

The Use of Etomidate in Air Medical Transport

John A. Pakiela, DO, FACOEP
Chief Flight Physician
Cleveland Metro Life Flight
MetroHealth Medical Center
Senior Instructor
Case Western Reserve University School of Medicine
Cleveland OH 44109-1998 USA
 jpakiela@metrohealth.org

- Learning Objectives**
1. To describe the potential benefits of etomidate for procedural sedation in air medicine
 2. To discuss the use of etomidate in rapid-sequence intubation in the air medical field

Etomidate is an ideal pharmacologic agent in the air medical setting because it has an excellent safety profile, while providing adequate sedation for only a brief duration. Etomidate can also be used in potentially hazardous situations that are commonly encountered in the air medical field, including hemodynamically unstable patients, patients at risk for myocardial ischemia, and those who present with head injuries.¹

Etomidate has been used successfully in air medicine as part of the regimen for rapid-sequence intubation under standard accepted hospital practice. Most protocols call for the use of etomidate at 0.2 to 0.4 mg/kg intravenously, along with the usual medications given for pretreatment and neuromuscular blockade. Studies have shown that intubation success rates are comparable to those in other studies evaluating success rates of rapid-sequence intubation using etomidate in the hospital setting.²

Although it has been well documented that etomidate can be used safely and effectively in the emergency department for procedural sedation,^{3,4} little has been written concerning the use of etomidate in the prehospital setting or during air medical transport. We are currently examining the use of



Figure 1. Air medical service scene response. The helicopter lands at the site of the accident in order to assist prehospital personnel with care and transport of the injured patient.

etomidate for procedural sedation in the air medical field, primarily with chest tube insertion, fracture reduction, and joint relocation. Alert trauma patients who are being transported to MetroHealth, who require conscious sedation, and who give consent for the sedation and procedure are being enrolled (Figure 1).

Our prospective study utilizes a standardized dose of etomidate, 0.1 mg/kg intravenously, in patients who require procedural sedation. No other agents are used in conjunction with etomidate in this study. Additional doses of etomidate, 0.1 mg/kg, can be given as needed. The procedure is then completed. Side effects such as nausea, vomiting, and myoclonus are noted, if present. A complete set of vital signs, including pulse, blood pressure, respiratory rate, and oxygen saturation, is recorded prior to the procedure and every 5 minutes after injection of etomidate. An Aldrete Post-Anesthesia Recovery Score (Table 1) is also recorded at standardized intervals. Finally, the success of the procedure is documented, and a questionnaire that addresses degree of satisfaction, level of sedation, and tolerance of the procedure is completed.

Although the study has been in progress only for a short time, anecdotally we have seen successful completion of procedures without hemodynamic compromise or adverse outcome. This can be illustrated with the following case:

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Score	Consciousness	Activity	Respiration	Color	Circulation
0	Not responding	No movement	Apneic	Cyanotic	BP <50% pre-sedation level
1	Arousable by voice to command	Moves 2 extremities	Dyspnea or hypoventilation	Pale, dusky, blotchy, jaundiced, other	BP 20–50% pre-sedation level
2	Fully awake	Moves all 4 extremities to command	Able to breathe deeply and cough	Pink	BP 10–20% pre-sedation level

Our air medical service was dispatched to a scene response in a rural community, in which the helicopter landed at the site of the incident in order to assist prehospital personnel with their care. The patient was a male in his 20s who had fallen 20 feet from a ladder, landing on his feet. He had an obvious open right tibia/fibula fracture and a pulseless right foot, which was rotated 180 degrees posterior to anatomic position. We found the patient nearly prone, with prehospital personnel maintaining spinal immobilization. Even the slightest movement caused the patient significant pain. The patient's vital signs were all within normal limits and he had a Glasgow Coma Scale score (Table 2) of 15 upon initial evaluation. There were no primary survey issues.

Table 2. Glasgow Coma Scale Score

Eye opening	
Spontaneous	4
To speech	3
To pain	2
None	1
Best motor response	
Obeys commands	6
Localizes pain	5
Normal flexion (withdrawal)	4
Abnormal flexion (decorticate)	3
Extension (decerebrate)	2
None (flaccid)	1
Verbal response	
Oriented	5
Confused conversation	4
Inappropriate words	3
Incomprehensible sounds	2
None	1

From Teasdale G, Jennett B. Assessment of coma and impaired consciousness: a practical scale. *Lancet* 2(7872):81-4, 1974.

The decision was made to use etomidate to sedate this patient so that he could be log rolled onto the backboard and his fracture could be reduced. The patient was given 0.1 mg/kg of etomidate intravenously, and a non-rebreather oxygen mask was applied.

The patient was fully immobilized and the fracture was reduced, with return of a pulse in the right foot. The patient's vital signs remained the same throughout the procedure. The satisfaction with the level of sedation, tolerance, and recall of the procedure were determined to be excellent by the patient, flight physician, and flight nurse specialist. No side effects were noted.

We continue to enroll patients into our prospective, observational study in order to evaluate the use of etomidate in the air medical field for procedural sedation.

In summary, etomidate has great potential to become one of the most reliable and safe multipurpose agents in the air medical crew's formulary for treating critically ill patients. It has a well-documented safety record in rapid-sequence intubation, and we hope to show its salutary benefits for procedural sedation. As with any agent, there are potential risks associated with the use of etomidate for procedural sedation. These include oversedation, which can lead to hypoventilation and airway compromise, as well as nausea and vomiting, which can lead to aspiration. To minimize these risks, one must be prepared to establish a definitive airway and have a suctioning device and bag valve mask nearby.

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Etomidate for Anesthesia Induction in the Prehospital Setting

Andreas R. Thierbach, MD,* and Tim Piepho, MD

**Chair, ITACCS Mass Casualty and Disaster Committee
Clinic of Anesthesiology
Johannes Gutenberg University
Langenbeckstr. 1
55131 Mainz, Germany
Thierbach@uni-mainz.de*

Learning Objectives

1. To understand the pharmacology of etomidate in traumatized patients
2. To understand advantages and side effects of etomidate in trauma patients
3. To learn how etomidate should be applied in trauma patients

Etomidate is a sterile, nonpyrogenic solution containing 2 mg etomidate and 0.35 mg propylene glycol per milliliter. It is also available in Europe as an emulsion in soybean oil, glycerol, and purified egg phosphatide. It is used for induction of general anesthesia. The standard intravenous induction dose varies from 0.15 to 0.4 mg/kg. The duration of hypnosis varies from 5 to 15 minutes following a single induction dose. Etomidate is metabolized rapidly in the liver primarily by ester hydrolysis or by N-dealkylation. The primary

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