

## Sugammadex: A savior for an elderly cardiac patient! A case report

### ABSTRACT

In an elderly patient with known cardiac and pulmonary risk, a reversal agent with a faster onset and least hemodynamic effects is preferable. Being inert, the sugammadex–rocuronium complex is associated with minimal muscarinic effects. We report a successful management with rocuronium and sugammadex in an eighty three year old male patient with a history of Ischemic Heart Disease, atrial fibrillation, and Interstitial Lung Disease posted for a cochlear implant surgery.

**Key words:** Cardiorespiratory disease, elderly, sugammadex

### Introduction

Sugammadex is a complex oligosaccharide with a hydrophobic core and hydrophilic exterior. Van Der Waals forces and hydrophobic bonds form a strong 1:1 interaction between the hydrophobic core of sugammadex and the aminosteroidal neuromuscular blocking drugs.<sup>[1]</sup> The resulting complex is water soluble and gets excreted in the urine. The affinity of sugammadex for rocuronium is greater than that for vecuronium.<sup>[1]</sup> Sugammadex facilitates rapid reversal from moderate rocuronium blockade in all age groups.<sup>[2]</sup> Also, it is not known to cause significant hemodynamic effects in patients with cardiac diseases and is associated with a decreased incidence of respiratory complications.<sup>[3,4]</sup>

### Case Report

An 83-year-old male patient was posted for cochlear implant surgery. The patient had a past history of Percutaneous

Transluminal Coronary Angioplasty (PTCA) performed for Ischemic Heart Disease (IHD). He had later developed repeated episodes of atrial fibrillation for which he was started on tablet amiodarone. Subsequently, after a few months he started having respiratory discomfort, which was diagnosed as Interstitial Lung Disease (ILD) attributed to pulmonary toxicity due to amiodarone. The drug was then stopped immediately, and the patient was treated for the same. For the present surgery when the patient was attended preoperatively, the latest Pulmonary Function Tests (PFTs) showed mild restrictive lung disease, and he was in sinus rhythm. He was on tablet apixaban to prevent thromboembolic complications. It was asked to be discontinued three days before surgery, during which bridging therapy with subcutaneous heparin was started. The preoperative Two-Dimensional Echocardiography (2D-ECHO) did not demonstrate any clot or thrombus in any of the cardiac chambers, and mild hypokinesia was noted in the basal and mid-inferior segments.

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After confirming the identity and consent, the patient was wheeled into the Operation Theatre (OT). Monitors according to the American Society of Anaesthesiologists (ASA) standards, were attached to the patient. Electrocardiogram (ECG) tracing showed a normal sinus rhythm. After noting the heart rate, saturation, and the blood pressure, the patient was induced with injection midazolam 1 mg, injection fentanyl 80 micrograms, incremental doses of sevoflurane until loss of consciousness, and then injection rocuronium 50 mg. The patient was intubated with an oral cuffed endotracheal tube. He was hemodynamically stable during induction and also throughout the procedure. A repeat dose of muscle relaxant was not required in our patient. On completion of the surgery, we used sugammadex in the dose of 2 mg/kg as spontaneous respiratory efforts were seen. The patient was extubated 90 seconds after administering sugammadex, and was observed in the Recovery room for two hours before shifting him to the ward.

## Discussion

Rocuronium has a faster onset of action than vecuronium and atracurium.<sup>[5]</sup> It is preferable in cardiac patients, as it is cardiostable.<sup>[6]</sup> However, the duration of action of rocuronium is longer in elderly patients due to alterations in metabolism, drug distribution, and elimination.<sup>[7]</sup> Therefore, a reversal drug that rapidly clears the neuromuscular blocking drug and prevents the recurrence of neuromuscular blockade is desirable. Sugammadex, a modified gamma cyclodextrin, is known to rapidly reverse neuromuscular blockade induced by aminosteroid neuromuscular blocking agents, mainly rocuronium. When compared to neostigmine, it provides a faster and more complete recovery.<sup>[8]</sup> Due to the availability of sugammadex and its proven benefits in patients with cardiorespiratory diseases, we used the combination of rocuronium and sugammadex.<sup>[1]</sup> Atracurium is associated with histamine release, which may lead to tachycardia and bronchospasm. Considering the previous history of atrial fibrillation and ILD in our patient, we did not choose atracurium.

McDonagh *et al.*<sup>[2]</sup> in their study, observed that sugammadex when used in the dose of 2 mg/kg, facilitated rapid recovery in all age groups. They observed that elderly patients required a mean time of 3.6 minutes after the administration of sugammadex to gain a train of four (TOF) ratio of 0.9. Recurrence of neuromuscular blockade was not observed in any patient in their study.

Our patient was elderly. Considering the faster onset of action and cardiostability of rocuronium, and the proven benefit of sugammadex in elderly patients, we decided to use these

two drugs for the fast and complete recovery from general anesthesia. We observed our patient for revascularization after extubation for two hours, considering the elimination half-life of rocuronium is 83 minutes.<sup>[9]</sup> No recurrence of neuromuscular blockade was observed in our patient.

Kizilay *et al.*<sup>[3]</sup> conducted a study in 90 cardiac patients undergoing noncardiac surgeries. Half of the patients received neostigmine and an anticholinergic drug, and the other half received sugammadex to reverse rocuronium-induced neuromuscular blockade. They observed that the increase in hemodynamic parameters like heart rate, systolic and diastolic blood pressures were more prominent in the group receiving neostigmine. Our patient had a history of IHD, and it was appropriate to choose a reversal drug with a low risk of tachycardia. Extubation itself is a stressor that can lead to tachycardia due to sympathetic stimulation. This sympathetic stimulation, accompanied by the tachycardia caused by the reversal drugs may induce an increase in heart rate beyond the ischemia threshold. Therefore in our case, sugammadex was chosen.

Our patient also had ILD due to amiodarone. Sugammadex is associated with reduced pulmonary complications in the postoperative period. Wang *et al.*<sup>[4]</sup> conducted a meta-analysis of 14 randomized control trials (RCT) and observed that sugammadex was associated with a significantly lower risk of predicted postoperative pulmonary complications (PPCs) when compared to neostigmine. This was attributed to the complete reversal of neuromuscular blockade by sugammadex, as even the slightest residual paralysis could lead to PPCs. Ji *et al.* reviewed patients with respiratory dysfunction who received sugammadex for the surgery, and observed that the incidence of PPCs including intensive care unit admission, cough, pleural effusion, and difficulty in breathing was lower in them.<sup>[10]</sup>

## Conclusion

Due to the beneficial effects of sugammadex on the cardiovascular and respiratory systems in elderly patients, we used rocuronium and sugammadex. The intraoperative course was uneventful with no derangements in the hemodynamics, airway pressures, or saturation. We thus managed to conduct the case uneventfully. We recommend the use of sugammadex for the reversal of rocuronium-induced neuromuscular blockade in elderly patients with underlying cardiac and respiratory dysfunction.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given

his consent for clinical information to be reported in the journal. The patient understands that his name and initials will not be published and that due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Nil.

#### Conflicts of interest

There are no conflicts of interest.

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