

ORIGINAL RESEARCH

Dexmedetomidine and Midazolam for sedation of eclamptic patients on mechanical ventilation in ICU

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ABSTRACT

Background: Eclampsia is a serious complication of pregnancy characterized by the onset of seizures or convulsions in a woman with preeclampsia. The present study was conducted to assess efficacy of Dexmedetomidine and Midazolam for sedation of eclamptic patients on mechanical ventilation in ICU. **Materials & Methods:** 70 eclamptic pregnant women > 18 years of age undergoing lower segment caesarean section for termination of pregnancy under general anaesthesia and requiring postoperative mechanical ventilation in ICU were divided into 2 groups. Group I received loading dose of 0.05 mg/kg of midazolam over 10 minutes and group II received loading dose of 1 µg/kg of dexmedetomidine over 10 minutes. Vital parameters - Invasive blood pressure (IBP), oxygen saturation (SpO₂), heart rate (HR) and electrocardiography (ECG) of all patients were monitored in the ICU. The Ramsay Sedation Score was assessed hourly. Side effects were compared. **Results:** The mean Ramsay sedation score pre- drug was 1.2 in group I and 1.4 in group II and post- operatively was 2.5 in group I and 2.9 in group II. The difference was significant (P < 0.05). Pre- drug and post- operatively, pulse rate (beats/min) was 119.2 and 120.5 and 84.5 and 78.4 in group I and II respectively. The pre- drug mean SBP (mm Hg) was 152.4 and 148.6 and post- operatively was 124.2 and 110.2. The pre- drug mean DBP (mm Hg) was 94.2 and 82.4 and post- operatively was 82.0 and 70.4. The pre- drug mean MAP (mm Hg) was 114.2 and 100.6 and post- operatively was 100.4 and 88.2 respectively. The difference was significant (P < 0.05). Bradycardia was observed in 5 in group I and 11 in group II and hypotension 2 in group I and 6 in group II. The difference was significant (P < 0.05). **Conclusion:** Dexmedetomidine was as effective as midazolam for producing and maintaining adequate short-term sedation of mechanically ventilated eclampsia patients.

Key words: Dexmedetomidine, eclampsia, midazolam

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INTRODUCTION

Eclampsia is a serious complication of pregnancy characterized by the onset of seizures or convulsions in a woman with preeclampsia. Preeclampsia is a condition that typically occurs after the 20th week of pregnancy and is characterized by high blood pressure and signs of damage to organs, most commonly the liver and kidneys. When a woman with preeclampsia progresses to eclampsia, she may experience seizures, which can be generalized or focal in nature. These seizures are often accompanied by other symptoms such as severe headache, visual disturbances, abdominal pain, and changes in blood pressure. Eclampsia is a medical emergency and requires immediate treatment to protect the mother and baby.¹

Various agents are being used for ICU sedation, such as propofol, midazolam, fentanyl and lately dexmedetomidine. Traditionally, Midazolam has been the most commonly administered sedative drug for ICU patients worldwide.² Midazolam is a fastacting benzodiazepine that rapidly penetrates the central nervous system to produce an onset of sedation in 2 to 2.5 minutes. All benzodiazepines reliably cause amnesia, but have no analgesic activity (hence often combined with fentanyl), and produce dose dependent respiratory depression which is enhanced in combination with opioids. Hence, long-term or high dosage of midazolam in the critically ill patients may lead to over sedation; prolonged mechanical ventilation and longer ICU stay.³ Dexmedetomidine is a newer sedative used for ICU sedation and has better

haemodynamic stability and minimal respiratory depressant effect. Dexmedetomidine is a highly selective α_2 -adrenergic receptor agonist. In contrast to other sedative hypnotic agents, dexmedetomidine also has adequate analgesic effect and may induce a sedative state similar to physiologic sleep by acting on α_2 receptors in the locus coeruleus.⁴ Various studies regarding the efficacy of midazolam and dexmedetomidine for sedation of critically ill patients in ICU have been done globally. The studies comparing efficacy of midazolam and dexmedetomidine for sedation in eclamptic patients requiring mechanical ventilation in ICU are minimal.⁵ The present study was conducted to assess efficacy of Dexmedetomidine and Midazolam for sedation of eclamptic patients on mechanical ventilation in ICU.

