

ABSTRACT

In Myasthenia Gravis (MG), 65–70% of patients exhibit thymic hyperplasia and 10–15% develop thymomas, making thymectomy a common intervention. Acetylcholinesterase (AChE) inhibitors should not be withheld on the morning of surgery, whereas opioids, benzodiazepines, calcium channel blockers, aminoglycosides, and preoperative sedation should be minimized to reduce postoperative ventilation risk.¹ Preoperative evaluation should include airway assessment, pulmonary function testing, and muscle strength examination to assess reintubation risk. Due to MG patients’ sensitivity to neuromuscular blockers, a 50% dose reduction of rocuronium or vecuronium is recommended.³ Although Sugammadex is commonly used, reversal may be inadequate and require neostigmine with glycopyrrolate. Such failures likely reflect intraoperative exacerbation of MG rather than drug inefficacy.² Intraoperative neuromuscular monitoring with Train-Of-Four (TOF) and consideration of an arterial line for close hemodynamic and gas monitoring are advised. Ultimately, individualized preoperative planning and vigilant intraoperative management are essential to minimize neuromuscular complications in MG.

Medication	Role	Perioperative Plan
Pyridostigmine	AChE inhibitor	Continued morning of surgery
Prednisone	Steroid	Continued; stress dose used if needed
Xarelto	Anticoagulant	Held pre-op, restarted post-op
Rocuronium	Neuromuscular blocking agent (NMBA)	Used 50% dose
Sugammadex	Reversal agent	Used successfully

Table 1. Medications, Their Role, and Their Use in This Case.

BACKGROUND

Myasthenia Gravis (MG) is an autoimmune disorder characterized by autoantibodies targeting acetylcholine receptors at the postsynaptic membrane of the neuromuscular junction, making anesthetic management of these patients difficult.¹ This population has a hypersensitivity to NMBAs and a higher risk of respiratory failure. Due to this increased vulnerability, extensive preoperative preparation and neuromuscular monitoring are essential to mitigate complications.³

