Can J Anesth/J Can Anesth (2013) 60:508–509
DOI 10.1007/s12630-013-9909-7

CORRESPONDENCE

Recurarization after sugammadex following a prolonged rocuronium infusion for induced hypothermia

Tetsuya Murata, MD · Toshi Kubodera, MD · Masakazu Ohbayashi, MD · Kichiro Murase, MD, PhD · Yushi U. Adachi, MD, PhD · Naoyuki Matsuda, MD, PhD

Received: 14 January 2013 / Accepted: 15 February 2013 / Published online: 5 March 2013

To the Editor,

Sugammadex encapsulates the steroidal neuromuscular blocking agents, rocuronium and vecuronium, and rapidly reverses their effect. Although recurarization is possible after administration of sugammadex,[1] only a few cases have been documented clinically.[2] We report here a patient showing signs of neuromuscular block in spite of repeated administration of sugammadex. Consent for publication of this report was obtained from the patient's family.

A 56-yr-old male patient with chronic renal failure was scheduled for a pancreatoduodenectomy. On the morning of the planned surgery, he underwent a cardiac arrest while still on the ward of our university hospital. After recovery of spontaneous circulation, tracheal intubation was performed, and emergency contrast-enhanced computed tomography revealed a pulmonary air embolism. He was admitted to the intensive care unit where therapeutic mild hypothermia was induced (day 1) and continuous hemodiafiltration therapy was initiated.

T. Murata, MD
Department of Anesthesia, Daiyukai General Hospital, Nagoya City, Aichi, Japan

T. Kubodera, MD
Department of Emergency Medicine, Ohgaki Municipal Hospital, Ohgaki City, Gifu, Japan

M. Ohbayashi, MD · K. Murase, MD, PhD · N. Matsuda, MD, PhD
Department of Emergency and Critical Care Medicine, Nagoya University Graduate School of Medicine, Nagoya City, Aichi, Japan

Y. U. Adachi, MD, PhD (✉)
Department of Emergency Medicine, Nagoya University Hospital, Nagoya City, Aichi, Japan
e-mail: yuadachi@med.nagoya-u.ac.jp

To prevent shivering as one of the complications of hypothermia, rocuronium was infused continuously at a rate of 25 $mg \cdot hr^{-1}$. The patient received 1,376 mg over 46.5 hr (day 3). Two days later (day 5), his body temperature had recovered, hemodynamic variables were stable, and consciousness had improved. Accordingly, weaning from mechanical ventilation was attempted for tracheal extubation; however, his tidal volume was small under pressure support mode (8 cm H_2O). An accelomyographic monitor (TOF-Watch®, NihonKoden, Tokyo, Japan) applied to the adductor pollicis muscle showed a train-of-four (TOF) count of four with a TOF ratio of 0.2. Consequently, sugammadex 400 mg was administered. Immediately after the injection, the patient's responses to noxious stimuli and verbal commands showed improvement; however, 12 hr later, tidal volume in the pressure support mode (8 cm H_2O) had decreased, and the patient's response to stimuli was weak. A second injection of sugammadex (400 mg) was administered, and this clearly increased tidal volume and the response to noxious stimuli.

On the next day (day 6), after confirmation of adequate ventilation, airway patency, and neurological recovery, the patient's trachea was extubated without any difficulties, and oxygen was applied by face mask. Although oxygen saturation was maintained (> 90%), the patient complained of dyspnea approximately 12 hr after tracheal extubation. Although the accelomyographic monitoring at the adductor pollicis appeared normal, the intensivist in charge, suspecting residual neuromuscular blockade, administered another dose of sugammadex 400 mg. Consciousness and spontaneous ventilation improved immediately after the injection, and dyspnea disappeared without apparent change in accelomyographic response.

No complications were detected after the third administration of sugammadex. On day 8, continuous hemodiafiltration

was terminated and intermittent hemodialysis was scheduled on the ward. The patient was discharged from the intensive care unit and transferred to a municipal hospital for rehabilitation and hemodialysis therapy 26 days after the cardiopulmonary arrest. He remained with a slight neurological deficit.

In the present case, the serum concentration of rocuronium and sugammadex could not be determined. Acceleromyographic recordings performed in the intensive care unit might have been unreliable because of the staff's unfamiliarity with this type of monitoring. Nevertheless, the patient's recovery from respiratory insufficiency and weakness in response to noxious stimuli were well recognized by the staff immediately after each sugammadex injection.

There is a possibility of recurarization after the reversal of sugammadex;[1] however, reports on repeated occurrences of paralysis are lacking. Shibusawa *et al*.[3] described an incomplete and delayed recovery after sugammadex administration in a patient with chronic renal failure. Consequently, sugammadex should be used with caution in patients with renal dysfunction. Mild hypothermia therapy induced after cardiac arrest might also increase the risk of recurarization.

Conflicts of interest None declared.

References

1. *Eleveld DJ*, *Kuizenga K*, *Proost JH*, *Wierda JM*. A temporary decrease in twitch response during reversal of rocuronium-induced muscle relaxation with a small dose of sugammadex. Anesth Analg 2007; 104: 582-4.
2. *Le Corre F*, *Nejmeddine S*, *Fatahine C*, *Tayar C*, *Marty J*, *Plaud B*. Recurarization after sugammadex reversal in an obese patient. Can J Anesth 2011; 58: 944-7.
3. *Shibusawa M*, *Ejima Y*, *Nishino R*, *Toyama H*, *Kurosawa S*. Use of sugammadex in patients undergoing caesarean section using general anesthesia with rocuronium (Japanese). Masui 2012; 61: 805-9.