

Perioperative Anaphylaxis: A Rare but Severe Reaction to Sugammadex in a High-Risk Patient

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Main Points

Perioperative Anaphylaxis from Sugammadex:

❖ Sugammadex, a drug used to reverse the neuromuscular blockade, has been associated with rare but life-threatening anaphylactic reactions, which have been increasing with its widespread use.

Case Report Summary:

❖ This is a case of a 63-year-old female with an extensive allergy history who experienced anaphylaxis after being administered sugammadex during surgery. The reaction included severe bronchospasm, hypotension, and required emergency interventions, including epinephrine and a tracheostomy.

Mechanism and Risks:

❖ The exact mechanism of sugammadex-induced anaphylaxis is unclear, but it may involve both allergic and non-allergic pathways. There is speculation that environmental exposure to cyclodextrins, which are structurally like sugammadex, might contribute to hypersensitivity.

Clinical Presentation and Management:

❖ Anaphylactic reactions to sugammadex typically manifest within minutes of administration, with symptoms like hypotension, wheezing, and swelling. Immediate treatment is critical, with epinephrine being the first-line therapy.

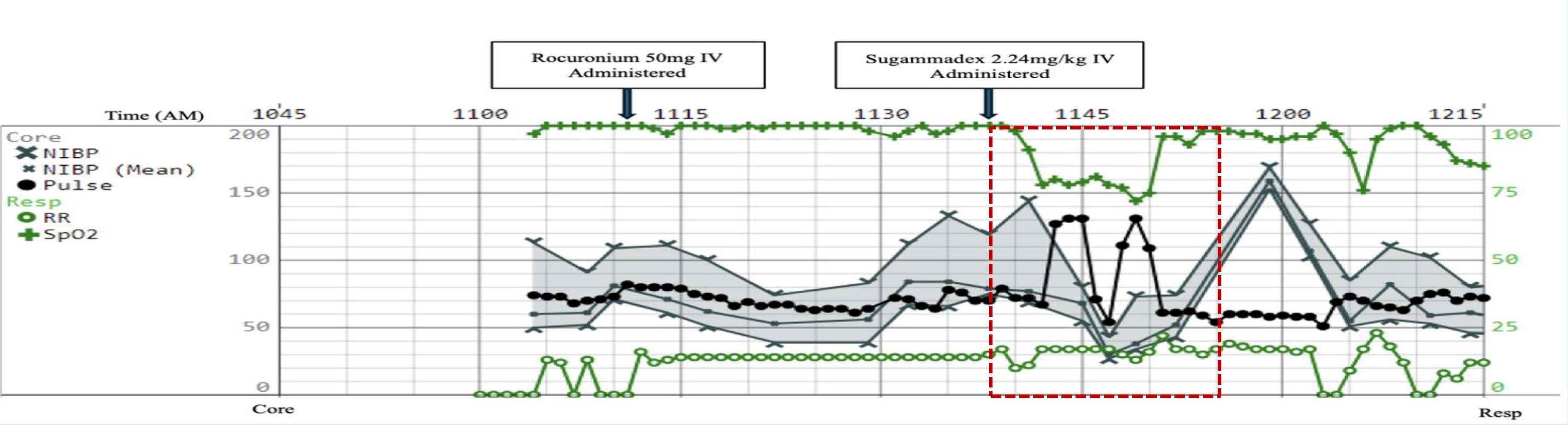
Implications for Practice:

❖ Given the risk of anaphylaxis, especially in patients with a history of allergies, preoperative allergy testing for the sugammadex-rocuronium compound might be warranted. Awareness of the potential for severe reactions is essential for anesthesiologists to ensure patient safety.

