Turk J Anaesth Reanim 2016; 44: 108-10 DOI: 10.5152/TJAR.2016.03274

Case Report

# Postoperative Respiratory Failure in a Patient with Undiagnosed Myastenia Gravis

Funda Özel, Ali Aydın Altunkan, Mustafa Azizoğlu
*Department of Anaesthesiology and Reanimation, Mersin University School of Medicine, Mersin, Turkey*

Abstract

Myasthenia gravis (MG) is an autoimmune disease caused by the development of antibodies against the nicotinic acetylcholine receptor. There is hypersensitivity against non-depolarizing muscle relaxants in these patients. Sugammadex eliminates the effects of steroid non-depolarizing muscle relaxants, such as rocuronium and vecuronium, by selectively encapsulating their molecules. In this case report, we present a case of recurarization and respiratory failure after the use of sugammadex and rocuronium in a patient with preoperatively undiagnosed myasthenia gravis.

**Keywords:** Myasthenia gravis, rocuronium, sugammadex, respiratory failure

## Introduction

Myasthenia gravis (MG) is an autoimmune neuromuscular disease caused by the development of antibodies against nicotinic acetylcholine receptors. Although the start of the disease is more often between the ages of 15–30 and 50–75 years, it may occur at any age. It is more common in women in younger patients and more common in males in older patients. The main clinical sign of MG is muscle weakness that increases with movement, recovers partially or completely with rest and shows fluctuations in the intensity and distribution over time. Weakness of the muscles of the eyes is evident in the vast majority of patients, manifesting itself as diplopia and ptosis (1). The first sign is ptosis in 50–60% of patients. Diplopia may sometimes be the initial symptom. As a result, ptosis and/or diplopia is found in 90% of patients with MG. Concomitant thymomas are observed in 10% patients and thymic hyperplasia in about 70% patients. Anticholinesterases, corticosteroids, plasmapheresis and immunosuppressive drugs are used in treatment (2). After orotracheal intubation is provided in these patients using a depolarizing drug at decreased doses during general anaesthesia, the maintenance of anaesthesia is continued with inhalational agents (3). If adequate muscle relaxation cannot be achieved, short-acting non-depolarizing drugs are recommended at decreased doses. Sugammadex is one of the first clinical representatives of a new group of drugs called as selective muscle relaxant-binding agents (4).

## Case Presentation

Before drafting this case report, written informed consent of the patient was received. The patient was a 63-year-old 75-kilogram (kg) male patient for whom direct laryngoscopy was planned by Ear, Nose and Throat clinic (ENT) because of vocal cord dysfunction. In preoperative evaluation, the findings of physical examination, ECG, chest X-ray, biochemistry and haemogram were normal. History taking revealed that he had a cholecystectomy operation 22 years ago and there was not any other characteristic except for this. In addition, it was also found that the patient didn't use any medication.

In the induction of anaesthesia, 2 mg $kg^{-1}$ propofol and 0.6 mg $kg^{-1}$ rocuronium was administered in the patient, who was taken to the operating room. The patient was intubated with a number 6.5 tube 2 minutes after rocuronium administration. Anaesthesia was maintained with 50% $O_2$ + 50% $N_2O_2$ and 2% of sevoflurane. At the end of 20-minute intervention, sugammadex was used at a dose of 2 mg $kg^{-1}$. When the patient reached adequate spontaneous respiration, he was extubated when $SpO_2$ was 98%. No problems developed during the observation in the recovery room and the patient was



**Address for Correspondence:** Dr. Ali Aydın Altunkan, Mersin Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon Anabilim Dalı, Mersin, Türkiye E-mail: aaltunkan@hotmail.com


Received : 29.04.2015
Accepted : 14.07.2015

conscious, cooperative and oriented. The patient was sent to the inpatient department after 30 minutes of follow up in the recovery room. Two hours later, the patient developed respiratory distress while under observation, and he was taken to operating room in emergency conditions. When the patient arrived, he was unconscious, cyanotic and had no spontaneous breathing; however, carotid pulse was palpable. The patient was urgently intubated and after monitoring, he was sent to anaesthesia and intensive care unit for follow-up, monitoring and mechanical ventilatory support.

