofol when used as an induction agent for abdominal surgeries under general anaesthesia.

Table 1: Drug Characteristics of Propofol

Features	Contents
Available form	10 ml, 20 ml, 50 ml vials
Concentration	10 mg/ml
Route of drug	Intravenous
Onset of action	15–20 seconds
Duration	3–5 minutes (IV bolus)

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Dose	2–2.5 mg/kg IV (adults); 2.5–3 mg/kg (children)
Maintenance	50–150 µg/kg/min, with nitrous oxide or opioids
Half-life	Distribution: 40 min; Terminal: 4–7 hours
Elimination	Metabolised in liver, excreted by kidneys and lungs

[Table 1] This table outlines the pharmacological characteristics of Propofol as an induction agent.

Table 2: Drug Characteristics of Etomidate

Features	Contents
Group	Imidazole derivatives
Available form	10 ml ampoule
Concentration	2 mg/ml
Route of drug	Intravenous
Onset of action	15–20 seconds
Duration	3–5 minutes (IV bolus)
Dose	0.3–0.5 mg/kg IV
Recovery	Rapid, 6–8 minutes
Half-life	3–5 hours
Elimination	Metabolised in liver, excreted renally and partially in bile

[Table 2] This table summarizes the pharmacological profile of Etomidate.

Table 3: Serum Cortisol Levels

Time of Day	Normal Range (mcg/dL)	Normal Range (nmol/L)
Morning (8 AM)	5–25 mcg/dL	138–690 nmol/L
Evening (4 PM)	1–10 mcg/dL	83–276 nmol/L

[Table 3] This table indicates normal physiological ranges of serum cortisol at different times of day.

Table 4: Nil Per Oral (NPO) Guidelines

Items	Minimum Fasting Time
Clear liquids	2 hours
Breast milk	4 hours
Infant milk	4 hours
Light meal	6 hours
Heavy meal	8 hours

[Table 4] This table outlines standard fasting durations prior to anaesthesia.

Table 5: Distribution of Age

Age Group (years)	Propofol (n=50)	%	Etomidate (n=50)	%	Overall %
31-40	23	46%	23	46%	46%
41–50	21	42%	15	30%	36%
51–60	06	12%	12	24%	18%
Total	50	100%	50	100%	100%

[Table 5] This table presents the distribution of patients according to their age groups in both Propofol and Etomidate groups.

Table 6: Distribution of Gender

Gender	Propofol (n=50)	Etomidate (n=50)
Male	28	27
Female	22	23

[Table 6] This table compares gender distribution in the Propofol and Etomidate groups.

Table 7: Distribution of ASA

ASA Grade	Propofol (n=50)	Etomidate (n=50)
ASA I	26	25
ASA II	24	25

[Table 7] This table shows the distribution of patients according to ASA physical status in both groups.

Table 8: Comparison Changes in Heart Rate at Different Time Intervals

Time Interval	Propofol (Mean ± SD)	Etomidate (Mean ± SD)	p-value
Baseline	82 ± 6	83 ± 7	0.52
After Induction	78 ± 7	82 ± 6	0.04*
After Intubation	88 ± 9	84 ± 8	0.03*

*Significant at $p < 0.05$

[Table 8] This table presents heart rate values at baseline, induction, and intubation across both groups.

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Table 9: Comparison Changes in SpO_2 at Different Time Intervals

Time Interval	Propofol (Mean ± SD)	Etomidate (Mean ± SD)	p-value
Baseline	99 ± 1	99 ± 1	0.82
After Induction	98 ± 1	99 ± 1	0.15
After Intubation	98 ± 1	99 ± 1	0.11

[Table 9] This table presents oxygen saturation levels across different time intervals in both groups.

Table 10: Comparison Changes in SBP at Different Time Intervals

Time Interval	Propofol (Mean ± SD)	Etomidate (Mean ± SD)	p-value
Baseline	128 ± 10	129 ± 11	0.64
After Induction	110 ± 12	126 ± 9	0.01*
After Intubation	122 ± 14	128 ± 11	0.03*

[Table 10] This table compares SBP changes at various time points across both groups.

Table 11: Comparison Changes in DBP at Different Time Intervals

Time Interval	Propofol (Mean ± SD)	Etomidate (Mean ± SD)	p-value
Baseline	80 ± 7	79 ± 8	0.57
After Induction	68 ± 8	77 ± 7	0.02*
After Intubation	74 ± 9	78 ± 8	0.04*

[Table 11] This table presents DBP values at baseline, induction, and intubation for both groups.

Table 12: Comparison Changes in MAP at Different Time Intervals

Time Interval	Propofol (Mean ± SD)	Etomidate (Mean ± SD)	p-value
Baseline	96 ± 8	95 ± 7	0.69
After Induction	82 ± 9	94 ± 8	0.01*
After Intubation	90 ± 10	95 ± 9	0.03*

[Table 12] This table shows MAP values recorded at various time intervals for both groups.