MATERIALS & METHODS

The present study consisted of 70 eclamptic pregnant women > 18 years of age undergoing lower segment caesarean section for termination of pregnancy under

general anaesthesia and requiring postoperative mechanical ventilation in ICU. All gave their written consent to participate in the study.

Data such as name, age, etc. was recorded. Patients were divided into 2 groups. Group I received loading dose of 0.05 mg/kg of midazolam over 10 minutes followed by maintenance dose of 0.1 mg/kg/hour (50 mg of midazolam made to 50 mL with 0.9% NaCl and connected to syringe infusion pump was used). Group II received loading dose of 1 μ g/kg of dexmedetomidine over 10 minutes followed by maintenance dose of 0.5 μ g/kg/hour (200 μ g of dexmedetomidine made to 50 mL with 0.9% NaCl and connected to syringe infusion pump was used). Vital parameters -Invasive blood pressure (IBP), oxygen saturation (SpO₂), heart rate (HR) and electrocardiography (ECG) of all patients were monitored in the ICU. The Ramsay Sedation Score was assessed hourly. Visual analogue scale (VAS 0 - 10) was assessed hourly. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Comparison of Ramsay sedation score

Ramsay Sedation Score	Group I	Group II	P value
Pre- drug	1.2	1.4	0.92
Post- operatively	2.5	2.9	0.87

Table I shows that mean Ramsay sedation score pre- drug was 1.2 in group I and 1.4 in group II and post-operatively was 2.5 in group I and 2.9 in group II. The difference was significant (P< 0.05).

Table II Assessment of parameters

Parameters	Variables	Group I	Group II	P value
Pulse rate (beats/min)	Pre- drug	119.2	120.5	0.91
	Post- operatively	84.5	78.4	0.05
SBP (mm Hg)	Pre- drug	152.4	148.6	0.75
	Post- operatively	124.2	110.2	0.02
DBP (mm Hg)	Pre- drug	94.2	82.4	0.04
	Post- operatively	82.0	70.4	0.05
MAP (mm Hg)	Pre- drug	114.2	100.6	0.03
	Post- operatively	100.4	88.2	0.02

Table II, graph I shows that pre- drug and post- operatively, pulse rate (beats/min) was 119.2 and 120.5 and 84.5 and 78.4 in group I and II respectively. The pre- drug mean SBP (mm Hg) was 152.4 and 148.6 and post-operatively was 124.2 and 110.2. The pre- drug mean DBP (mm Hg) was 94.2 and 82.4 and post- operatively was 82.0 and 70.4. The pre- drug mean MAP (mm Hg) was 114.2 and 100.6 and post- operatively was 100.4 and 88.2 respectively. The difference was significant (P< 0.05).

