Management of Anesthesia in A Patient with Myasthenia Gravis

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Introduction

Myasthenia gravis (MG) is either an autoimmune or congenital neuromuscular disease that leads to fluctuating muscle weakness and fatigue. In the most common cases, muscle weakness is caused by circulating antibodies that block acetylcholine receptors at the postsynaptic neuromuscular junction [1], inhibiting the excitatory effects of the neurotransmitter acetylcholine on nicotinic receptors at neuromuscular junctions. Alternatively, in a much rarer form, muscle weakness is caused by a genetic defect in some portion of the neuromuscular junction [2]. The disease incidence is 3–30 cases per million per year and rising as a result of increased awareness. Medical treatment of MG includes improving neuromuscular transmission by anticholinesterases, suppressing the immune system and reproduction in any medium, provided the original author and source are credited.

Clinical features

The myasthenic patient can be a challenge to anesthesiologists, and the post-surgical risk of respiratory failure has always been a matter of concern. During postoperative period pain, analgesics and residual effects of anaesthetics can adversely affect pulmonary function which is already limited by the MG itself. This makes it important for the anesthesiologist to be aware of possible signs of the disease and to be properly updated on the optimal perioperative anesthesiological management of the myasthenic patient [3].

Case

This report describes the management of anesthesia in a patient with MG undergoing thymectomy.

Summary

Purpose: This report describes the management of anesthesia in a patient with myasthenia gravis, undergoing thymectomy.

Clinical features: The patient was a 22-yr-old female. Thoracic computed tomography revealed a thymoma and a right-side paratracheal lymph node 46x44mm in size. A thymectomy operation was required. Low minimum alveolar concentration sevoflurane anesthesia and infusion of remifentanil was combined with thoracic epidural anesthesia. Without the use of muscle relaxant, the patient was administered tracheal intubation with left-sided double-lumen endotracheal tube for one lung ventilation. The operation was uneventful. At the end of surgery, the patient was easily extubated and transferred to the intensive care unit.

Conclusion: This combination was well tolerated for tracheal intubation and allowed a quick transition to spontaneous breathing and a rapid recovery from anesthesia, good postoperative analgesia and an uneventful recovery.

Purpose:

Case:

The patient was a 22-yr-old female. Thoracic computed tomography revealed a thymoma and a right side paratracheal lymph node 46x44mm in size. A thymectomy operation was required. The patient had an Ossermann and Genkins classification score of II a and was taking 300mg pyridostigmine and 200mg hydroxychloroquine sulphate daily. Preoperative blood chemistry, respiratory and thyroid function tests were normal. Written informed consent was obtained from the patient. We decided use low minimum alveolar concentration (MAC) sevoflurane anesthesia and infusion of remifentanil was combined with thoracic epidural anesthesia (TEA) method for the patient. Preoperatively, 10mL/kg Ringer lactate infusion was started via an iv cannula. A radial artery catheter was placed under local anaesthesia. Electrocardiogram, invasive arterial pressure, pulse oximetry and capnography were continuously monitored. With the patient in a sitting position, epidural puncture was performed from a median approach with a 18G tuohy needle between the 6th and 7th thoracic vertebrae. The epidural space was identified by loss of resistance to air and 12mL of 0.25% bupivacaine (30mg) with 2mL fentanyl (0.1mg) were injected. 4cm of epidural catheter was placed under local anaesthesia. Electrocardiogram, invasive arterial pressure, pulse oximetry and capnography were continuously monitored. With the patient in a sitting position, epidural puncture was performed from a median approach with a 18G tuohy needle between the 6th and 7th thoracic vertebrae. The epidural space was identified by loss of resistance to air and 12mL of 0.25% bupivacaine (30mg) with 2mL fentanyl (0.1mg) were injected. 4cm of catheter was threaded into the epidural space. The sensory level was tested with ether. The preoperative level of the sensory block was between dermatomes T2 and T10. Anaesthesia was induced after preoxygenation with 1kg/kg bolus remifentanil, 1.5mg/kg lidocaine, and 2mg/kg bolus propofol and tracheal intubation was applied with a left-sided double-lumen endotracheal tube for one lung ventilation. After the tracheal intubation remifentanil was infused from 0.1μg/kg/min dosage. The patient was ventilated with a 50 % mixture of oxygen and air to maintain end-tidal CO₂ between 30 and 35mmHg. It was administered as low MAC (0.8-1.0) sevoflurane. Left lung ventilation was applied during surgery via the left side double-lumen endotracheal tube. The patient was hemodynamically stable during intubation and the surgical procedure. In the second hour of the surgical procedure, the patient received 0.25% 8mL bupivacaine via the epidural catheter. A continuous epidural infusion and 4mL bolus (limited to 20 minute) of the epidural anesthesia solution (fentanyl...
citrate 0.03mg/ml and bupivacaine 0.5mg/ml) was administered through the epidural catheter for postoperative pain management. At the end of surgery, the patient was easily extubated and was transferred to the intensive care unit (ICU). In the ICU, the patient was hemodynamically stable without any subjective or objective impairment of respiratory function. The patient was discharged from the ICU 24 hrs after surgery.