Case Report

1) Patient Information: ❖ 63-year-old female with cervical disc disease and myelopathy at C6-7. ❖ Scheduled for anterior cervical disectomy and fusion.	2) Medical History: ❖ Delayed emergence from anesthesia. ❖ BMI of 34.32 kg/m². ❖ Dysphagia and history of difficult intubation. ❖ Conditions: sleep apnea, asthma, hypertension, coronary artery disease, hyperlipidemia, hypothyroidism, peripheral vascular disease, Type 1 diabetes. ❖ Allergies: cephalosporins (anaphylactic reactions), hydrocodone (nausea), and penicillin (rash).	3) Anesthesia and Intubation: ❖ Induced with propofol, fentanyl, and rocuronium. ❖ Intubated with a GlideScope due to difficult airway history. ❖ Maintained on remifentanil drip.
4) Event During Surgery (Figure 1): ❖ Sugammadex Administration: 2.24 mg/kg given to reverse the paralytic for neuromonitoring. ❖ Bronchospasm: Developed within minutes after sugammadex administration. ❖ Interventions: ❖ Difficulty with bag-mask ventilation, increased peak airway pressures. ❖ Switched to 100% FiO₂, decreased air entry detected bilaterally.	5) Differential Diagnoses and Immediate Actions: ❖ Possible causes considered: right main stem intubation, asthma exacerbation, airway circuit occlusion, and mucous plugging. ❖ Endotracheal tube (ETT) and circuit checked for migration or occlusion. ❖ Albuterol administered without significant improvement.	6) Patient Deterioration (Figure 1): ❖ Blood pressure drop: Systolic pressure in the 60s, started on phenylephrine drip. ❖ Anaphylaxis suspected: Due to lack of oxygen saturation improvement and decreased BP. ❖ Treatment for anaphylaxis: ❖ Epinephrine administered. ❖ Followed by dexamethasone (8 mg) and Benadryl (25 mg), leading to stabilization.
7) Additional Observations: ❖ Tongue swelling and edema noticed, increasing suspicion for anaphylaxis. ❖ Chest X-Ray performed to rule out pneumothorax. ❖ Bronchoscopy Findings: ❖ ETT confirmed in correct position, no mucous plugging found, some secretions removed by suction.	8) Post-Surgery Outcomes: ❖ Surgery canceled; patient remained intubated on epinephrine drip. ❖ Extubated to BiPAP in ICU two days later. ❖ Persistent airway swelling led to tracheostomy under general anesthesia. ❖ Significant subglottic granulation tissue found, treated with steroid injections twice.	9) Follow-Up: ❖ Patient continues outpatient management. ❖ Tracheostomy remains in place.

Figure 1- Intraoperative Vitals Following Sugammadex Administration



NIBP- Non-Invasive Blood Pressure
RR- Respiratory Rate
SpO₂- Oxygen Saturation

- Sugammadex was administered at 11:37am.
- Within minutes, there was a severe decrease in blood pressure, pulse and oxygen saturation.

Discussion

- ❖ Perioperative anaphylactic reactions to sugammadex are rare but can be life-threatening.
- ❖ Sugammadex is a modified γ -cyclodextrin that encapsulates and inactivates paralytics, providing rapid reversal of the neuromuscular blockade.
 - Advantages of sugammadex:
 1. Quick, predictable reversal
 2. Lower risk of residual paralysis
 - Adverse Effects of sugammadex:
 1. Inadequate reversal due to improper dosing
 2. Cardiac effects including bradycardia and QT interval prolongation
 3. Anticoagulant effects
 4. Anaphylaxis
- ❖ First reported in 2011, anaphylactic reactions to sugammadex have been increasing. A 5-year multi-center retrospective study in Japan (2012-2016) showed a 0.02% incidence of sugammadex-induced anaphylaxis.
- ❖ All anaphylaxis case reports were confirmed through a positive skin reaction to the sugammadex-rocuronium compound.
- ❖ Tryptase levels are indicative of anaphylaxis. Tryptase levels in this case were in the high normal range at 9.9 ug/L (Normal: 2.2 - 13.2 ug/L).
- ❖ Factors that might increase the patient's likelihood of experiencing an anaphylactic reaction:
 - Allergy history
 - Genetic susceptibility
 - Environmental exposure to cyclodextrins
 - Cyclodextrins have a similar structure to sugammadex.
 - Cyclodextrins are commonly found in food additives and pharmaceuticals in the United States.
- ❖ Long-term outcomes of anaphylaxis can significantly impact quality of life.
 - Tracheal stenosis can occur in 10-22% of cases of intubation for > 7 days.
 - In this case, tracheal stenosis developed after just two days of intubation, a rare occurrence typically seen in only 1-2% of cases.