

# Myasthenia Gravis (MG)

Extended Version

**Classic case:** 6 yr female, spayed German Shepherd, **exercise intolerance** and **regurgitation**

## Presentation:

### Signalment

- Congenital – autosomal recessive (RARE)
  - **Jack Russell Terrier**, Springer Spaniel, **Smooth Fox Terrier**, **Smooth-haired Miniature Dachshund**
  - Brahman cattle
- Acquired – **most common form of MG seen**
  - Mostly **young** and **middle-aged** dogs
    - **Bimodal age of onset**, peaking at 3 and 10 yrs
  - Many breed at risk, but **German Shepherds**, **Golden Retrievers**, Labrador Retrievers, and mixed breeds get acquired MG most often
  - Akita, German Short-haired Pointers, Chihuahua also at high risk
  - Newfoundlands, Great Danes can have inherited predisposition
  - **Abyssinian** & Somali most commonly affected cat breeds



German Shepherd.  
Photo courtesy of Pohjakroon

### Clinical signs – 3 syndromes

1. **Focal MG** – any of the following
  - **Megaesophagus** – regurgitation
  - Decreased swallowing reflex
  - **Facial muscle weakness**
  - **Laryngeal paralysis**
  - Very rare in cats
2. **Generalized MG**
  - Acute onset of exercise intolerance
  - Para or tetraparesis after exertion
  - Some degree of recovery after period of rest
  - During an exercise test:
    - The limbs start to tremble
    - Muscles become stiff
    - Short-strided
    - **Normal proprioception and reflexes**
  - **Megaesophagus** in the majority of dogs – regurgitation
  - **Cats** usually have **neck ventroflexion**, decreased palpebral reflex

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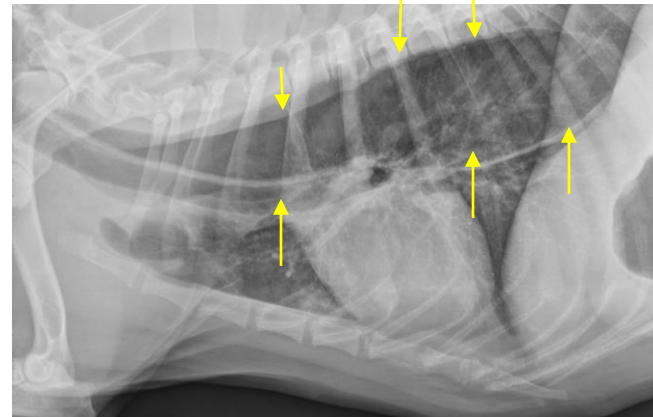
## Presentation: (continued)

### Clinical signs – 3 syndromes

#### 3. Myasthenic crisis, fulminating myasthenia gravis

- Acute para- or tetraparesis
- Megaesophagus is almost always present
- Rapid progression
- Respiratory distress
- Occurs rarely in the cat

**DDX:** Hypokalemia, OPP toxicity, polyradiculoneuritis, botulism, tick paralysis, polymyositis, hypothyroidism, methimazole therapy in cats



Lateral radiograph, megaesophagus in a dog.  
Image courtesy of Dr. Terri Defrancesco

## Test(s) of choice:

- **Tensilon® (edrophonium) test**
  - Ultra-short-acting **acetylcholinesterase inhibitor** – prolongs availability of acetylcholine
  - Quick and practical
  - Improvement of gait disturbances w/in 1 minute and lasts 2-3 minutes in most, but **not all cases**
  - Risk of cholinergic crisis – rare, but be prepared
    - Respiratory disturbances, ptialism, vomiting, miosis, tachycardia, hypotension, muscle spasms, weakness
    - Treat with atropine
  - False positive responses can occur in other myopathies or neuropathies
- **Acetylcholine receptor antibodies** – **Gold Standard**
  - **Acquired form only**
  - Titer can be negative early in disease or if treated concurrently with corticosteroids
- **Thoracic radiography**
  - ± Megaesophagus, ± aspiration pneumonia
  - ± Thymoma
- **Muscle biopsy**
  - Congenital form - Shows decreased acetylcholine receptors
  - Acquired form - Shows immune complexes at the neuromuscular junctions
- **Minimum data base**
  - CBC, biochemistry panel, urinalysis, T<sub>4</sub>
  - To rule out other causes of weakness and/or concurrent problems
- **Repetitive nerve stimulation**
  - Requires anesthesia and expensive electrodiagnostic equipment
  - Decremental response of compound muscle action potential

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## Rx of choice:

- **Cholinesterase inhibitors**
  - Inhibits the breakdown of **acetylcholine**
  - Dosage must be titrated to individual animal – start low
    - symptoms of overdose may mimic myasthenia!
    - Hypersalivation, vomiting, diarrhea, miosis, bradycardia, weakness
  - Pyridostigmine bromide (**Mestinon®**) – oral
  - Neostigmine – parenteral
- **Immunosuppression**
  - Use with caution – avoid if aspiration pneumonia present
  - Glucocorticoids – can exacerbate muscular weakness.
  - **Mycophenolate**
  - Azothioprine, cyclophosphamide, cyclosporine
- **Aspiration pneumonia**
  - Nebulization, coupage,
  - Antibiotics - Avoid those causing neuromuscular blockade (ampicillin, aminoglycosides)
- **Megaesophagus**
  - Improved esophageal motility – metoclopramide or cisapride
  - Elevated feedings
  - Gastrotomy tube
  - Cimetidine or ranitidine to increase pH of gastric contents and prevent esophagitis

## Prognosis:

- Spontaneous resolution can occur, but **very rare**

### Congenital MG

- **Poor** prognosis,  
**EXCEPT** Smooth-haired Miniature Dachshunds which have spontaneous resolution by 6 months of age

### Acquired MG

- Cats – Fair prognosis because megaesophagus is rare
- Dogs
  - Fair – if treatment started early, **BUT 1 year mortality rate is 40-60% among all dogs**  
– **Warn owners** of multiple hospitalizations and high risk of aspiration pneumonia
  - Poor if dog develops aspiration pneumonia secondary to swallowing difficulties and dysphagia
  - Very poor for myasthenic crisis



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## Prevention:

- Congenital form can be prevented by adhering to good breeding practices
- **Prevent aspiration pneumonia**
  - Turn recumbent animals every 2 – 4 hours
  - Upright feedings, by hand
  - Gastrostomy tube

## Pearls:

- **Congenital myasthenia gravis** is caused by an inadequate number of postsynaptic nicotinic acetylcholine receptors because of a **RARE** genetic defect
- **Acquired myasthenia gravis** is an **autoimmune disease** where antibodies bind to the postsynaptic acetylcholine receptors in striated muscle, causing them to be internalized.
  - Can be associated with other diseases: hypothyroidism, thymoma, thymic cysts, lymphoma, cholangiocellular carcinoma, anal sac adenocarcinoma, osteogenic sarcoma, methimazole therapy in cats
- Incidence of thymomas with acquired MG in cats is about 15-26%, in dogs is around 3%.

**Refs:** A Practical Guide to Canine and Feline Neurology, Dewey, 2<sup>nd</sup> ed. p 521-536, Veterinary Neuroanatomy and Clinical Neurology, de Lahunta and Glass, 3rd ed. p 87, 93-95, Small Animal Neurology, Jaggy. p 304-308, Merck Manual, 10<sup>th</sup> ed (online): Inflammatory Disorders of the Peripheral Nerve and Neuromuscular Junction

## My Notes: