

Peer Reviewed

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Megaesophagus

P PROFILE

Definition

- Megaesophagus is a condition of esophageal dilation and dysmotility. It may be diffuse or regional/segmental and is further classified as:
 - ▶ Congenital or acquired
 - ▶ Idiopathic or secondary to other esophageal or nonesophageal diseases.
- Megaesophagus may be the only manifestation of a systemic disease, such as focal myasthenia gravis.

Systems. Megaesophagus is a disorder of the esophagus but may occur with more generalized disease conditions. The respiratory system may be secondarily affected (aspiration pneumonia, rhinitis) by exposure to regurgitated esophageal contents.

Genetic Implications. Congenital megaesophagus is heritable as a simple autosomal dominant or recessive trait with high penetrance in miniature schnauzers¹ and as a simple autosomal recessive trait in fox terriers.² See **Breed Predispositions for Megaesophagus**, page 44.

Incidence/Prevalence. Megaesophagus is the most common cause of regurgitation in dogs and cats; however, it is more common in dogs than cats.

Causes

Causes of megaesophagus are classified as:

Congenital: Onset of signs at weaning (**Figure 1**)

- Inherited
- Idiopathic
- Secondary
 - ▶ Vascular ring anomaly (**Figure 2**, page 44)
 - ▶ Glycogen storage disease
 - ▶ Myasthenia gravis

Acquired: Young adult to middle age (7–15 years)

- Idiopathic
- Secondary
 - ▶ *Autoimmune:* Thymoma
 - ▶ *Endocrine:* Hypoadrenocorticism

CONTINUES



Generalized megaesophagus in a 2-month-old dog. The trachea is displaced ventrally, and there is increased soft tissue present overlying the dorsal mediastinum.

Regional megaesophagus secondary to vascular ring anomaly (persistent right aortic arch) in an 8-month-old mixed-breed dog. There is severe distension of the esophagus cranial to the heart base with accumulation of fluid, a small amount of gas, and ingesta in the esophageal lumen, and ventral displacement of the trachea.



Breeds Predisposed to Megaesophagus

- Chinese shar-pei
- Fox terrier
- German shepherd
- Great Dane
- Golden retriever
- Irish setter
- Labrador retriever
- Miniature schnauzer
- Newfoundland
- Siamese cat

Predisposition to secondary megaesophagus parallels breed predispositions of the associated conditions (eg, myasthenia gravis in fox terriers, hiatal hernia in Chinese shar-peis).

- ▶ **Gastrointestinal:**
 - Esophagitis (segmental dilation)
 - Esophageal obstruction (foreign body, stricture, mass, hiatal hernia, GDV)
- ▶ **Metabolic:** Electrolyte disturbances
- ▶ **Neuromuscular:**
 - Botulism
 - Canine distemper
 - Dermatomyositis
 - Dysautonomia
 - Myasthenia gravis
 - Neosporosis
 - Polyomyositis
 - Polyneuropathy
 - Tetanus
- ▶ **Toxicity:**
 - Australian tiger snake venom
 - Lead
 - Organophosphates

Pathophysiology

Dysmotility due to dysfunction of esophageal muscle or nerves results in esophageal dilation and accumulation of food and fluid. Idiopathic megaesophagus may be due to selective dysfunction of vagal afferents innervating the esophagus, resulting in an abnormal neural response to distension and failure of peristalsis. Inability to move food into the stomach leads to weight loss and malnutrition.

History & Clinical Signs

- Cough and/or dyspnea (secondary aspiration pneumonia)
- Hypersalivation
- Nasal discharge (secondary rhinitis)
- Normal to increased appetite

- Regurgitation
 - ▶ Most common sign
 - ▶ Occurs minutes to hours after eating
 - ▶ Liquids often better tolerated than solid foods
- Weight loss

Physical Examination

- Poor body condition
- Mucopurulent nasal discharge with secondary rhinitis
- Increased respiratory rate and harsh (increased airway secretions) or diminished lung sounds with aspiration pneumonia (lung consolidation)
- Bulge in the cervical region in animals with severe esophageal distension
- Patients with secondary megaesophagus may have other abnormalities referable to the associated primary disease.

