

## CASE REPORT

# Timing of sugammadex administration: a case report

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### ABSTRACT

Sugammadex is a relatively new drug used to reverse the effects of rocuronium, a non-depolarizing muscle relaxing agent to hasten emergence from general anesthesia. Unlike neostigmine and atropine, its use is not associated with re-curarization or cardiac arrhythmias. Sugammadex carries a small risk of allergic reactions including anaphylactic shock.

We present a case report of a 67 years old woman who underwent an urgent operation for small bowel obstruction. Due to atrial fibrillation (AF) the anesthesiologist administered Sugammadex just before skin closure. Soon after the injection, peak inspiratory pressures (PIP) increased precipitously followed by hypotension and increasing tachycardia. For anticipated cardioversion, the chest was exposed and it revealed urticarial. There was severe bronchospasm on auscultation. Treatment of anaphylactic shock was initiated, the patient improved dramatically and fully recovered.

This case is presented to alert practitioners to the importance of a sudden rise in PIP after Sugammadex administration in the early diagnosis of an anaphylactic reaction, and to suggest that due to the risk of anaphylaxis, it may be advisable to initiate sugammadex only when the patient can be fully exposed without compromising the sterility of the operating field.

**Key words:** Muscle relaxant; Anaphylaxis; Allergic reactions

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### INTRODUCTION

Sugammadex [Org 25969, trade name Bridion (Merck & Co., Inc.)] is relatively a new drug used for reversing skeletal muscle paralysis induced by steroidal neuromuscular blocking agents such as rocuronium and vecuronium.<sup>1</sup> Unlike competitive reversing agents, sugammadex forms a complex with the paralytic molecules circulating in the plasma, and enhances their elimination by the kidney. Consequently, it eliminates the risk of post-operative residual curarization associated with the traditional competitive reversing agents. In randomized controlled trials sugammadex reliably shortened muscle relaxation from 20 to 1 min.<sup>2</sup>

While sugammadex had been shown to be safe

and effective reversing agent, it is associated with hypersensitivity reactions including anaphylactic shock in up to 1% of the cases.<sup>3</sup> Delayed suspicion and a delayed diagnosis can happen when the drug is given while the patient's body cannot be exposed (for example, during skin closure) and urticaria cannot be observed.

The purpose of this presentation is to alert physicians to the importance of a sudden rise in peak inspiratory pressure (PIP) in the early diagnosis of anaphylaxis, in order to avoid premature extubation. The development of laryngeal edema may make re-intubation difficult or even impossible. A safer timing of sugammadex administration may be sought.

## CASE REPORT

A 67 year old woman, with a body mass index of 32, required an urgent laparotomy for small bowel obstruction. General anesthesia was induced with 150 mg of propofol 1% and 150 µg of fentanyl. Rocuronium was used for muscle relaxation on induction. Anesthesia was maintained with isoflurane, fentanyl 100 µg bolus and rocuronium 20 mg bolus. Soon after induction she developed atrial fibrillation with rapid ventricular response, however, there was no hemodynamic compromise. Inj. amiodarone was used to slow down the ventricular rate from 120-140 beats per minute (bpm) to 90-100 bpm. The operation was uneventful and lasted for 30 min, after which reversal of neuromuscular blockade was initiated. Due to the arrhythmia, the anesthesiologist eschewed traditional reversing agent (neostigmine and atropine) in favor of sugammadex, in order to avoid exacerbation of the rapid ventricular response.

Two minutes after administration of sugammadex (200 mg IV) PIP rose precipitously to 45 cmH<sub>2</sub>O. The anesthesiologist suspected that the patient was struggling against the ventilator, and considered increasing the depth of anesthesia. However, blood pressure dropped to 70/40 mmHg and the ventricular rate rose to 140-160 bpm. The rapid AF was interpreted as to be a result of "high adrenergic drive" on recovery from anesthesia, and the drop in blood pressure was attributed to low cardiac output secondary to the rapid heart rate. Consequently, it was decided to attempt cardioversion.

When the sterile sheets covering the chest were removed, erythema and urticaria of the chest wall was observed. PIP increased further, and on auscultation a decreased bilateral airflow accompanied by expiratory wheeze was noted.

At this point, a diagnosis of anaphylactic shock was made, and treated with 0.5 mg adrenaline, 200 mg hydrocortisone IV and 2 ml of intra-tracheal albuterol. The patient improved dramatically: airway resistance, as measured by PIP, normalized, blood pressure rose to 90/60 mmHg, and wheezing on auscultation became less severe. The patient was shifted to ICU and was extubated after 14 hours,

without any further sequelae.

## DISCUSSION

While the potential of sugammadex to cause anaphylactic shock is well known,<sup>4</sup> the presentation in our patient was unusual. Sugammadex was administered when the operation was still going on, but the muscle relaxation was no longer needed. Consequently the patient was still covered by sterile sheets, and observation of the skin was impossible. The resulting delay in diagnosis could have been disastrous.

The temporal relationship between administration of sugammadex and the sudden rise in PIP could have alerted the anesthesiologist to the possibility of bronchospasm due to anaphylaxis, but the differential diagnosis is not straight forward and until the patient was exposed and the rash was observed, it was difficult to rule out other alternative explanations.

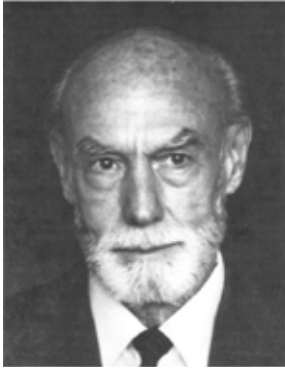
This case suggests that the timing of reversing neuromuscular blockade with sugammadex should differ from the timing of reversal with traditional agents. When using traditional reversing agents, it is customary to start them as soon as muscle relaxation is no longer required. The usual timing enables extubation immediately after skin closure, rapid turn over the patients and better utilization of resources. In addition, it allows longer observation against post-operative residual curarization. However, due to the risk of anaphylaxis, it seems unwise to follow the same practice with sugammadex.

This case indicates that it is probably safer to administer sugammadex only after the skin is closed, and the covers can be removed without compromising the sterility of the field. The short delay will allow unhindered observation of signs of an allergic reaction or anaphylaxis. Because sugammadex acts very quickly, and is free from residual curarization, waiting the extra minute or two should not materially affect operating room utilization or case turnover rate. In our case presented here, delaying reversal would have led to earlier diagnosis, and treatment could have been initiated before desaturation and collapse.

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*In brief, it becomes increasingly evident that the prime, urgent need of our times is not for more science and improved technology, medical or otherwise, but for some new ethical policies and moral guidelines to live and govern by*

ROGER SPERRY NEUROPSYCHOLOGIST,  
NOBEL LAUREATE, 1981