[Table 1] highlights the pharmacological features of Propofol. It shows rapid onset (15–20 seconds), short duration (3–5 minutes), and induction dose of 2–2.5 mg/kg IV. Its favourable recovery profile is due to hepatic metabolism with renal and pulmonary excretion. [Table 2] outlines Etomidate's properties. It has similar onset and duration as Propofol but is more haemodynamically stable. The induction dose is 0.3–0.5 mg/kg IV, with metabolism in the liver and excretion through kidneys and bile. [Table 3] presents normal serum cortisol values, showing higher morning levels (5–25 mcg/dL) compared to evening (1–10 mcg/dL). This diurnal variation is relevant because Etomidate may cause transient adrenal suppression. [Table 4] lists fasting recommendations before anaesthesia. Clear liquids are allowed up to 2 hours, breast milk for 4 hours, light meals for 6 hours, and heavy meals require 8 hours of fasting to reduce aspiration risk. [Table 5] shows patient age distribution, which was comparable between groups (31–60 years). Both groups were well balanced, eliminating age as a confounding factor. [Table 6] demonstrates gender distribution across groups, with nearly equal male-to-female ratios in both Propofol and Etomidate groups, ensuring demographic uniformity. [Table 7] shows ASA grading distribution. Both groups had similar numbers of ASA I and II patients, confirming comparable baseline perioperative risk. Table 8 indicates that Propofol reduced heart rate after induction, while Etomidate maintained stability. At intubation, Propofol caused a rise, whereas Etomidate remained steady. These differences were statistically significant. [Table 9] shows oxygen saturation remained normal in both groups throughout, with no significant differences, confirming effective oxygenation. [Table 10] reveals Propofol significantly lowered SBP after induction, while Etomidate maintained values closer to baseline. Differences persisted at intubation and were statistically significant. [Table 11] confirms that Propofol reduced DBP significantly post-induction, whereas Etomidate preserved stability. At intubation, DBP remained higher with Etomidate, showing better cardiovascular preservation. [Table 12] demonstrates that MAP dropped significantly in the Propofol group after induction, while Etomidate maintained near-baseline values. The difference was statistically significant at both induction and intubation.

DISCUSSION

The choice of an induction agent in general anaesthesia remains a critical decision, particularly in abdominal surgeries where haemodynamic fluctuations may adversely affect outcomes. Both Propofol and Etomidate are widely used intravenous agents, but they differ substantially in their cardiovascular effects. This study compared the two agents with respect to haemodynamic stability during induction and intubation, and the results strongly favour Etomidate as the more stable agent. The baseline demographic distribution in terms of age, gender, and ASA physical status was comparable between the two groups, ensuring that outcome differences could be attributed to the drugs themselves rather than confounding factors. This is likewise consistent with earlier comparative studies that referenced the importance of demographic

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matching when assessing effects of anaesthetic agents.[2,3] Propofol has been the induction agent of choice for years, largely due to its quick onset, smooth induction, and good recovery characteristics. But its well-known side effect is an (inaadreduced dose-dependent systolic blood pressure, diastolic blood pressure, and mean arterial pressure because of systemic vasodilation and mild myocardial depression.[4,5] In this study, we have clearly demonstrated the adverse competency, the doses of propofol confirmed, and a statistically significant drop in SBP, DBP, and MAP post-induction. These changes provide particular concern in patients with very little cardiovascular reserve when unanticipated hypotension could affect brain and organ perfusion and conflate risk to the patient.[6] In contrast, Etomidate, as the induction agent remained hemodynamically stable throughout induction and intubation. Heart rate, SBP, DBP, and MAP demonstrated values close to baseline values with minimal fluctuation. These results are consistent with previous studies demonstrating that it has minimal cardiovascular depression effects even in high-risk patients.[7,8] This is due to the lack of a significantly caused sympathetic tone or swinging baroreceptor reflexes during the hypotensive, this is especially advantageous in patients with ischaemic heart disease, hypovolemia, or traumatic incidents. These physiological changes confirm the prior pharmacological advantages in a controlled clinical environment study. Oxygen saturation was stable in both groups during induction and intubation, meaning neither agent affected oxygenation or ventilation. This finding echoes previously published work showing no difference in SpO_2 with different induction agents when satisfactory monitoring and supplemental oxygen was provided.[9] Adverse events varied between both groups. Propofol was associated with pain on injection and brief hypotension, events that are well-established complications. Etomidate, on the other hand, was associated with myoclonus and infrequent postoperative vomiting and nausea, both common limits of the agent.[10,11] Myoclonus is typically self-limited and benign, although in some cases it may be unwanted in specialist circumstances such as ophthalmic or neurosurgical work. Postoperative nausea and vomiting, while bothersome, can be treated effectively with antiemetic prophylaxis. An important pharmacological drawback of Etomidate is its potential for adrenal suppression through inhibition of 11-β-hydroxylase, which reduces cortisol and aldosterone synthesis.[12] While transient adrenal suppression was not measured in the present study, it has been widely documented in the literature, particularly after repeated dosing or prolonged infusion. This effect warrants caution in patients with sepsis, trauma, or chronic steroid use, where adequate adrenal response is crucial for survival. Thus, while Etomidate offers superior cardiovascular stability, its endocrine effects must be considered in patient selection. The findings of this study align with the broader consensus in anaesthetic literature. Propofol remains highly useful in elective, low-risk cases where its rapid recovery and antiemetic properties are advantageous.[13] However, for patients where haemodynamic stability is paramount such as elderly patients, those with cardiovascular disease, or major abdominal procedures Etomidate is the induction agent of choice.[14,15]