Pain Severity

Varies from absent (patients without inflammation as a cause or consequence of megaesophagus) to moderate (smooth-surface, inert esophageal foreign body) to severe (esophagitis, caustic or sharp foreign bodies)

Dx DIAGNOSIS

Definitive Diagnosis

- Diagnosis is confirmed by demonstration of regional or diffuse esophageal dilation on thoracic radiographs or fluoroscopy.
- Finding megaesophagus should prompt further investigation to identify potential causes. Endoscopic examination of the esophagus is useful in identifying foreign body, stricture, or esophagitis but is not a good screening test because anesthesia may induce transient loss of esophageal tone.
- Idiopathic megaesophagus is a diagnosis of exclusion.

Differential Diagnosis

- Differential diagnoses include diseases that disturb esophageal function without causing dilation, and nonesophageal diseases that may cause similar clinical signs.
- It is critical to distinguish regurgitation from

vomiting, expectoration, and dropping of prehended food, which are not characteristic of esophageal disease.

Laboratory Findings

There are no laboratory abnormalities characteristic of megaesophagus, but abnormalities can reflect underlying primary diseases (eg, hyperkalemia/hyponatremia in hypoadrenocorticism, creatine phosphokinase increases in muscle disease, anemia/basophilic stippling in lead toxicity).

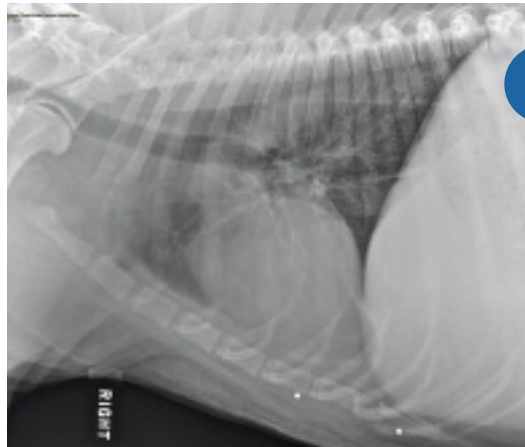
Imaging

- Thoracic radiography demonstrating dilation of the esophagus along a large proportion of its length supports a diagnosis of megaesophagus (Figure 3). See **Key Points: Imaging Diagnosis of Megaesophagus**.
- Megaesophagus may be diagnosed with an esophagram (oral administration of liquid barium followed by radiographic or fluoroscopic imaging). Due to the risk for aspiration pneumonia, contrast studies are often contraindicated unless absolutely needed to establish a diagnosis.
- Fluoroscopy offers the advantage of real-time demonstration of motility and is a sensitive and definitive test for megaesophagus, especially in more subtle cases.

Additional Diagnostic Tests

Additional testing to help differentiate causes of acquired secondary megaesophagus may include:

- *Acetylcholine (ACh) receptor antibody*: Myasthenia gravis (25%–30% of secondary megaesophagus cases)
- *ACTH stimulation*: Hypoadrenocorticism
- *Atropine response test*: Dysautonomia
- *Blood cholinesterase*: Organophosphate toxicity
- *Esophagoscopy*: Esophagitis, foreign body, mass, stricture
- *Electromyography*: Myasthenia gravis, polymyositis
- *Muscle biopsy*: Dermatomyositis, polymyositis, glycogen storage disease
- *Nerve conduction/nerve biopsy*: Polyneuropathy
- *Skin biopsy*: Dermatomyositis
- *Tensilon test*: Myasthenia gravis



Generalized megaesophagus in a 9-year-old pointer. Esophagus is dilated with air along its entire length.



