Reversal of Profound Neuromuscular Blockade with Sugammadex after Failure of Rapid Sequence Endotracheal Intubation: a Case Report

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Summary: Barbosa FT, Cunha RM – Reversal of Profound Neuromuscular Blockade with Sugammadex after Failure of Rapid Sequence Endotracheal Intubation: a Case Report.

Background and objectives: Sugammadex is a reversal agent that acts as a selective antagonist of neuromuscular blockade induced by rocuronium and vecuronium. This is a case report of an elderly female patient who had sugammadex just after rocuronium induction.

Case report: An 88-year-old female patient, 34 kg, presented a femoral fracture and had to undergo general anesthesia after spinal anesthesia failure. Induction was performed with propofol 1.5 mg.kg^{-1}, rocuronium 1.2 mg.kg^{-1}, fentanyl 100 mcg, and lidocaine 2 mg.kg^{-1}. There was no success in either tracheal intubation or laryngeal mask positioning maneuvers. The use of sugammadex at a dose of 16 mg.kg^{-1} was required and respiratory function returned to normal.

Conclusion: Literature recommends sugammadex at a dose of 16 mg.kg^{-1} for patients with profound blockade. It was used in our patient with rapid and effective reversal of neuromuscular blockade allowing the patient to undergo another procedure to ensure the airway patency without clinical impairment of her general condition.

Keywords: Intraoperative Complications; Intubation, Intratracheal; Cyclodextrin, Sugammadex.

INTRODUCTION

Sugammadex is a chemically modified gamma-cyclodextrin that acts as a selective antagonist of neuromuscular blockade induced by rocuronium and vecuronium [1]. Rocuronium has proved to be a reasonable alternative to provide a rapid sequence induction without the occurrence of some events observed in patients when using succinylcholine, such as hyperkalemia, masseter muscle rigidity, reported onset of malignant hyperthermia (in some cases after its usage). Sugammadex has been used to provide the reversal of various doses of rocuronium (0.6, 1.0, and 1.2 mg.kg^{-1}) [2].

The aim of this report is to describe a case in which sugammadex was used to reverse muscle relaxation immediately after rocuronium induction in an elderly patient, following unsuccessful tracheal intubation maneuvers.

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CASE REPORT

RBQC, aged 88 years and 9 months, 34 kg, female, presented with femoral neck fracture 8 hours before the procedure, ASA II, skinny, with a history of lumbar spine ankylosis and no additional comorbidities. In the operating room, the patient was monitored with ECG, neuromuscular junction monitor, oximetry, bispectral index, and noninvasive arterial pressure. After being monitored she was placed in a sitting position for spinal anesthesia; the procedure was not successful due to a marked degree of scoliosis and inability to identify the subarachnoid space.

General anesthesia was performed with induction of propofol 1.5 mg.kg^{-1}, rocuronium 1.2 mg.kg^{-1}, fentanyl 100 mcg, and lidocaine 2 mg.kg^{-1}. Tracheal intubation was attempted three times unsuccessfully; the laryngeal mask did not adapt to the patient due to her protruding teeth, and they were unable to ventilate with a face mask. At this point, the use of sugammadex at a dose of 540 mg (16 mg.kg^{-1}) was selected, obtaining rapid reversal of respiratory activity.

Patient had no cardiovascular changes along or after the intubation procedures and reversal of rocuronium. The monitor of neuromuscular blockade was installed after the reversal and the monitored TOF value reached 0.95. The operation proceeded with the surgical airway technique under local anesthesia. The patient was discharged after three days without sequelae.

DISCUSSION

Acetylcholinesterase antagonists do not allow a rapid reversal of profound neuromuscular blockade, while sugammadex has the potential for this type of reversal with the return of

muscle activity occurring in less than 2 minutes compared to neostigmine [3]. The sugammadex-rocuronium interaction reduces the amount of free rocuronium plasma concentration, decreasing the affinity of the rocuronium still connected to the acetylcholine receptor, which in turn increases the amount of this muscle relaxant in plasma derived from stocks of relaxant linked to the receptor, and also enables the connection of sugammadex plasma free molecules with the rocuronium that has lost its connection with the nicotinic receptor, which eventually returns to the plasma [4]. The mean plasma clearance in man of 70 kg is 120 mL.min^{-1}, distribution volume is 18 L, and half-life is 100 minutes [5]. Profound neuromuscular blockade should be reversed with 4 mg.kg^{-1} and moderate blocking with a dose of 2 mg.kg^{-1} [5].

Rocuronium at a dose of 1.0 mg.kg^{-1} is recommended for rapid sequence intubation in conditions similar to succinylcholine and within 60 seconds [2]. In this case report the recommendation was followed. However, an event of impossible intubation was diagnosed, as it was not possible to intubate or ventilate the patient. Sugammadex at a dose of 16 mg.kg^{-1}, immediately after the use of rocuronium, was recently indicated as effective to reverse profound neuromuscular blockade [5,6]. This same dose was used in the patient with clinically effective reversal. Pühringer et al. [7] conducted a study using a dose of 16 mg.kg^{-1} and reported that the median time for reversal of neuromuscular blockade was 1.9 minutes.

Neostigmine presents longer time for reversal (> 66.2 min.) than sugammadex which lasts for only 4.5 minutes [3]. Neostigmine may also fail to reverse profound neuromuscular blockade and may not provide good conditions to extubate patients [8]. There was no evidence of the need of neostigmine in this case report.

Recurarization after sugammadex administration has been reported in cases which doses were lower than 2.0 mg.kg^{-1} [9,10]. As the mechanism of action is different from acetylcholinesterase inhibitors, the drug has low potential to generate arrhythmias [5]. Doses as high as 40 mg.kg^{-1} did not induce arrhythmias [5].

In Brazilian literature there are no researches involving the use of sugammadex in trauma centers; therefore, studies are necessary to elucidate the optimal dose in multisystem trauma patients.

CONCLUSION

Literature recommends sugammadex at a dose of 16 mg.kg^{-1} for patients with profound neuromuscular blockade. It was used in this case report with rapid and effective reversal of blockade, allowing the patient to undergo another procedure to ensure airway patency without clinical impairment of her general condition.

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