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Case Report

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Myasthenia gravis – can i relax my patient? a case report

Abstract

Myasthenia gravis is a neuromuscular disease with a multisystemic involvement and multiple drug interactions not restricted to neuromuscular blockers, but also including anaesthetic and analgesic agents, increasing the risk of anaesthesia-related complications. In this case report, we describe our safe and effective anaesthetic technique for a Myasthenia Gravis patient submitted to Video-Assisted Thoracoscopy thymectomy, requiring neuromuscular block. Since we are dealing with an increasingly frequent disease, the authors wish to highlight the need for appropriate consensus, as no standardized recommendations have been brought through, encouraging scientific societies in the provision of guidelines, especially whenever neuromuscular blocking agents are necessary.

Keywords: Myasthenia Gravis, Neuromuscular Blocking Agents, Thoracic Surgery, Video-Assisted

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Introduction

Myasthenia gravis (MG) is a neuromuscular autoimmune disease with increasing incidence, resulting in fatigable weakness of skeletal muscles, caused by antibodies directed against postsynaptic membrane proteins. Treatments options are aimed at improving symptoms and include anticholinesterases and immunosuppressive therapy. In most seropositive patients, thymectomy is recommended as the thymus is involved in the production of antibodies. However, in the postoperative period of this surgery, the risk of respiratory failure and myasthenic crisis is highly increased and occurs in up to 30% patients.[1]

According to the Committee of the Myasthenia Gravis Foundation of America, MG is classified regarding the degree of muscular paralysis, from limited extraocular muscles fatigue (type 1) to severe generalized weakness (type 4), with type 5 reserved to those requiring tracheal intubation. These patients have therefore an increased risk of significant respiratory (pulmonary aspiration risk, dysphagia, difficulty in removing secretions) but also cardiovascular complications (atrioventricular blocks, dysrhythmias such as atrial fibrillation and cardiomyopathy), as the antibodies display cross-reactivity with β1 and β2 adrenergic receptors. Whenever approaching patients with this disorder, cautious perioperative management is required due to systemic involvement of the disease and possible drug interactions. These patients are unpredictably sensitive to nondepolarizing muscle relaxants, analgesic agents and residual effects of anaesthetic agents, which can all have an impact on an already compromised pulmonary function. Meticulous preoperative evaluation and testing are required as MG can be associated with other autoimmune or cardiovascular diseases. In this case report we describe our approach for anaesthetic management of a MG patient submitted to Video-Assisted Thoracoscopy (VATS) thymectomy.

Case report

We describe the case of a 50-year-old woman, 161-cm tall and weighing 50 kg, ASA physical status of 2 presenting for VATS thymectomy. She was diagnosed with MG at 45 years-old and had no other comorbidities. She had an Osserman and Genkins MG type II classification, reporting increasing generalized fatigue, ptosis and amblyopia of the right eye. She was taking 300mg pyridostigmine daily with only partial improvement of symptoms. Additionally, she was a former smoker (30 pack-years), ceasing the habit 1 month prior to the surgery. The patient had 2 previous breast augmentation surgeries: the former 20 years ago and the latter 4 years ago, with no complications reported. Preoperative imaging (CT scan and MRI) showed thymic hyperplasia, imposing a VATS thymectomy.

Serum antibodies against AChR-Ab and anti-MUSK antibodies were negative. Preoperative blood chemistry and thyroid tests were normal. The ECG had a normal sinus rhythm. The patient had no pulmonary or cardiovascular dysfunction, specifically denying dyspnoea or dysphagia, with mild generalized weakness. In the operating room, we started ASA standard care monitoring and an IV cannula was placed. Her blood pressure reading was 105/60 mmHg with a pulse rate of 65 beats per min and oxygen saturation was 98% on room air. 1 mg midazolam was administered. Also, electroencheplogram electrodes were applied for monitoring the bispectral index (BIS).

We decided to conduct a total intravenous anaesthesia (TIVA), with remifentanil and propofol infusions, in order to enhance intubating conditions with reduced doses of rocuronium. After adequate preoxygenation, induction of anaesthesia ensued with a remifentanil perfusion at 0.05 mcg/kg/min, followed by a bolus of 40 mg lidocaine and 100 mg propofol. Maintenance of anaesthesia was ensured with TCI propofol guided by a BIS value between 40-60. Rocuronium administration was titrated with TOF-watch, which was calibrated beforehand. We started with 5 mg bolus, repeated accordingly to the TOF-watch. Intubation was accomplished with a left Robertshaw double-lumen tube (DLT) size 37. A total of 20 mg of rocuronium were necessary for tracheal intubation (0.4 mg/kg) with a target of 1 in TOFR.

After intubation, an arterial line was placed at the left radial artery.

The procedure went uneventful with the patient in left lateral decubitus position and left lung ventilation by DLT. 10 mg bolus of rocuronium were repeated as demanded by acceleromyography monitoring at 2 minute-interval, with a total of 60 mg of rocuronium given. Analgesia was ensured with the continuous remifentanil perfusion plus 1 g of paracetamol, 100 mg of tramadol, 30 mg of cetorolac and 2 gr of metamizole. Total procedure time was of 2 hours and 15 minutes. At the end of surgery, neuromuscular block status was at 35% TOFR. 200 mg sugammadex were given, with complete

reversal of block and a TOFR of 90%. Awake extubation occurred smoothly.