TREATMENT

Medical

- Nutritional support
- Antibiotics for pneumonia
- Oral sucralfate solution for esophagitis
- Endoscopic removal or advancement of esophageal foreign body
- Treatment of primary disease in patients with secondary megaesophagus

Surgical

- Correction of vascular ring anomaly
- Esophageal foreign body that cannot be retrieved endoscopically
- Resection of strictures that are not resolved with balloon dilatation
- Resection of esophageal masses

Activity

Activity should be restricted for at least 30 minutes postprandially.

Nutritional Aspects

- High-calorie diet
- Multiple, small meals; some patients do best with a gruel and some with canned-food meatballs
- Elevated feeding
 - Elevated feeding with vertical positioning of the esophagus allows gravity to facilitate esophageal emptying into the stomach. Use of elevated bowls is not sufficient.
 - Elevated position should be maintained for 30 minutes after feeding to optimize this effect. This may be achieved by holding smaller patients upright in the owners' arms.
 - Dogs can often be taught to remain positioned with the front feet up on a raised surface or to use a Bailey chair

Key Points: Imaging Diagnosis of Megaesophagus

- Esophageal dilation with air, fluid, or food; may be diffuse or regional/segmental
- Persistent dilation present on additional radiographs
- May also see signs of primary disease (esophageal mass, GDV, hiatal hernia)
- Secondary aspiration pneumonia
- Normal findings can include:
 - Small triangular accumulation of air in proximal cervical esophagus
 - Pocket of air in thoracic esophagus proximal to heart base
 - Fluid in the caudal esophagus on left lateral view

Prokinetic Agents: Cats versus Dogs

Prokinetic agents (metoclopramide, cisapride) may be beneficial in cats with distal esophageal dilation. These drugs are sometimes used in an attempt to increase lower esophageal sphincter tone and prevent reflux in patients with esophagitis. However, these drugs do not affect motility in dogs and may be contraindicated because they can impair esophageal emptying.

(caninemegaesophagus.org/index.htm), which was developed to maintain proper feeding position.

- Placement of gastric feeding tubes may be considered but does not eliminate the risk for aspiration pneumonia.



MEDICATIONS

Prokinetics

- Metoclopramide or cisapride (see **Table**, next page, for dosages)
- Action: Stimulate motility of GI smooth muscle; antiemetic (metoclopramide); increase lower esophageal sphincter (LES) tone, which reduces gastroesophageal reflux
- Indications: For use in patients that would benefit from increased LES tone (megaesophagus secondary to gastric reflux) or in cats (may stimulate esophageal motility).
- Administration: Administer 30 min prior to meals

Ancillary Treatments

- Antibiotics (see **Table**, next page, for dosages) +/- oxygen therapy for aspiration pneumonia
 - ▮ Pneumonia may involve multiple bacterial organisms and caustic injury to lungs
 - ▮ Initial antibiotic choice is empirical; for refractory cases, culture and sensitivity of TTW or BAL samples
 - ▮ Consider combining drugs for broad-spectrum coverage
- Gastric acid reducer +/- sucralfate for esophagitis (see **Table**, next page, for dosages)
- Fluid therapy if needed
- Treatment for primary disease

Precautions

- Aspiration pneumonia may be precipitated by performing a barium swallow.
- Multiple (sequential) ACh receptor antibody test may be needed to diagnose myasthenia gravis.
- Oral drugs may be ineffective if medications are regurgitated or retained in esophagus.
- Prokinetics do not stimulate esophageal motility in dogs; they can also increase lower esophageal sphincter tone and prolong

esophageal transit time.

- Metronidazole can cause neurotoxicity.

