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Etomidate Induced Myoclonus for Procedural Sedation in Emergency Department

Sreekrishnan TP, Gireesh Kumar KP, Nandu Mohan, Manu Sudhi

Department of Emergency Medicine,
Amrita Institute of Medical Sciences, Amrita Vishwa Vidyapeetham, Kochi, Pin 682041

Abstract

Aim: We analyse the incidence of myoclonus in patients whom Etomidate is used for procedural sedation in the Emergency Room. According to previous studies, the incidence rate of Etomidate induced myoclonus is 33%.

Methods: This prospective study was performed between June 2016 to December 2016 in the Emergency Department of Amrita Institute of Medical Sciences, a tertiary care hospital. Etomidate was used for procedural sedation was carried out by the Emergency Physician. The presence of myoclonus was noticed and its duration was reported using the Myoclonus scale.

Results: 166 patients (116Males and 50Females) in the Emergency Department in whom Etomidate was used for procedural sedation were enrolled for the study. The mean age was observed to be 42 years among males and females. The mean cumulative dose was 0.3mg/kg. Premedication was not used, which increases the chance of detection of myoclonus. Full recovery to the preprocedural level of alertness was achieved within 30 mins in 160 (96%) of procedures. Mean changes in Systolic blood pressure, pulse rate and oxygen saturation were clinically insignificant. Myoclonus was observed in 4 (2.4%) of 166 patients which is significantly lower than the earlier studies.

Conclusion: Etomidate is a useful agent for carefully conducted procedural sedation because it provides effective, brief, deep sedation with little hemodynamic compromise. Myoclonus is seen only small percentage of patients and can be safely used for procedural sedation in the Emergency Room.

Keywords: Etomidate, Myoclonus, Emergency Department

INTRODUCTION

Etomidate is a nonbarbiturate hypnotic that induces sedation through GABA receptors in the central nervous system. It has been used as an anaesthetic induction agent for more than quarter of a century. Its rapid onset, short duration of action, clinically insignificant hemodynamic alterations and minimal side effects have accorded it a prominent role in emergency medicine as an adjunct in rapid sequence intubation.

These attributes likewise should make this skeletal muscle relaxant useful for procedural sedation. Compared with other anaesthetic agents for elective cardioversion etomidate was just as effective and demonstrated the least hemodynamic and ventilatory depression. Although concerns have been raised about its effect on the adrenal gland, single dose etomidate only minimally and transiently suppresses adrenal function, an effect that is thought to have little if any clinical consequence.

In an Emergency setting, a set of drugs have been used in patients for procedural sedation[1] of which Etomidate can be used as a sedative hypnotic agent [2]. Etomidate is a carboxylated imidazole[3] that depress CNS via GABA[4]. Because of its quick action, low profile for cardiovascular risk, minimal respiratory depression and reliable sedation, Etomidate is optimal for procedural sedation in the Emergency Room. Etomidate can act as a defensive role in cerebral and myocardial ischemia, has an easy dosing profile, limited ventillation suppression and decreased release of histamine [6] for patients who are hemodynamically unstable. Etomidate is the inducting agent [7] . In traumatic brain injury patients it reduces intracranial pressure and maintains normal arterial pressure[8]. Etomidate is highly protein bound in blood plasma and it is metabolised by hepatic and plasma estrases[9].

The most common adverse effects of Etomidate are Myoclonus and adrenal suppression. Others include nausea, vomiting and pain at the injection site[10]. In both anesthesia and emergency literature, myoclonus with etomidate induction and sedation in ED has been described. In ED sedation doses, the reported incidence of etomidate induced myoclonus is about 33%.[11]

Our study is to assess the incidence of Etomidate induced myoclonus and compare it to the earlier data.

MATERIALS AND METHODS

Here we conducted a prospective study for a period of 6 months between June 2016 to December 2016 at Amrita Institute of Medical Sciences, Kochi a 1000 bedded tertiary care hospital. Patients who were subjected to sedation in the Emergency Department with etomidate were enrolled for the study. In our Emergency Department, the procedure was undertaken at the vigilance of the emergency physician (EP). Only emergency nurses and physicians trained and certified in procedural sedation are authorized to perform sedation in the ED. Continuous cardiac monitoring, transcutaneous oxygen saturation monitoring, pulse rate, blood pressure, respiratory rate and level of consciousness are measured serially a minimum of every 5 minutes during the procedure and then every 15 minutes for at least 30 minutes or until vital signs stabilize near pre sedation levels. Supplemental oxygen is administered (at least 2L through a nasal cannula), and resuscitation equipment is placed at the bedside.

