Anesthetic Management in A Patient with Myasthenia Gravis Posted for Thymectomy

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Abstract :

Myasthenia gravis is an autoimmune disease which causes disorder in transmission at the neuromuscular junction. In patients with myasthenia gravis undergoing surgical procedures administration of general anaesthesia becomes challenging. Overall safe general anaesthesia can be achieved through adequate preoperative assessment and optimization; vigilant intraoperative monitoring of neuromuscular transmission along with adequate dose titrations and by Train of four responses (TOF) guided administration of non depolarising muscle relaxants.

Keywords : Myasthenia Gravis, Neuromuscular monitoring, Thymectomy

Introduction:

Myasthenia gravis (MG) is an autoimmune disorder resulting from production of auto antibodies against acetylcholine receptors in the postsynaptic membrane of the neuromuscular junction; it is characterized by fatigable weakness of skeletal muscles. Thymus plays a central role in autoimmune MG, it is involved in the autosensitisation process as it's abnormalities such as thymoma are associated with abnormal production of antibodies associated with MG. Removal of as much thymic tissue is the goal in the treatment of Myasthenia Gravis. General anesthesia is challenging in MG patients as these patients are resistant to succinylcholine, a depolarizing NMB and unpredictably sensitive to nondepolarizing NMBAs.

Case report:

A 44 year old female, 77 kg weight, 160cm height with an ASA physical status 3, known case of myasthenia gravis for last 2 years, diagnosed with thymoma of 30mmx13mmx26mm size in anterior mediastinum and scheduled for thymectomy. Patient presented with generalized weakness in all four limbs, bilateral ptosis, and mild dysphagia with on regular medication with tab pyridostigmine 60mg twice a day.

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Pre-operative workup:

Preoperatively, BP- 146/78 mm Hg, Pulse-71 beats/min, RR-16 breaths/min, oral temperature was 37.1°C, and SPO_2 98% on room air. The patient denied any generalized pain or discomfort. The review of systems revealed a normal pulmonary function tests and cardiovascular status and mild generalized weakness that the patient expressed was her baseline. The neck movement was slightly limited because of mild pain on extension and flexion. A Mallampati score of 3 was assigned along with a thyromental distance >7 cm. The sternomental distance was >12 cm, and dentition was normal. The patient denied any shortness of breath, chest pain. The CBC and chemistry laboratory values were within normal limits. Acetylcholine esterase antibody titre was >8. The chest radiograph was clear, and the ECG & 2D ECHO were normal. Patient was asked to omit morning dose of pyridostigmine.

Pre-medication:

In the OT, all multipara monitors, electrodes of TOF and BIS were attached. Two peripheral large bore intravenous cannulae were inserted and patient was given injection Ranitidine 50mg, Injection ondansetron

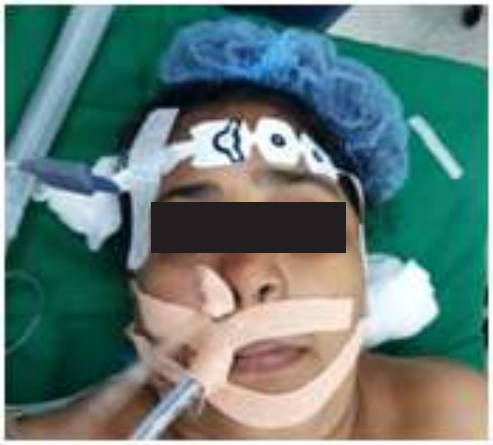
4mg IV, injection glycopyrrolate 0.2mg, injection midazolam 1mg,injection fentanyl 50 mcg.

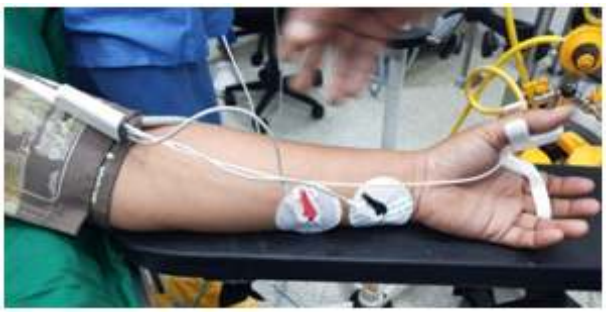
Induction:

Patient was pre oxygenated with 100% oxygen for 3 minutes. Injection propofol 2mg/kg, injection atracurium 8mg(0.1mg/kg), given and intubation done with ET 7.5.

Maintainance:

Oxygen, Air, sevoflurane with minimum alveolar concentration (MAC) 1.7, intermittent boluses of fentanyl & TOF guided titrated dose of atracurium (0.02-0.04mg/kg) given throughout surgery. Spo2, NIBP, Pulse, $EtCO_2$ and urine output were monitored throughout the surgery.





Extubation:

Ten minutes after stopping anesthetics, patient was able to open her eyes & breath spontaneously and generating adequate tidal volume, TOF machine showing the 4/4 ratio. To prevent post operative myasthenic crisis patient shifted to ICU intubated and kept on 6 lit O_2 on T-piece & on next day after normal ABGA report Patient was extubated.

Discussion:

Myasthenia gravis is believed to be the most common progressive autoimmune disorder involving the postsynaptic junction. Patients with MG tend to have some abnormality of their thymus gland, which may include thymic hyperplasia or a thymoma. [1]

Respiratory function should be evaluated by obtaining forced vital capacity (FVC) measurements before surgery to assess the need for postoperative mechanical ventilation. A poor FVC is a strong indicator of the need for postoperative ventilation. The presented patient lacked apparent signs and symptoms of active pulmonary compromise at the time of evaluation & obtained normal values of FVC performed preoperatively as per an internal medicine consult.[1,2]

Patients with MG have a higher incidence of heart disease because the antibodies have a high affinity for B1 and B2 adrenergic receptors. Consequently, a thorough and complete cardiovascular assessment is crucial in the preoperative phases. In this case patient had normal finding and otherwise stable hemodynamics. [1] Patients treated with anti-cholinesterase agents should hold this dose the morning of the surgery to avoid interactions with neuromuscular blocking agents. In the presented case, the morning dose of pyridostigmine was held pre-emptively. [1, 5] Patients with MG are extra sensitive to the effects of nondepolarizing agents and are resistant to the effects of depolarizing agents. When succinylcholine is used, MG patients are at a higher risk of developing phase 2 blocks, especially with repeated doses.[3]

When nondepolarizing agents are used, the onset is shorter and duration is longer. It has been suggested

that because of the unique metabolism of atracurium, it is the neuromuscular agent of choice. With an initial dose of 0.1mg/kg that is approximately one fifth of normally used and incremental doses of 0.02-0.04mg/kg, satisfactory conditions were achieved. Neuro muscular function was monitored throughout the train of four mechanical twitch response. In reduced dosage and with careful neuromuscular monitoring atracurium is safe to use in myasthenic patient.[3] Because volatile anesthetics enhance the effects of nondepolarizing agents, it is important to be aware of their impact on patients with MG. Sevoflurane was shown to potentiate the effects of nondepolarizing agents to the greatest degree of all the volatile anesthetics in patients with MG.[1,2]

Overall, the IV agents appear to be relatively uneventful. Opioids appear to be safe but may have an effect of central nervous system depression that in high doses so we used titrated dose of fentanyl.[4] Adequate pre operative assessment and optimization, vigilant monitoring during surgical procedure along with titrated dose of propofol, fentanyl,sevoflurane and TOF guided atracurium provide smooth induction, stable hemodynamic course, rapid emergence & early extubation in patients with myasthenia gravis undergoing surgical procedures.[4,5]

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