Graph I Assessment of parameters

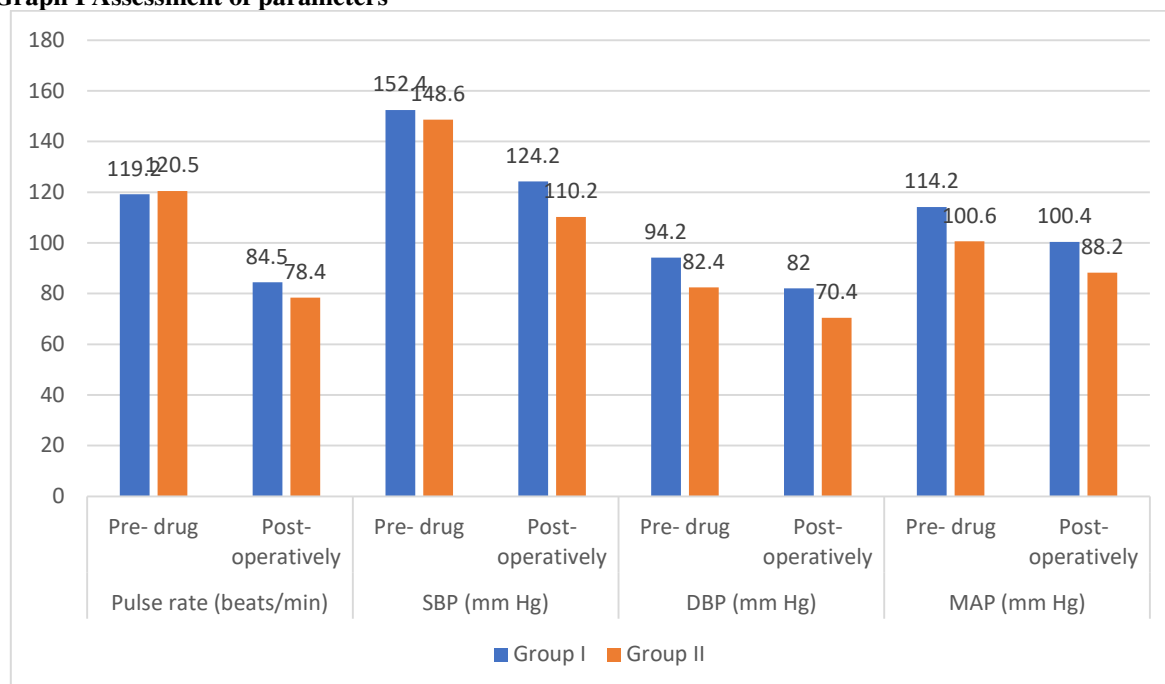


Table III Comparison of side effects

Side effects	Group I	Group II	P value
Bradycardia	5	11	0.01
Hypotension	2	6	0.03

Table III shows that bradycardia was observed in 5 in group I and 11 in group II and hypotension 2 in group I and 6 in group II. The difference was significant (P< 0.05).

DISCUSSION

The exact cause of eclampsia is not fully understood, but it is thought to be related to abnormalities in the placenta that affect blood flow to the uterus.⁶ Risk factors for developing eclampsia include first pregnancies, multiple pregnancies (such as twins or triplets), a history of preeclampsia in a previous pregnancy, obesity, and certain medical conditions like chronic hypertension and kidney disease. The management of eclampsia involves stabilizing the patient and controlling seizures.⁷ Medications such as magnesium sulfate are commonly used to prevent and treat seizures. Blood pressure control is also crucial to reduce the risk of further complications. In severe cases, early delivery of the baby may be necessary to protect the mother's health.⁸ The present study was conducted to assess efficacy of Dexmedetomidine and Midazolam for sedation of eclamptic patients on mechanical ventilation in ICU.

We found that mean Ramsay sedation score pre- drug was 1.2 in group I and 1.4 in group II and post-operatively was 2.5 in group I and 2.9 in group II. Pre-drug and post- operatively, pulse rate (beats/min) N was 119.2 and 120.5 and 84.5 and 78.4 in group I and II respectively. The pre- drug mean SBP (mm Hg) was 152.4 and 148.6 and post- operatively was 124.2 and 110.2. The pre- drug mean DBP (mm Hg) was 94.2 and 82.4 and post- operatively was 82.0 and 70.4. The pre- drug mean MAP (mm Hg) was 114.2 and 100.6

and post- operatively was 100.4 and 88.2 respectively. Jakob et al⁹ in their study two Hundred patients were enrolled in the study and all completed the study. The demographic data in both the groups were statistically insignificant. The difference in mean Ramsay Sedation Scores were statistically insignificant in both groups from 2nd to 24 hours. Haemodynamically, there was decrease in pulse rate in both the groups at all-time intervals and this decrease was significant in group II at 8th, 12th, and 24th hour in comparison to group I. The drop in mean systolic blood pressure (and mean arterial blood pressure) was statistically significant in group II at 1st hour and remained highly significant at 2nd to 24th hours.

We observed that bradycardia was observed in 5 in group I and 11 in group II and hypotension 2 in group I and 6 in group II. A meta-analysis by Jen A. Tan et al¹⁰ observed that dexmedetomidine was associated with increased risk of bradycardia and hypotension. Stephen M Jacob et al observed that length of ICU stay was similar in both dexmedetomidine and midazolam groups.

The limitation the study is small sample size.

CONCLUSION

Authors found that dexmedetomidine was as effective as midazolam for producing and maintaining adequate short-term sedation of mechanically ventilated eclampsia patients.

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