Interactions

- Metoclopramide: Anticholinergic drugs, phenothiazines, butyrophenones, narcotics, sedatives, tranquilizers
- Cisapride: Ventricular arrhythmias when administered with ketoconazole, itraconazole, miconazole



FOLLOW-UP

Patient Monitoring

- Clinical status
- Body weight
- Thoracic radiographs

Prevention

- Eliminate congenitally-affected animals from breeding programs
- Prevent foreign body ingestion
- Relieve obstructions early before irreversible damage occurs
- Treat esophagitis aggressively to prevent stricture formation
- Prevent esophagitis, when possible (eg, water flush after administration of doxycycline capsules)

Complications

- Aspiration pneumonia
- Malnutrition
- Rhinitis

Course

- Congenital megaesophagus may improve or resolve as the patient matures.
- Acquired secondary megaesophagus may or may not resolve when the primary disease condition is treated: resolution occurs in about half of myasthenia gravis patients.
- Patients with idiopathic megaesophagus show progressive deterioration; adequate nutrition is difficult to maintain in large-breed dogs.
- Aspiration pneumonia often recurs leading to death or euthanasia.
- Anesthesia- and esophagitis-associated megaesophagus resolves within 2 to 14 days.

BAL = bronchoalveolar lavage;
GI = gastrointestinal; LES =
lower esophageal sphincter;
TTW = transtracheal wash

CONTINUES



Table. Megaesophagus Medication Dosages

Prokinetics

Cisapride	Cats: 0.1–1 mg/kg PO Q 8–24 H
Metoclopramide	Dogs & cats: 0.2–0.4 mg/kg PO, SC, IM Q 8 H

Antibiotics

Amoxicillin* (gram-aerobes, anaerobes)	Dogs & cats: 10–20 mg/kg PO Q 12 H Ferrets: 10–35 mg/kg PO, SC Q 12 H
Enrofloxacin (aerobes, gram-positive & gram-cocci & bacilli)	Dog & cats: 2.5–5 mg/kg PO, IM Q 12 H Ferrets: 10–20 mg/kg PO, IM, SC Q 12–24 H
Metronidazole (anaerobes)	Dogs & cats: 10–15 mg/kg PO, IV Q 8–12 H Ferrets: 10–30 mg/kg PO Q 12 H

Gastric Acid Reducer +/- Sucralfate

Famotidine	Dogs & cats: 0.5–1 mg/kg PO, SC, IM, IV Q 12–24 H
Omeprazole	Dogs & cats: 0.5–1.5 mg/kg PO Q 12–24 H
Sucralfate	Dogs: 0.5–1 gram PO Q 8 H Cats: 0.25–0.5 gram PO Q 8–12 H <i>Give as oral suspension for esophagitis</i>

*Amoxicillin can be combined with clavulanic acid

Future Follow-Up

Patients with aspiration pneumonia should have thoracic radiographs at 1 to 2 week intervals to guide duration of therapy. Because megaesophagus can be transient, follow-up imaging of newly-diagnosed patients is recommended.



IN GENERAL

Relative Cost

- Initial diagnostic evaluation (physical examination, CBC/serum biochemical profile/urinalysis, thoracic radiographs): \$\$\$
- Secondary megaesophagus (additional diagnostics to identify primary disease): \$\$\$–\$\$\$\$
- Medical treatment and follow-up: \$\$–\$\$\$\$
- Surgical treatment of esophageal obstruction: \$\$\$\$\$

Cost Key

\$ = < \$100	\$\$\$\$ = \$500–\$1000
\$\$ = \$100–\$250	\$\$\$\$\$ = > \$1000
\$\$\$ = \$250–\$500	

Prognosis

- Guarded to poor
- Depends on patient age, cause, duration, and presence of complications:
 - In young animals, esophageal function may improve as they mature; 25% to 50% recover.
 - Secondary megaesophagus may resolve after treating the primary disease.
 - Patients with long-standing or severe esophageal distension will suffer irreversible esophageal muscle damage.
 - Prognosis for idiopathic megaesophagus is poor.

Future Considerations

Little reliable published data about megaesophagus are available. Studies to define prognostic indicators should be undertaken to help practitioners make better informed clinical decisions.

CBC = complete blood count

See Aids & Resources, back page, for references and suggested reading.