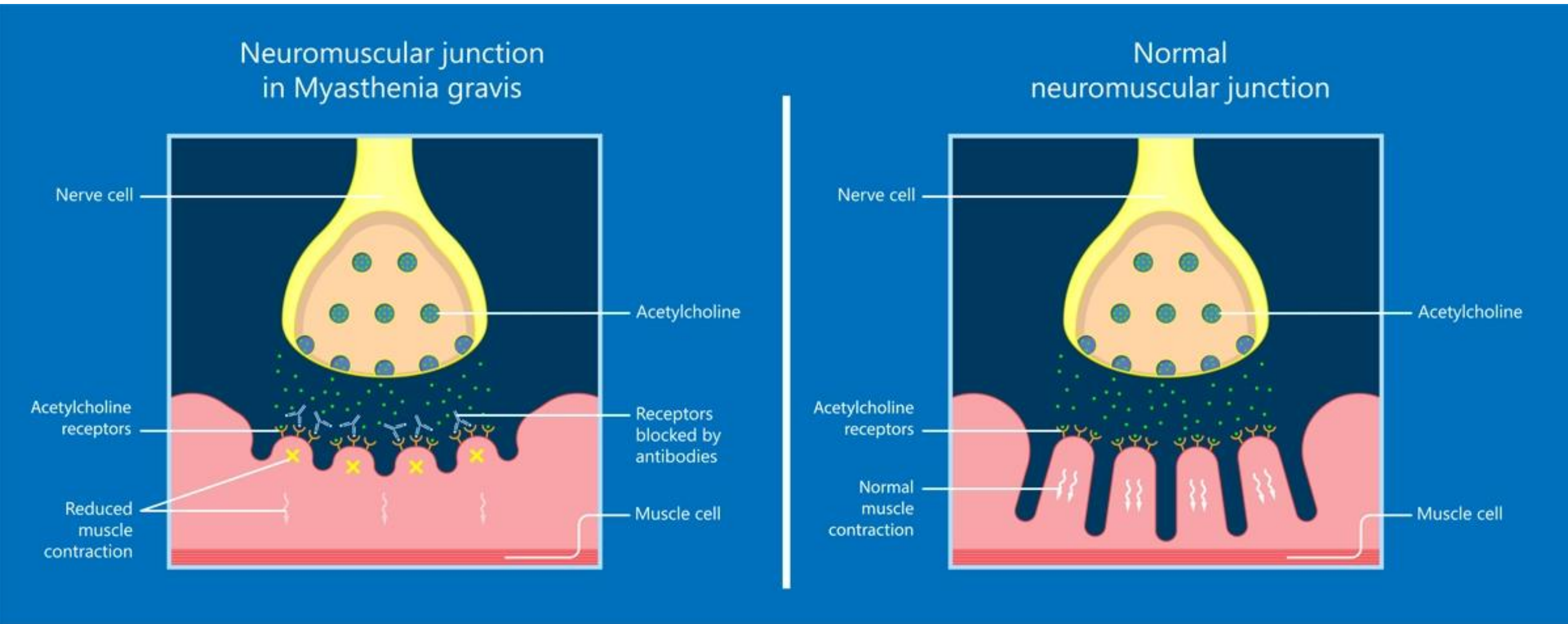


Figure 1. MG Pathophysiology at a Cellular Level.

OBJECTIVES

- Summarize key anesthetic management principles for MG patients undergoing thymectomy
- Identify medications and perioperative factors that increase the risk of postoperative respiratory compromise
- Outline evidence-based strategies for neuromuscular blockade and reversal to minimize intraoperative and postoperative complications

CASE

A 25-year-old female with MG diagnosed in 2022 underwent robotic thymectomy. Her past medical history included subarachnoid hemorrhage, Factor V Leiden deficiency, acute cerebral venous sinus thrombosis, focal seizures, and migraines. Her medications included pyridostigmine 60 mg three times daily, prednisone 2.5 mg daily, and Xarelto 20 mg daily. Physical exam was unremarkable with no signs of respiratory distress or deoxygenation. Intraoperatively, she received general anesthesia with a double lumen tube and standard monitoring. Induction included propofol and fentanyl with rocuronium. Anesthesia was maintained with sevoflurane, and she was re-relaxed based on TOF monitoring. The patient was reversed with Sugammadex and extubated without issue.

