MYASTHENIA GRAVIS AND SEVOFLURANE

- A Case Report -

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Summary

Myasthenia gravis is characterized by weakness and easy fatiguability of voluntary muscles. Myasthenic patients are sensitive to non-depolarizing relaxants. Sevoflurane, as an alternative, can be used to achieve good tracheal intubation. In this report, we present our experiences.

Key Words: Myasthenia gravis, Tracheal Intubation.

Introduction

Myasthenia gravis is a disorder that causes curare-like effect on neuromuscular junction by autoimmune antibodies against the acetylcholine receptors of the neuromuscular synapse. It is characterized by weakness and easy fatiguability of voluntary muscles[1,2].

The treatment of this disease consists of anticholinesterases, plasmapheresis, immunosupressive drugs and thymectomy[2]. Even though nearly 96% of patients benefit from thymectomy, the reported need for postoperative ventilation following trans-sternal thymectomy ranged from 10% to 50%.

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Myasthenic patients are sensitive to nondepolarizing relaxants. It is suggested therefore that muscle relaxants and sedatives are best avoided in myasthenics undergoing thymectomy. Volatile anesthesia may also be associated with a slow recovery and postoperative respiratory depression[3-5].

Although sevoflurane is not the "ideal" volatile anesthetic, its low blood:gas solubility in combination with minimal airway irritation allows for smooth and rapid induction and recovery of anesthesia[6]. Reports indicate that sevoflurane can be used to achieve good tracheal intubating conditions, without using neuromuscular blocking agents for either the myasthenics or the nonmyasthenics[7,8].

In this report, we present our experience with a woman diagnosed as myasthenia gravis with thymoma. Sevoflurane was used as a sole anesthetic agent for induction and maintanence of anesthesia.

Case Report

A 31 year old 50 kg female patient was admitted because of diplopia, ptosis, muscle weakness, difficulty in speech, difficulty in swallowing, dyspnea and dysphagia of six months duration. Myasthenia gravis was diagnosed clinically and confirmed by electromyography and elevated anticholinesterase antibody. Chest computed tomography scan showed thymic enlargement.

According to the classification as defined by Osserman and Genkins, the patient was graded as II B (generalized moderate weakness and bulbar dysfunction). She was treated with 60 mg pyridostigmine (orally three times a day). Because of lack of response, the total dose of pyridostigmine was increased to 300 mg and she was schecluded for elective trans-sternal thymectomy.

In preparation for surgery, two sessions of plasmapheresis were undertaken and therapy with pyridostigmine was continued.

On the day of surgery, no premedication was given. Routine monitoring electrocardiogram, automatic blood pressure, capnograph

and pulse oximeter) were applied, and an iv access appropriate for the nature of the surgery, was established. Patient breathed oxygen for 3 min (fresh gas flow 4 L/min) from a face mask connected to a semiclosed breathing circuit. During this period baseline data were recorded. Immediatly before anesthesia was induced, the face mask was removed. The fresh gas flow of the anesthesia machine was adjusted 4 L/min (N_2O/O_2 70%) and the sevoflurane vaporizer was set beyond the 8% setting to provide maximum sevoflurane delivery. The reservoir bag was evacuated and allowed to refill. The patient was told during the 30-sec period of circuit priming that the anesthetic has a definite odor but would not be unpleasent to breath. The face mask was placed over the nose and mouth after a forced exhalation, and the patient took three maximum breaths, as previously instructed. At the loss of eye-lash reflex, an oral airway was placed and the lungs were manually hyperventilated (end tidal CO_2 25-30 mmHg) with the sevoflurane gas mixture. Pulse oximetry, inspired oxygen, inspired and expired carbon dioxide, nitrous oxide and sevoflurane concentrations, were continously monitored. Gases were sampled from the elbow between the face mask and the Y tubing. Every 30 sec following the loss of eyelash reflex (which occurred at 40^{th} sec), both pupils were examined for position and size. Four min after the first breath of sevoflurane, face mask and oral airway were removed, laryngoscopy was applied and a size 7 endotracheal tube was inserted. No breath holding, expiratory stridor, laryngospasm or secretions were observed. After TOF (train of four) value diminished from 94 to 80, intubation was performed. No difficulties were encountered in the ability to open the jaw nor to response of laryngoscopy (coughing, bucking). Vocal cords were in midposition. Following intubation, anesthesia was continued with 70% N_2O/O_2 and 2-2.5% sevoflurane inhalation. End tidal CO_2 was held between 25 and 35 mmHg. The intraoperative period was uneventful.

Ten min. after the stopping anesthetics, patient was able to open her eyes, and breath spontaneously, TOF value was increased to preinhalation value (94). At SpO_2 99% she was extubated. She responded to verbal commands at 4^{th} min. after extubation.

Discussion

Administration of muscle relaxants in myasthenic patients remains controversial because of unpredictable responses[9]. They are sensitive to nondepolarizing relaxants. Intermediate-acting nondepolarizing relaxants, however, such as atracurium and vecuronium which are eliminated rapidly, can be titrated to achieve the required neuromuscular block that can be completely reversed at the end of surgery. Many such patients are sensitive to nondepolarizing muscle relaxants, even a defasciculating dose can result in nearly complete paralysis in some patients[10].

Although various anesthetic approaches have been reported in myasthenic patients, clinicians are well aware of the risk of postoperative respiratory failure[11]. Baraka[10] has described the use of deep inhalation anesthesia technique either for tracheal intubation or for the anesthetic maintenance of myasthenics.

Until the past decade, halothane and isoflurane have been preferred for myasthenics. But the pungent smell of isoflurane is not easly accepted by most patients. Marked respiratory depression leading to prolonged recovery, potentiation of arrhythmias and hepatotoxicity of halothane are the main disadvantages of these drugs[12].

Current volatile anesthetics all potentiate the effects of muscle relaxants. The newest volatile anesthetics, sevoflurane, can be more effective on neuromuscular relaxation[13]. When 66% nitrous oxide was combined with 7% sevoflurane, good tracheal intubating conditions could be achieved without the use of neuromuscular blocking drugs or adjuvants on healty patients[7].

One study reports that, in the absence of muscle relaxants, a 7 min. administration of 4% sevoflurane attaining 1 MAC sevoflurane anesthesia, produced a marked depression of the TOF values in the majority of myasthenic patients[14]. In the 7^{th} min. of the sevoflurane administration TOF value was diminish from 93.6 to 75.8. In our patient, however, inhalation of 8% sevoflurane and 70% N_2O/O_2 was achieved. Her TOF value at preinhalation period was 94 which it diminished to 90 and 80 at 2 min. and 4min. respectively. When endotracheal tube

condition was acceptable as described previously, our patient was intubated at 4th min. of the beginning of the inhalation without any complications[7].

Although chronic anticholinesterase therapy can be associated with increase in salivary and bronchial secretion, laryngoscopy and intubation were not associated with increased airway secretions, coughing, or laryngospasm in our patient.

It is recommened that sevoflurane can be used as a highly suitable induction and maintanence agent for myasthenic patients.

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