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Effect of Ketamine as an Adjuvant in Epidural Anesthesia

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Abstract

Background: Postoperative pain remains a major clinical concern across different surgical procedures. Epidural anesthesia is commonly used; however, optimizing its analgesic efficacy remains a priority. **Objectives:** The current study aimed to evaluate the effect of epidural ketamine as an adjuvant on postoperative pain control and opioid requirement. **Methods:** A prospective cohort study was conducted on 150 patients undergoing cesarean section, inguinal hernia repair, and fracture neck of femur surgery. Patients were divided into two groups: Ketamine group (n=75), Control group (n=75). Ketamine, a well-known NMDA receptor antagonist, has been investigated as an adjuvant in epidural anesthesia to enhance analgesic efficacy and reduce opioid consumption. This study evaluates the pharmacological basis, clinical effectiveness, and safety concerns of epidural ketamine. While several studies demonstrate improved analgesia and opioid-sparing effects, concerns regarding neurotoxicity and inconsistent evidence limit its routine use. Further large-scale randomized controlled trials are needed to establish its safety and efficacy. **Conclusion:** Epidural ketamine is an effective adjuvant for postoperative analgesia, offering prolonged pain relief and reducing opioid consumption, with acceptable side effects.

Keywords: Epidural anesthesia, Ketamine, Postoperative pain, Analgesia, Cohort study

Introduction

Effective postoperative pain management is essential to improve patient outcomes and reduce complications (1,2). Epidural anesthesia is widely used in various surgical procedures (3,4), including cesarean section, inguinal hernia repair, and orthopedic surgeries.

Ketamine, an NMDA receptor antagonist, has gained attention as an adjuvant due to its analgesic properties and opioid-sparing effect (5-7).

Objectives

The current study aimed to assess the effectiveness of epidural ketamine in postoperative pain control, its impact on opioid consumption, and associated adverse effects.

Methodology

Study Design and Area

Prospective cohort study conducted at a tertiary hospital.

Study Period: (From October2022 to September 2023)

Sample Size: A prospective cohort study was conducted on 150 patients undergoing cesarean section, inguinal hernia repair, and fracture neck of femur surgery. Patients were divided into two groups: Ketamine group (n=75), Control group (n=75) did not receive ketamine

Inclusion Criteria:

Age 18–80
ASA I–III
Undergoing selected surgeries

Exclusion Criteria
Allergy to ketamine
Psychiatric illness
Chronic opioid use

Data Collection Method:
Pain scores (VAS)
Opioid consumption
Side effects monitoring

Statistical Analysis
All data were collected, coded, and analyzed using IBM SPSS Statistics (Version XX, IBM Corp., Armonk, NY, USA). Continuous variables were presented as mean ± standard deviation (SD), while categorical variables were expressed as numbers and percentages (%). The normality of data distribution was assessed using the Shapiro–Wilk test. For comparison between the two groups (Ketamine group vs Control group): Independent samples t-test was used for normally distributed continuous variables. Mann–Whitney U test was used for non-normally distributed data. Chi-square test (χ^2) was used for categorical variables. A p-value < 0.05 was considered

Ethical Approval:

Approval obtained from institutional ethics committee. Informed consent was taken from all patients.

Results

A total of 150 patients were included in the study and randomly divided into two equal groups: Ketamine group (n = 75) and Control group (n = 75).

There were no statistically significant differences between the two groups regarding demographic data (age, sex, weight) (p > 0.05) (Table1).

Table1: Demographic Data

Variable	Ketamine Group(n=75)	Control Group(n=75)	p-Value
Age(years)	45.2 ±12.1	46.5 ±11.8	0.62
Gender(M\F)	40/35	38/37	0.74
Weight(Kg)	72.5 ± 10.3	73.8 ± 9.9	0.55
ASA(i\ii\iii)	30/35/10	28/37/10	0.81
Duration of Surgery(min)	90 ±20	92 ± 18	0.66

Postoperative pain scores were significantly lower in the Ketamine group compared to the Control group, particularly during the first 12 hours after surgery (p < 0.001).

Patients who received ketamine showed prolonged analgesia duration, with effective pain control lasting up to approximately 12 hours postoperatively (Table2).

Table 2: Postoperative pain Scores (VAS)

Time	Ketamine(VAS)	Control (VAS)	P-value
2h	2.0 ±1.0	5.5 ±1.2	<0.001
6h	2.5 ±1.1	6.0 ±1.3	<0.001
12h	3.0 ±1.2	6.5 ±1.5	<0.001

Moreover, the requirement for rescue analgesia was significantly reduced in the Ketamine group compared to the Control group (p < 0.001).

There was a marked reduction in the use of intravenous analgesics in the ketamine group.

Adverse Effects were ~20% hypersensitivity, ~10% hypotension (>60 years), and ~30% nausea/vomiting (Table3).

Table3: Analgesic Consumption

Variable	Ketamine Group(n=75	Control Group(n=75)	p-Value
Patients requiring rescue	15(20%)	55(73%)	<0.001
Time to first analgesic(hours)	10.5 ± 2.0	3.5 ± 1.2	<0.001
Total analgesic consumption(mg)	50 ± 20	120 ± 35	<0.001

Discussion

The study demonstrates that epidural ketamine significantly enhances postoperative analgesia and reduces opioid requirements(6,8).

The prolonged analgesic effect (up to 12 hours) is clinically valuable, especially in reducing opioid-related complications(5,7).

However, the relatively high incidence of side effects such as hypersensitivity and nausea should be carefully considered(9,10).

Conclusion

Epidural ketamine is an effective adjuvant for postoperative analgesia, offering prolonged pain relief and reducing opioid consumption, with acceptable side effects.

Study Limitations:

- Non-randomized design
- Possible bias
- Limited control over confounding factors

Recommendations

Consider use of ketamine in epidural analgesia. Further RCT studies recommended. Careful monitoring in elderly patients.

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