



(CASE REPORT)



## Etomidate as anesthetic agent in asthmatic child with food allergy

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### Abstract

Children with bronchial asthma and respiratory infections have significant peri-operative implications for the anaesthesiologists. With improvements in medical knowledge and anaesthesia techniques, morbidity and mortality associated with an asthmatic child undergoing surgery have come down. Etomidate is an intravenous anesthetic agent whose clinical effects are the result of potentiation of the gamma-amino butyric acid inhibitory neurotransmitter system with the alteration of transmembrane chloride conductance. Physicians commonly use etomidate for adult rapid-sequence intubation, but the manufacturer does not recommend its use for children under 10 years of age due to a lack of data. Ketamine has been suggested as an alternative agent given its limited effects on hemodynamic function related to the release of endogenous catecholamines. A child aged 11 years and weighing 40 kg, with egg allergy and a more general allergic predisposition, with a history of asthma treated with inhalants and a recent respiratory infection with antibiotics, came with a diagnosis of acute abdomen. Etomidate was used as an anesthetic agent in combination with ketamine, using rocuronium and sevoflurane. Corticosteroids and aminophylline were given to prevent bronchospasm. Ketamine and etomidate, both of which provide effective sedation with limited effects on hemodynamic function, have become increasingly popular as induction agents.

**Keywords:** Etomidate; Ketamine; Allergic; Astma; Child; Intubation

### 1. Introduction

Asthma represents one of the most common chronic diseases in children with an increasing incidence reported worldwide. The key to successful anaesthetic outcome involves thorough pre-operative assessment and optimisation of the child's pulmonary status, leading to airway obstruction. Even though the association between airway inflammation and hyper-responsiveness is consistent, the exact mechanism involved is not completely elucidated [1].

First introduced into clinical practice in 1972, etomidate has a long history of use as an intravenous anesthetic and sedative. Like propofol, etomidate has a hypnotic effect but does not provide any analgesia. Its popularity in clinical practice is the result of its beneficial effects on intracerebral dynamics with limited effects on hemodynamic function. When compared to other commonly used anesthetic induction agents such as propofol or the barbiturates, etomidate is generally devoid of adverse effects on cardiovascular. These properties have led to its use as an anesthetic induction in both adult and pediatric patients with altered myocardial performance, congenital heart disease, or hypovolemia. In contrast to the large amount of clinical experience with its use in the adult population, the clinical experience in the pediatric-aged patient is somewhat limited. Resuscitation guidelines from the American Academy of Pediatrics state "etomidate should not be routinely used when intubating an infant or child with septic shock." In the case, that it is used, recognition of adrenal suppression as a consequence is advocated [2-12].

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## 2. Case Study

A child aged 11 years and weighing 40 kg, with egg allergy and a more general allergic predisposition, with a history of asthma treated with inhalants and a recent respiratory infection with antibiotics, came with a diagnosis of acute abdomen. The child was given preoperatively 4 mg of ondansetron, 4 mg of Dexatone, 80 mg of salbutamol and 1 mg of Dormicum. After 3 minutes of preoxygenation, rapid induction was performed with Fentanyl 0.15 mg, ketamine 10 mg, Propofol 12 mg, and Esmeron 50 mg and with open-label sevoflurane 3%. After intubation with tube 6, he was placed on mechanical ventilation on a Dräger ventilator and volume control ventilation model, as anesthesia was maintained with 3% sevoflurane. Morphine 2 mg and Apotel 600 mg were given intraoperatively. Aminophylline 180 mg was additionally given intraoperatively. The duration of the surgery was two hours. Awakening with pure oxygen was done with Bridion 150 mg.

### 2.1. Management and outcome

Etomidate, a safe and effective anesthetic induction agent in both adult and pediatric patients with altered myocardial performance, congenital heart disease, or hypovolemia. Recent concern has been expressed regarding its effects on the endogenous production of corticosteroids and the impact of that effect on patient outcomes. Rapid sequence intubation is generally used in emergency airway management to protect the airway from passive regurgitation of gastric contents, along with a rapid acting neuromuscular blocking agent. Ketamine and etomidate, both of which provide effective sedation with limited effects on hemodynamic function, have become increasingly popular as induction agents. In this case study, etomidate was used as an anesthetic agent in combination with ketamine, using rocuronium and sevoflurane. Corticosteroids and aminophylline were given to prevent bronchospasm.

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## 3. Discussion

Pentobarbital is associated with more frequent side effects and parental concerns compared to etomidate. Propofol is the most commonly administered intravenous agent for anaesthesia in children. However, there are concerns that the emulsified preparation may not be safe in children with an allergy to egg, peanut, soybean or other legumes. The propofol is mixed in a liquid containing soybean oil and a substance called egg lecithin. Lecithin is a fatty substance found in some plant and animal tissues. Genuine serious allergic reaction to propofol is rare and is not reliably predicted by a history of food allergy. However, there are concerns that the emulsified preparation may not be safe in children with an allergy to egg, peanut, soybean or other legumes. The rate of reaction to propofol may be higher in food-allergic children than the 1 in 60,000 seen in the general population. In children less than 10 years old, etomidate seems to produce minimal hemodynamic changes, and appears to have a low risk of clinically important adrenal insufficiency, myoclonus, and status epilepticus.

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## 4. Conclusion

Etomidate remains an effective agent for anesthetic induction in the operating room as well as for sedation during endotracheal intubation in the ICU and emergency room setting. In addition to beneficial effects on intracerebral dynamics, it has limited effects on hemodynamic function even in the setting of hypovolemia, congenital heart disease, and depressed myocardial function. Although it results in the depression of adrenal function for up to 24 h following a single dose, there is controversy regarding the clinical impact of this effect. These concerns have led to the recommendation that it not be administered to patients with sepsis or at risk of sepsis. Etomidate shows a very good anesthetic agent profile when combined with ketamine and sevoflurane in asthma and food allergies in children over 10 years of age.

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## Compliance with ethical standards

### *Statement of ethical approval*

The present research work does not contain any studies performed on animals/humans subjects by any of the authors.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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