The strengths of this study include its randomized, prospective design and blinding of both participants and observers, which minimize bias. Standardization of technique and continuous haemodynamic monitoring add robustness to the findings. However, limitations must also be acknowledged. The sample size of 100 patients, while adequate to detect significant haemodynamic differences, may not reveal rare adverse events. The study excluded ASA III and IV patients, who represent the population most vulnerable to cardiovascular instability. Furthermore, cortisol levels were not measured, which could have provided direct evidence of Etomidate-induced adrenal suppression.

Future research could expand larger and more diverse populations, assess patients at high risk, and include parameters to assess endocrine– along side– haemodynamics. Comparisons with adjuncts (opioids, benzodiazepines) may be informative in shaping responsive inductions. Long-term following of postoperative outcomes recovery time, nausea, vomiting, and endocrine stability will compound the overall evidence levels.

Overall, this study provides evidence of superior haemodynamic stability with Etomidate in comparison to Propofol in the instigation of general anaesthesia for abdominal surgeries. Propofol provided substantial reductions in blood pressure and heart rate; however, Etomidate produced near baseline due to its pharmacologic attributes. This makes it a relevant choice for patients with higher cardiovascular risk. Along with adverse effects of Etomidate itself, (i.e., myoclonus or adrenal suppression considerations); induction agent may need to be personalized along the haemodynamic stability and specific recognitions that the agent provided towards current recovery outcomes.

Limitations: In our study, Patients aged 31 to 60 years took part in our study. This category excluded children and elderly people who were unable to undergo the procedure. Propofol infusion syndrome, allergic patients, emergency surgery, ASA grades III and IV, if the patient opposes surgery. Before undergoing surgery, informed consent should be obtained from the patient.

Future Scope: Future research can focus on high-risk groups such as elderly patients, individuals with cardiac comorbidities, and emergency surgical cases, where induction agent choice plays a critical role. Comparative evaluation with newer agents or combinations of drugs can be explored to optimize induction with minimal cardiovascular fluctuations. Advanced monitoring techniques like invasive

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arterial pressure, cardiac output studies, and echocardiography can be incorporated in future studies to provide more precise hemodynamic data. Pharmacoeconomic analysis of induction agents may also be undertaken to guide cost-effective anaesthesia practices in resource-limited settings.

Summary: This study aimed to evaluate and compare the hemodynamic stability provided by two intravenous anaesthetic agents, Propofol and Etomidate during induction of anesthesia in patients aged 31 to 65 years. The sample consisted of 100 patients undergoing elective abdominal surgery were randomized equally into two groups, with a predominance of females (around 80%) and a majority falling within the 31-50 age range. Group A received Propofol (2-2.5 mg/kg). while Group B received Etomidate (0.3-0.5 mg/kg). Patients in the Etomidate group had a higher proportion classified as ASA II, indicating more mild systemic disease and possibly higher baseline perioperative risk. Statistical Analysis were compared seperately in each groups and both groups showed significant results ($P<0.05$). Results showed etomidate maintained more stable blood pressure and heart rate during induction, while propofol caused significant reductions in blood pressure with compensatory increases in heart rate. Etomidate also reduced stress response and preserved oxygen saturation, similarly to propofol, but had higher rates of injection pain and myoclonus, which are manageable. Propofol allowed faster recovery but with greater hemodynamic fluctuations. This support is considering Etomidate as a safer induction agent for patients at risk of hemodynamic fluctuations, although further studies could clarify long-term outcomes and broader patient populations.

In conclusion, etomidate is preferred for patients needing cardiovascular stability during induction, whereas propofol is suitable when rapid recovery is prioritized.

CONCLUSION

In this study, Etomidate demonstrated superior hemodynamic stability compared to Propofol during anaesthesia induction, maintaining blood pressure and heart rate within safer limits. While Propofol is effective for induction, it is often associated with significant reductions in systolic, diastolic, and mean arterial pressures, accompanied by compensatory tachycardia. Etomidate, on the other hand, not only preserves cardiovascular stability but also attenuates stress responses, such as cortisol release, while maintaining oxygen saturation at levels comparable to Propofol. However, its use is limited by a higher incidence of injection pain and myoclonus, which are manageable with clinical interventions. Propofol provides the advantage of faster recovery but at the expense of greater hemodynamic fluctuations. Therefore, Etomidate is preferred when cardiovascular stability is crucial, whereas Propofol may be considered when rapid recovery is prioritized.

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