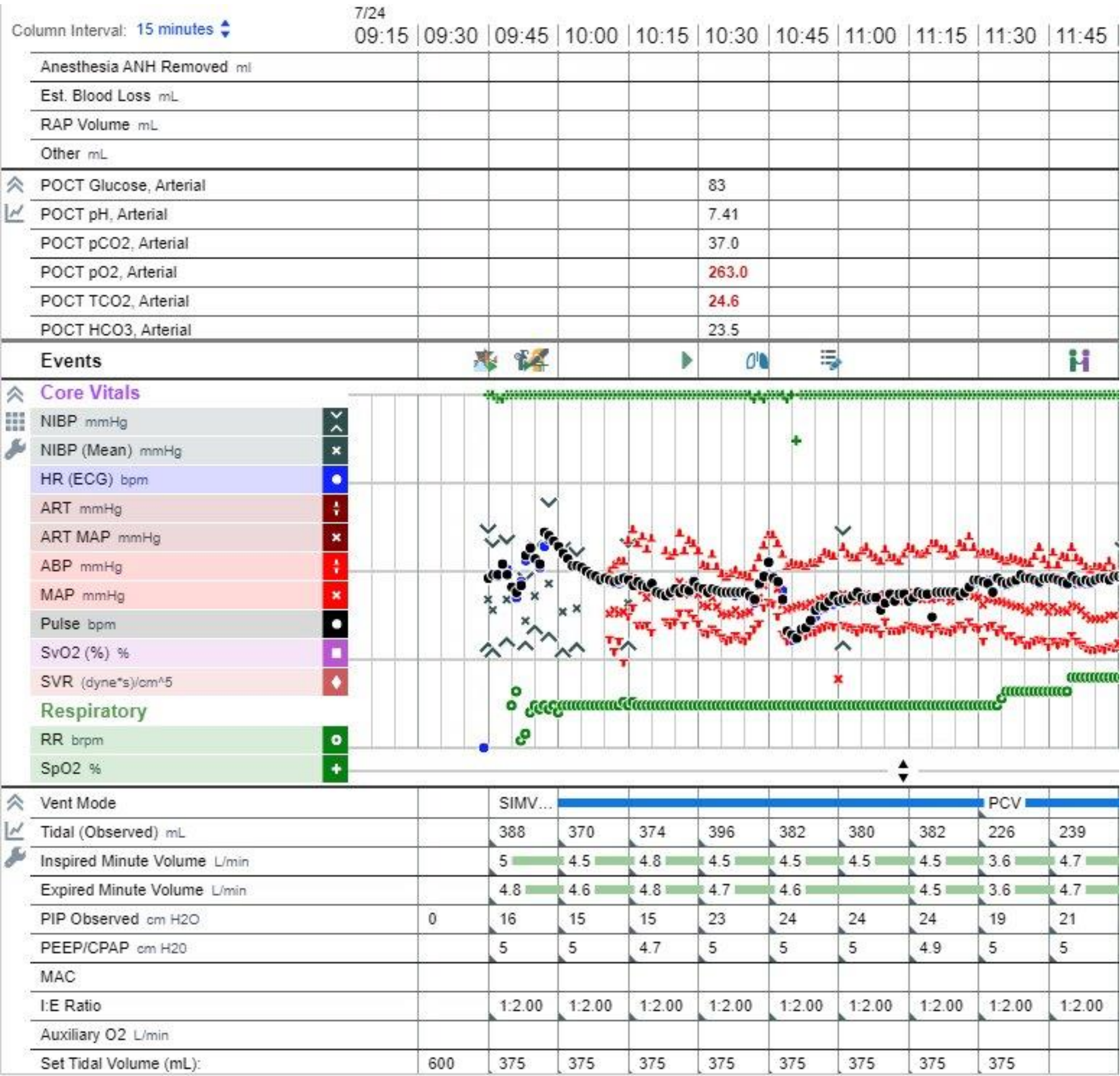


Figure 2. Intraoperative Anesthesia Record Showing Vital Signs, Ventilator Parameters, and Arterial Blood Gas Trends

DISCUSSION

This case highlights the anesthetic challenges of MG during thymectomy. Continued pyridostigmine, reduced-dose rocuronium, and TOF enabled safe extubation are considerations to help mitigate negative outcomes.¹ The efficacy of neostigmine is dampened in MG patients due to the fundamental decrease in acetylcholine receptors, making Sugammadex the more favorable option due to its direct interaction with NMBAs.⁴ While Sugammadex is commonly used, incomplete reversal may occur, leading to a myasthenic crisis which would precipitate profound bulbar and diaphragmatic muscle weakness. This would lead to airway compromise and the need for urgent ventilatory support.² Individualized planning, multidisciplinary coordination, and vigilant monitoring remain key to minimizing perioperative complications in MG.

Preop: Ensure disease stability and surgery early in day; assess bulbar and respiratory symptoms; continue AChEs until surgery

Induction and Maintenance: Potent inhaled anesthetics are often used without need for NMBAs; IV anesthetics such as propofol also often used; IV lidocaine, low dose short-acting opioids, and esmolol can be given with induction

NMBAs: Should be used with caution; often not necessary, but if needed, lowest dose possible of rocuronium and vecuronium are recommended

Reversal: Sugammadex recommended for neuromuscular blockage reversal rather than neostigmine

Figure 3. Recommended Surgical Considerations and Management of MG patients .⁴

FUTURE DIRECTION

Future work should focus on establishing standardized anesthetic guidelines for Myasthenia Gravis, particularly regarding neuromuscular blockade and reversal management. Comparative studies between Sugammadex and neostigmine could help define optimal reversal strategies and identify predictors of incomplete recovery. Additionally, development of perioperative risk assessment tools and multicenter outcome registries would improve preoperative planning and patient safety. Enhanced collaboration between anesthesiology and neurology teams may further refine individualized care pathways and reduce postoperative respiratory complications in MG patients.

REFERENCES/ACKNOWLEDGMENTS

- Dillon FX. Anesthesia issues in the perioperative management of myasthenia gravis. Semin Neurol. 2004 Mar;24(1):83-94. doi: 10.1055/s-2004-829587. PMID: 15229795.
- Fernandes HDS, Ximenes JLS, Nunes DI, Ashmawi HA, Vieira JE. Failure of reversion of neuromuscular block with sugammadex in patient with myasthenia gravis: case report and brief review of literature. BMC Anesthesiol. 2019 Aug 17;19(1):160. doi: 10.1186/s12871-019-0829-0. PMID: 31421671; PMCID: PMC6698336.
- Blichfeldt-Lauridsen L, Hansen BD. Anesthesia and myasthenia gravis. Acta Anaesthesiol Scand. 2012 Jan;56(1):17-22. doi: 10.1111/j.1399-6576.2011.02558.x. Epub 2011 Oct 19. PMID: 22091897.
- Kveraga, R., & Schaefer, M. (2025, March 5). Anesthesia for the patient with myasthenia gravis or Lambert–Eaton myasthenic syndrome. UpToDate.