The procedural sedation forms, the ED record, and the hospital's comprehensive computerised database were reviewed in a systemic fashion by the investigators. The

data was collected and compiled using Microsoft Excel. Demographics were recorded on each patient. The dose of etomidate were noticed. The observed result was the presence of the myoclonus. The informations were tabulated on data sheet .

Table 1 Characteristics of ED patients receiving intravenous Etomidate for procedural sedation

No. of Patients	
No. of procedural sedation	**166**
Age(mean),y	166
Male	42
Female	116
Weight (mean), kg	50
Height (mean), in	79
	67

[y-years, kg- kilogram, in- inches]

Table 2 Myoclonus scale used to assess the degree of myoclonus

0- No Myoclonus
1- Mild myoclonus :Minor tremors or myoclonus of 1 extremity
2-Moderate myoclonus: Myoclonus of 2-3 extremities
3- Severe myoclonus : Involvement of all extremities or myoclonus severe enough to require extremity stabilization or premature termination of procedure

Selection and Description of Participants

All patients who were subjected for procedural sedation with Etomidate are included in the study. Those who were pregnant, having neuromuscular disorder , having adverse reaction with Etomidate and who are unable to give the consent were excluded from the study.

Technical Information

In this study patients who developed Myoclonus after the administration of Etomidate during procedural sedation in the Emergency Department. The severity of myoclonus developed in patients after the administration of Etomidate was measured using the scale. Continous monitoring of vital parameters, pulse oximetry and cardiac monitoring were done according to the guide lines of the Emergency Department.

Ethics

The data collection was done after the authorisation from the Research Committe. The patients were chosen according to the exclusion and inclusion criteria.

Statistics

Percentage of patients with respect to various variables was computed namely Age, Sex, Gender Distribution, Mean total of Etomidate dose, Severity of Myoclonus, Time to onset of myoclonus after Etomidate administration. Statistical significance was calculated using P value.

RESULTS AND DISCUSSION

In our study out of 166 patients (116male and 50 female), 4 patients (1 male and 3 female) developed myoclonus with the administration of Etomidate during procedural sedation in ED. The p value obtained for this is 0.04765(the result is significant at <0.05) which shows that study is significant.

This study focuses on the lower significant rate of etomidate induced myoclonus for procedural sedation in a tertiary care hospital. Other ED studies had showed that occurrence of myoclonus with Etomidate ranges from 7% to 20%. Studies also showed that occurrence of myoclonus is dose dependent. Adam Y yates et al showed that myoclonus had developed in about 75% of the patients. In our study about 2.4% of the patients developed myoclonus with etomidate which considerable lower compared to the previous studies in Emergency Department. The severeness of myoclonus was assessed using the scale [Table 2]. Patients who had developed mild to moderate myoclonus in the ED during sedation was less compared to other studies.

It is to be noted that, several studies show that the myoclonus can be abolished with administration of premedications like benzodiazepines or Fentanyl [12,13]. In our study we didn't administer any premedications prior to the administration, which further highlights the significance of this study.

Also, we were specifically looking for myoclonus which has increased our sensitivity to detect the occurrence of the same. The rate of myoclonus was less and the success of procedural sedations determined that the Etomidate can be administered as a sedative agent for the patient for procedural sedation.

Since etomidate induced myoclonus was less compared to other studies it can be administered as sedative agent in Emergency department for procedural sedations.

Table 3 Procedures for which etomidate was used in ED

Procedure	Number of procedures
Electrical cardioversion	69
Atrial fibrillation	54
Atrial flutter	5
Paroxysmal supraventricular tachycardia	10
Orthopaedic reduction	86
Shoulder dislocation	33
Hip dislocation	11
Elbow dislocation	6
Mandible dislocation	2
Fracture	
Forearm and wrist	22
Ankle and foot	12
Miscellaneous	11
Incision and drainage	6
Wound care	2
Foreign body removal	3

Table 4 - Results

Initial Etomidate dose (mean) (mg/kg)	0.13
Mean total Etomidate Dose	0.15
Total Number experiencing Myoclonus	4
Mild	2
Moderate	1
Severe	1
Time to onset of myoclonus after etomidate administration (mean) , s	52
Duration of Myoclonus (mean),s	90

CONCLUSION

From this we came to the conclusion that the incidence of Etomidate induced myoclonus is considerably less (only in 2.4% of patients) when compared with other ED studies.

Etomidate was found to be a useful agent for procedural sedation in emergency medicine because it provides effective, brief sedation with little hemodynamic compromise.

According to previous data, transient myoclonus occurs frequently with etomidate, incidence in the range 20 – 33%. We came to the conclusion that the incidence of Etomidate induced myoclonus is considerably less (only in 2.4% of patients) when compared with other ED studies. It is relatively safe and preferred agent for procedural sedation in Emergency department.

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