Myasthenia Gravis and Eaton-Lambert Syndrome

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Famous People with Myasthenia Gravis

Ari Onassis
Prominent Greek Shipping Magnate
Married Jackie Kennedy in 1968

David Niven
British Actor and Novelist
Academy Award for Best Actor

Sir Lawrence Olivier
English Actor, Director, and Producer
Academy Award for Best Actor

Phil Silvers
American Entertainer and Comedy Actor
Sergeant Bilko on “The Phil Silvers Show”
Famous People with Myasthenia Gravis

“Sleepy” Dwarf was supposedly inspired by one of Walt Disney’s friends who had myasthenia gravis.
Clinical Presentation of MG

- Generalized fatigue
- Weakness of striated muscles that **worsens** with use and **improves** with rest
- Classification of myasthenia
  - Class I  Ocular muscle weakness
  - Class II  Mild nonocular muscle weakness
  - Class III  Moderate nonocular muscle weakness
  - Class IV  Severe nonocular muscle weakness
  - Class V  Intubation or tracheostomy for airway protection +/- mechanical ventilation
Pathophysiology

- Autoimmune disease of the neuromuscular junction
- Antibodies to the acetylcholine receptor reduce the number of functional receptors
Association with Other Diseases

- Thymic hyperplasia
- Thymoma
- Other autoimmune diseases
  - Hyperthyroidism
  - Diabetes mellitus
  - Rheumatoid arthritis
  - Collagen vascular diseases
- Malignancy
Diagnosis of MG

- Characteristic pattern of progressive fatigue that improves with rest
- EMG testing
  - Repetitive stimulation of muscle groups with “fade”
- Pharmacologic testing
  - Curare IV into extremity isolated by tourniquet
    - Positive response is 10% decrement in EMG from baseline
  - Edrophonium (“Tensilon”) test 2-10mg IV
    - Transient improvement in strength
Therapy for MG

- Immunosuppressive agents
  - Not usually first line therapy
- Anticholinesterase therapy
  - Reversible inhibition of AChE
- IV immunoglobulin
- Plasmapheresis
- Thymectomy
Anesthetic Concerns with MG

- Degree of pulmonary impairment
- Magnitude of bulbar involvement
  - **Aspiration risk**
- Adrenal suppression from long-term steroids
- Associated cardiac disease
  - Arrhythmias
  - CHF
- Effects of anesthetic agents (more later!)
- Postoperative pain control
Effects of Anesthetics on MG

- Neuromuscular relaxants
  - Resistance to succinylcholine (requires 2-3x normal dose with possible prolonged duration of activity)
  - Extremely sensitive to the effects of NDMRs (often requiring one-tenth the normal dose)
- Volatile agents – Can cause profound muscle relaxation in patients with MG
- IV agents
  - Sensitive to respiratory effects of IV drugs
  - No effect with propofol or thiopental
- Regional anesthetics
  - Careful dosage so as not to affect accessory respiratory muscles
  - Avoid ester-type locals (pseudochoolinesterase depleted from anticholinesterase therapy)
Predicting the Likelihood of Postoperative Ventilation

- Leventhal et al.
  - Duration of disease > 6 years
  - History of chronic respiratory disease
  - Pyridostigmine dose > 750mg/day
  - Preoperative vital capacity < 2.9 L

- Eisenkraft et al.
  - Advanced generalized disease
  - History of MG-related respiratory failure
  - Associated steroid therapy
Post-Anesthetic Concerns with MG

• Assessing whether the patient has adequate respiratory function
  – Make sure patient is appropriately reversed
  – Use extubation criteria (5 second head-lift, vital capacity of 15 mL/kg, NIF of 25 cm H₂O, etc.)
  – Beware of patients with extensive bulbar involvement

• Disposition
  – 3 hours of clinical stability should be observed in the PACU before discharge to routine surgical floor
  – Otherwise, patient should be sent to the ICU
Myasthenic vs. Cholinergic Crisis

- **Myasthenic crisis**: Acute respiratory insufficiency and weakness precipitated by infection, exertion, menstruation, or stress. Pupils tend to be mydriatic.

- **Cholinergic crisis**: Efforts to increase nicotinic receptor stimulation overstimulate muscarinic receptors, causing weakness, SLUDGE syndrome, and miosis.
Myasthenic vs. Cholinergic Crisis

- Differentiation between the two
  - Review of historical information
  - Search for SLUDGE symptoms
  - Examination of the pupils
- Edrophonium given cautiously in 1mg IV doses will improve myasthenic crisis but NOT cholinergic crisis.
- In either case, protect the airway and ensure the patient is being adequately ventilated
Eaton-Lambert Syndrome

- Antibody-mediated destruction of *presynaptic* voltage-gated calcium channels causing deficient release of acetylcholine at the NMJ
- Associated with carcinoma of the lung, especially oat cell carcinoma of the bronchus
- Confused with MG, but…
  - NOT reversed by anticholinesterases or steroids
  - Weakness *IMPROVES* with exercise
  - Sensitive to *BOTH* depolarizing and nondepolarizing NMBs
A 58-year-old woman diagnosed with myasthenia gravis underwent laparotomy. Her anesthesia consisted of thiopental, nitrous oxide, fentanyl, and oxygen, with pancuronium as a muscle relaxant. During the procedure, she received an IV dose of gentamicin and remained apneic at the end of the procedure. The cause of the apnea could be ascribed to all of the following EXCEPT:

A. Thiopental
B. Myasthenia gravis
C. Pancuronium
D. Fentanyl
E. Gentamicin
Question 2

The patient with myasthenia gravis:

A. Has normal reactions to muscle relaxants
B. Reacts abnormally to relaxants only when the condition is not well controlled
C. Has decreased sensitivity to nondepolarizing muscle relaxants
D. Has an increased sensitivity to nondepolarizing muscle relaxants
E. Has an increased sensitivity to depolarizing muscle relaxants
Question 3

The myasthenia gravis patient:

A. Has weakness of the muscles innervated by cranial nerves
B. Usually has diaphragmatic weakness
C. Is very sensitive to nondepolarizing agents
D. Has focal sensory deficits
E. More than one of these