Discussion

The resultant respiratory and cardiovascular implications are a primary cause of mortality; therefore, a complete and comprehensive understanding of this disorder is vital for the anesthesia provider [6].

The use of muscle relaxants in patients with MG has been a controversial topic. Therefore, the anesthetization of patients with MG requires special attention, particularly in respect of the use of muscle relaxants. Current general anesthesia requires volatile anesthetic agents and sometimes muscle relaxants for tracheal intubation and anesthetic maintenance. Patients with MG are usually sensitive to the effects of non-depolarizing muscle relaxants, and volatile anesthetic agents accelerate their effect. Furthermore, the potential interaction of anticholinesterases (administered as therapeutic agents for MG) with both the depolarizing and non-depolarizing muscle relaxants is also a problem. The respiratory insufficiency introduced by such agents and the complications due to endotracheal tube placement can continue postoperatively and may require reintubation or prolonged intubation [7-9].

It is difficult to determine the optimal amount of muscle relaxants required in a patient with MG. Hence, there is an increasing trend of using non-muscle relaxant techniques in such patients who undergo surgery [7-9].

Various anesthesia procedures have been reported for patients with MG, such as the use of combination propofol and fentanyl, sevoflurane and fentanyl, propofol and sufentanil or propofol and remifentanil without muscle relaxants in the literature. Some studies have also reported the use of TEA in combination with techniques of general anesthesia [9-13].

TEA suppresses hormonal and metabolic stress response to pain, allowing stable hemodynamics during surgery and good postoperative analgesia without compromising pulmonary function [13].

Responses to endotracheal intubation arise essentially due to sympathetic stimulation causing increases in blood pressure, increases in heart rate and tachyarrhythmia [14]. Opioid narcotics were shown to provide hemodynamic stability and suppress most reactions to surgical trauma. Remifentanil has an extremely short context-sensitive half time which allows it to be administered in very high doses during particularly stressful intraoperative phases without prolonging recovery time.

In this case, a combination was used of low MAC sevoflurane anesthesia and an infusion of remifentanil with thoracal epidural anesthesia. Muscle relaxants were not used and hemodynamic responses to intubation were controlled effectively. The elimination of remifentanil is fast so that is possible to rapidly reduce its concentration in the plasma by changing the speed of infusion. The infusion of remifentanil and TEA allowed for the adjustment of the depth of analgesia during the operation. Effective analgesia for surgery was achieved in this patient with the use of TEA, but the low MAC sevoflurane anesthesia and infusion of remifentanil were needed for the patient to be able to tolerate the tracheal tube allowing adequate one lung mechanical ventilation without the use of muscle relaxants.

Clinicians are well aware of the risk of postoperative respiratory failure that may result from stress-induced exacerbation of MG (myasthenic crisis), an overdose of anticholinesterases (cholinergic crisis), the residual effects of myorelaxants or other adverse drug interactions (with antibiotics or antiarrhythmics). Therefore, routine postoperative ventilatory support and planned extubation in the ICU have been recommended for high-risk patients [15].

In conclusion, this combination avoided the use of muscle relaxants or high MAC volatile agents was well tolerated for tracheal intubation and allowed a quick transition to spontaneous breathing and a rapid recovery from anesthesia, good postoperative analgesia and an uneventful recovery.

References


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Page 2 of 2