

Etomidate for RSI: Seizure Considerations

Introduction

1. Rapid sequence intubation (RSI) is a process whereby an induction agent and a neuromuscular blocking agent are given in rapid succession to facilitate endotracheal intubation
2. The selection of a specific sedative depends on multiple factors: the clinical scenario, which includes patient factors (includes cardiorespiratory and neurologic status, allergies, comorbidity) and the clinician's experience/training and institutional factors, as well as the characteristics of the sedative
3. Etomidate remains the most commonly used induction agent; however, it is not without its own pharmacologic considerations such as the decrease in seizure threshold.

Etomidate	
Dose	0.3 mg/kg IV
Administration	IV push
Formulation*	20 mg/ 10 ml 40 mg/ 20ml
PK/PD	Onset: ~20 seconds Duration: 4-10 minutes Metabolism: Hydrolysis of the ethylester side Renal Excretion: 75%
Adverse Effects	Injection site pain, nausea, vomiting, myoclonus
Drug Interactions	No major reactions
Compatibility	Incompatible with vitamin c and vecuronium
Comments	There is hypothetical concerns about adrenal insufficiency with a single dose. Hemodynamically neutral

*Various formulations may appear, check you institution formulary

Drug	Hemodynamic Effect	Comments
Etomidate	↔ BP, ↔ CO, ↔ HR, ↓ cortisol, ↔ ICP	Prolonged inhibition of steroid synthesis in the critically ill; withdrawn from number of countries
Ketamine	↑BP, ↑ HR, ↑ CO, ↔ cortisol, ↑↓ ICP	↔ or ↑ CPP and ↔ ICP with standard anesthetic management
Propofol	↓ BP, ↔ HR, ↓ CO, ↔ cortisol, ↓ ICP	Hemodynamic compromise marked in elderly, ASA 3 or more or hypovolemic patients with 'standard' induction dose

Overview of Evidence

Author, year	Design/ sample size	Intervention & Comparison	Outcome
Perier et al, 2018	Retrospective N=97	Etomidate vs sodium thiopental for RSI in patients with convulsive status epilepticus	<ul style="list-style-type: none"> Seizure and/or status epilepticus recurred in 13 (56%) patients in the etomidate group and 11 patients (44%) in the sodium thiopental group
Gabor, 2006	Retrospective N=30	1 mg/kg of propofol or 0.2 mg/kg of etomidate for electroconvulsive therapy	<ul style="list-style-type: none"> After etomidate induction, seizure durations registered either by EEG or by EMG were longer than propofol treated cases.
Zuckerbraun et al, 2006	Retrospective N=101	Etomidate for RSI in general population	<ul style="list-style-type: none"> There was no relationship between seizures after etomidate administration and prior seizure history ($p = 0.25$).
Guldner, 2003	Retrospective N=105	Etomidate for RSI in general population	<ul style="list-style-type: none"> Complications included three patients who vomited within 10 minutes of etomidate administration. There were no cases of documented myoclonus, status epilepticus, or new-onset seizures.
Reddy, 1993	Prospective randomized study N=68	Etomidate, thiopental, methohexital or propofol for anesthesia induction	<ul style="list-style-type: none"> Spontaneous movement (myoclonic, dystonic or tremor): Etomidate 86%, thiopental 16.6%, methohexital 12.5%, propofol 5.5% EEG activity: 2 patients receiving etomidate, no generalized epileptiform activity noted
Ebrahim, 1986	Case reports N=12	etomidate for anesthesia induction in patient with intractable seizures	<ul style="list-style-type: none"> Electroencephalograms were recorded by means of subdural electrodes. Nine of the 12 patients showed an increase in epileptiform activity. In six of the nine patients, the activity was marked.
Krieger, 1985	Letter to editor N=55	Etomidate for anesthesia induction or to activate seizure focus	<ul style="list-style-type: none"> 25 patients had epileptiform activity associated with etomidate administration 6/30 patients had generalized epileptiform activity noted on EEG
Grant, 1983	Case series N=4	Etomidate infusion for sedation in ICU	<ul style="list-style-type: none"> Generalized and focal seizures after variable periods of etomidate <ul style="list-style-type: none"> EEGs were not evaluated at the time of suspected seizure activity. Patients were on infusion for 6-28 hours at onset of seizure activity.
Ghoneim, 1977	Prospective randomized study N=120	Etomidate or thiopental for anesthesia induction	<ul style="list-style-type: none"> 28% etomidate vs. 0% thiopental had myoclonic movements 11% etomidate vs. 1% thiopental had tonic movements No epileptiform discharges were noted in 10 patients who had EEG monitoring

Conclusion

- Etomidate is a commonly used induction agent for RSI in emergency settings. Etomidate has been shown to elicit myoclonus in a significant number of patients. However, whether myoclonus is associated with EEG confirmed epileptiform activities remains uncertain. To make matters worse, depending on the origin and type of seizure, it may be challenging for EEG to differentiate between non-seizure and seizure activity during myoclonic events.
- Due to the low level of evidence, the patients with a history of seizures should have the risk versus benefit assessment to determine the best induction agent.

References

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