Propofol was started for sedation at a dose of 1 mg $kg^{-1}$. Synchronized intermittent mandatory ventilation (SIMV) was followed with mode 100% $FiO_2$. After the analaysis of arterial blood gas (ABG), $FiO_2$ was set at 30% according to the level of oxygen. The patient was maintained in SIMV mode for 4 hours. Sedation was then stopped and observation was continued in the assisted spontaneous breathing (ASB) mode and 30% $FiO_2$. The patient was conscious and had a Glasgow Coma Scale (GCS) score of 15. Because no deterioration occurred in arterial blood gas and the breathing pattern was regular, the patient was extubated. He was then maintained under 6 L $min^{-1}$ $O_2$ through mask. According to the results of blood gas analysis, oxygen level was first adjusted to 4 L $min^{-1}$ and then to 2 L $min^{-1}$. The patient was maintained on mask ventilation for 12 hours and then changed to room air. Three hours after changing to room air, no deterioration occurred in ABG and the general situation of the patient was stable. Thus, he was transferred to the otolaryngology department.

The patient had fatigue and ptosis during follow-up in the department; thus, the patient was referred to the neurology department with the suspicion of MG. When the patient's history was taken in detail, he gave information about an increase in eyelid drooping in the evenings for 15 days, occasional double vision and fluctuating ptosis. The patient was admitted to the neurology section for advanced examination and treatment. The examination of the anti-acetylcholinesterase antibodies of the patient was requested by neurology department. Chest computed tomography (CT) imaging was performed to rule out thymomas. The anti-acetylcholinesterase antibody of the patient was found to be negative. No signs compatible with thymoma were observed in a thorax CT. Electromyography (EMG) of the patient was requested for ruling out polyneuropathy, and no evidence supporting polyneuropathy was found. In our hospital, single-fibre EMG and repetitive nerve stimulation test were not available. However, after administration of pyridostigmine, the clinical symptoms recovered. Taken along the clinical findings supporting the diagnosis, the patient was diagnosed with MG. The patient was discharged after being prescribed pharmacotherapy and suggesting the follow-ups at the outpatient clinic.

## Discussion

In the majority of patients undergoing surgical procedures, the diagnosis of diseases involving the neuromuscular issues such as MG is made beforehand. Such clinical pictures are taken into consideration in the selection of methods and agents for anaesthesia administration.

When surgery is required in the patients with MG, muscle relaxants should not be used; instead, regional methods and local anaesthesia should be preferred as much as possible. In cases where the muscle relaxants are needed, short-acting agents should be preferred, and Train of Four (TOF) monitoring should be performed (5). It is seen in the studies conducted that the use of rocuronium/sugammadex is common in the cases where muscle relaxation is needed in patients with MG. Decrease in the response to depolarizing muscle relaxants and increase in response to the non-depolarizing muscle relaxants can be seen in MG. Although anticholinesterases, which are specially used in reversing the neuromuscular block, are used in treating MG, their use at high doses in these patients may lead to muscarinic effects (such as hypersalivation, bradycardia) (6).

Successful results were obtained in the studies with the use of rocuronium/sugammadex in reversing the neuromuscular block in the surgeries of patients with MG. Rocuronium was used in patients at a dose of 0.2–0.3 mg $kg^{-1}$ and TOF monitoring was performed. Extubation was performed in conformity with sufficient TOF value by using sugammadex at a dose of 2 mg $kg^{-1}$. In this way, it was seen that the need for postoperative mechanical ventilation in patients with MG and the need for intensive care was decreased (7). It was stated in the study of Le Corre et al. (8) that it was not likely for sugammadex not to bind to rocuronium because the affinity of sugammadex to rocuronium molecules was high. A sugammadex molecule binds to a rocuronium or vecuronium molecule. Therefore, the most widely accepted hypothesis is that there is not sufficient amount of sugammadex to bind to the rocuronium molecules in the body. Because our patient was not previously diagnosed with MG, 2 mg $kg^{-1}$ of sugammadex was administered, and repetitive block related to insufficient dose was not considered. The patient was extubated because of adequate spontaneous breathing and 98% of $SpO_2$.