The patient was transferred to the intensive care unit (ICU), hemodynamically stable in sinus rhythm. The final gasometry revealed: pH 7.32, pCO_2 50, pO_2 82, HCO3- 25.8, Sat O_2 98%, Lactate of 0.8. The patient remained in ICU surveillance for 24 hours and was transferred to a standard care unit afterwards. During the postoperative stay, chest physiotherapy was provided. Hospital stay was uneventful.

Discussion

Although MG is a disease with significant anaesthetic complications, there are no universal recommendations for a standardized approach. A thorough evaluation is mandatory to define the disease's extent, with particular relevance to respiratory and cardiovascular systems. In the present case, no respiratory or cardiovascular symptoms were found and other autoimmune diseases were excluded. Specifically, thyroid function testing was done as 15% of MG patients have a concomitant thyroid dysfunction. Regarding the preoperative anticholinesterase treatment, though initially patients were instructed to withhold the morning dose on the surgery day, it is now recognized that treatment with pyridostigmine should be maintained until induction. In our case, the morning dose of pyridostigmine was continued to avoid an exacerbation risk.

Due to MG patients' susceptibility for respiratory compromise, sedative premedication is not routinely recommended. However, the perioperative distress response can also lead to an exacerbation. Bearing this in mind, in our case we decided to administer 1 mg IV midazolam, achieving an anxiolytic state without a deleterious respiratory effect. As already mentioned, there aren't definitive guidelines on anaesthetic management of MG patients. Nevertheless, whenever possible, the use of neuromuscular blocking agents should be avoided, as these patients present increased sensitivity to nondepolarizing agents, leading to postoperative respiratory complications. Thereafter, nondepolarizing agents' dose is usually reduced by one-half to two-thirds. On the other hand, resistance to the depolarizing agent succinylcholine can predispose to phase 2 blocks.

In our case, as the proposed procedure was a VATS-thymectomy, DLT intubation was required. In order to reduce the dose of neuromuscular blocker while achieving optimal intubation conditions, we decided to conduct a TIVA with propofol and remifentanil perfusions, while careful titrating the minimum amount of rocuronium needed for intubation and surgery, according to TOF monitoring. We chose remifentanil due to its short half-life and absence of neuromuscular effects, as well as its ability to facilitate tracheal intubation without muscle relaxants.[2] Although we are aware of the remifentanil's central respiratory depression effect, its context sensitive half-life of 9.5 minutes significantly lowers these risk, with a fast plasmatic elimination. Although there are reports of the use of TIVA or inhaled anaesthetics combined with opioids without neuromuscular agents,[3] we decided to include a neuromuscular blocker in our approach to maximize intubation and surgery conditions, considering our patient's absence of respiratory symptoms and low risk of postoperative exacerbations. Rocuronium was the nondepolarizing agent of choice, given the possibility of complete reversal with sugammadex and avoiding the need of neostigmine, with its potential of cholinergic crisis in a patient already on pyridostigmine treatment.

The rocuronium dose needed for intubation and intra-operatively was guided by TOF watch monitoring, in order to account for our patient's individual sensitivity to nondepolarizing neuromuscular blockers. Intubation was carried out, under optimal conditions, 10 minutes after the first rocuronium dose (5 mg), with a total of 20 mg (0.4 mg/kg) administered. Hemodinamically stability was ensured during DLT intubation with the remifentanil perfusion. After induction, an arterial line was placed on the left radial artery, as invasive blood pressure monitoring is routinely recommended in these patients. Although variability in the recovery of neuromuscular function with sugammadex has been noted by some authors,[4] we noted complete reversal of rocuronium's effects with 200 mg sugammadex and extubation occurred smoothly after recovery of adequate ventilatory function. Recent studies also report the safe use of rocuronium combined with sugammadex, without an increase in respiratory complications or length of stay after thymectomy.[5]

Regarding our analgesic strategy, we used a multimodal analgesic approach, as suboptimal pain management predisposes to a myasthenic crisis. Being aware that thymectomy and general anaesthesia are identified risk factors for postoperative respiratory complications in these patients, the patient was admitted to the ICU for close surveillance.[1] We also re-established the patient's oral medication promptly after recovery and promoted respiratory rehabilitation.

Conclusion

With this case, the authors highlight the need for appropriate evidence-based care of MG patients. MG is a disease requiring adaptive anaesthesia methods, specifically concerning drug interactions with avoidance of neuromuscular blockers. We describe a case where neuromuscular blockers were necessary and safely used in a patient with MG. Review of literature shows lack of specific recommendations. We, therefore, emphasize the need for standardized guidelines on management of patients with MG, to guide practitioners in the perioperative setting.

Acknowledgments

None.

Conflicts of interest

The authors declare no conflicts of interest.

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