Although MG patients have often been diagnosed previously, it is also rarely possible to encounter an undiagnosed case similar to our case. As in every case, the importance of being careful during the postoperative follow-up in the recovery room and using a recovery score, such as Aldrete, is evident.

However, although adequate spontaneous respiratory is provided in MG patients and no problems are encountered during the follow-up in postoperative recovery room, recurrence can be seen in the subsequent period. In the case that Ortiz-Gomez et al. (9) reported, although sugammadex 9.74 mg $kg^{-1}$ was used, the patient was re-intubated because of the development of recurrence after the extubation, and the patient was extubated after 3 hours in intensive care conditions.

Although not diagnosed, we wanted to show in this case report that the use of rocuronium/sugammadex in a patient with MG may not always be sufficient to reverse the neuromuscular block. However, we believe that it is difficult to make a distinction of whether the respiratory failure in our case was because of sugammadex recurrence or undiagnosed MG.

## Conclusion

MG is an autoimmune disease related to the neuromuscular junction, and it may be detected accidentally. We thought that it was appropriate to report this case in order not to forget the reality that care should be paid in terms of possible complications because of the agents that are used in neuromuscular junction pathologies.

---

**Informed Consent:** Written informed consent was obtained from patient who participated in this case.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept – A.A.A.; Design – A.A.A., F.Ö.; Supervision – A.A.A.; Resources – F.Ö., M.A.; Materials – A.A.A.; Data Collection and/or Processing – F.Ö., M.A.; Analysis and/or Interpretation – A.A.A., F.Ö.; Literature Search – A.A.A., F.Ö., M.A.; Writing Manuscript – F.Ö., A.A.A.; Critical Review – A.A.A.; Other – M.A.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

## References

1. Sieb JP. Myasthenia gravis: an update for the clinician. Clin Exp Immunol 2014; 175: 408-18. [CrossRef]
2. Erdal H, Özyurt Y, Arıkan Z. Myastenia gravis ve anestezi: olgu sunumu. Bakırköy Tıp Dergisi 2006; 2: 141-3.
3. Yeğenoğlu F, Esmaoğlu Çoruh A, Artış T, Bayram A. Myastenia gravisli olguda anestezi yönetimi. Erciyes Med J 2010; 32: 49-52.
4. Schaller SJ, Fink H. Sugammadex as a reversal agent for neuromuscular block: an evidence-based review. Core Evidence 2013: 8.
5. Karaman Y, Çakmak M, Özkarakaş H, Güvenli Y, Gönüllü M. Myastenia gravisli hastada sugamadeks ile postoperatif mekanik vetilasyon gereksinimi azalır mı? Ege Tıp Dergisi 2012; 51: 69-71.
6. Unterbuchner C, Fink H, Blobner M. The use of sugammadex in a patient with myasthenia gravis. Anaesthesia 2010; 65: 302-5. [CrossRef]
7. Tomak Y, Bostan H, Kazdal H. Myastenia gravisli bir olguda sugammadeks kullanımı. Turk J Anaesth Reanim 2011; 39: 341-5. [CrossRef]
8. Le Corre F, Nejmeddine S, Fatahine C, Tayar C, Marty J, Plaud B. Recurarization after sugammadex reversal in an obese patient. Can J Anaesth 2011; 58: 944-7. [CrossRef]
9. Ortiz-Gómez JR, Palacio-Abizanda FJ, Fornet-Ruiz I. Failure of sugammadex to reverse rocuronium-induced neuromuscular blockade: a case report. Eur J Anaesthesiol 2014; 31: 708-9. [CrossRef]