GASTRIC DILATATION-VOLVULUS
(COMMONLY KNOWN AS "BLOAT")

BASICS

OVERVIEW
- A disease in dogs in which the stomach dilates with gas and/or fluid (known as "gastric dilatation"), and subsequently rotates around its short axis (known as "volvulus")
- Also known by the abbreviation, "GDV," or by the term, "bloat"

GENETICS
- No direct genetic predisposition confirmed; however, dogs with a first-order relative with a history of GDV are at increased risk for development of GDV

SIGNALMENT/DESCRIPTION of ANIMAL

Species
- Dog; any large, deep-chested breed

Breed Predilection
- German shepherd dogs, Great Danes, standard poodles
- Rarely reported in smaller, deep-chested breeds, such as dachshunds and Pekingese

Mean Age and Range
- Any age; most commonly in middle-aged to older dogs

SIGNS/OBSERVED CHANGES in the ANIMAL
- Vomiting, which often progresses to "dry heaves"
- Anxious behavior
- Abdominal pain
- Abdominal distention; however, distended stomach may be contained under ribs, in which case abdominal distention may not be seen
- Collapse
- Drooling or excessive salivation (known as "ptyalism")
- Depression
- Rapid heart rate (known as "tachycardia")
- Rapid breathing (known as "tachypnea") or difficulty breathing (known as "dyspnea")
- Weak pulses; pale gums and moist tissues of the body (mucous membranes); and slowness of the pink color of the gums to return when the gums are blanched by finger pressure (known as "poor capillary refill time") are suggestive of low blood volume (known as "hypovolemia")

CAUSES
- Unknown
- Likely many factors, including anatomic (relating to the body structure), genetic and environmental factors

RISK FACTORS
- Classically has been linked to activity following a meal
- Anatomic predisposition in "deep-chested" dogs, particularly large- and giant-breed dogs
- Classically was thought that a lowered food bowel encouraged swallowing of air (known as "aerophagia"), which could lead to GDV; however, recent information identifies eating from a RAISED food bowl as a risk factor for development of GDV
- Having a first-degree relative with GDV and faster speed of eating have been identified as risk factors associated with the development of GDV
- Possibly having cancer in the gastrointestinal tract, as it can cause motility disturbances as well as retention of food and/or air in the stomach

TREATMENT

HEALTH CARE
- THIS DISEASE SYNDROME REPRESENTS AN EMERGENCY!
- Patients should be hospitalized, thoroughly assessed, and aggressively treated for poor circulation (known as "cardiovascular insufficiency")
- Fluid therapy: crystalloid therapy, colloid therapy, or a combination can be used; crystalloids are fluids that contain electrolytes (chemical compounds, such as sodium, potassium, chloride) necessary for the body, crystalloids generally are similar to the fluid content (plasma) of the blood and move easily between the blood and body tissues, example is lactated

Ringer's solution; colloids are fluids that contain larger molecules that stay within the circulating blood to help maintain circulating blood volume, examples are dextran and hetastarch
- Subsequent to stabilizing the circulation, decompression of the stomach should be performed
- Passing a stomach tube through the mouth, down the esophagus (the tube between the throat and the stomach), and into the stomach (known as "orogastric intubation") is the preferred method of obtaining decompression of the stomach; commonly, considerable resistance is encountered upon reaching the area between the esophagus and the stomach, where the esophagus passes through the diaphragm (known as the "esophageal hiatus")—the lubricated tube can be twisted or repositioned to facilitate passage of the stomach tube; differing patient positions (such as sitting, standing, lying down) can be attempted to facilitate passage
- In cases where passage of the stomach tube (orogastric intubation) is unsuccessful, passing a large-diameter sterile needle or catheter through the skin, abdominal wall, and into the stomach (known as "percutaneous gastrocentesis") can be attempted; gas typically will make an audible noise when escaping—considerable time is necessary to achieve stomach decompression using this technique, owing to the small diameter of the needle in combination with the considerable amount of gas entrapped within the stomach
- Following patient stabilization and stomach decompression, surgical intervention is indicated

ACTIVITY
- Restriction of activity for approximately two weeks postoperatively is recommended

DIET
- Oral intake of food is recommended as soon as possible
- The role of food bowl height in the occurrence and recurrence of this disease is unclear at this time

SURGERY
- Surgical intervention should be performed as soon as possible in a stable patient or in a patient for which diligent stabilization efforts have proved to be ineffective
- Surgical intervention has three main goals: 1) returning the stomach (and spleen, if necessary) to its normal position in the body (known as "anatomical reposition"), 2) assessment of organ viability (in other words, "What is the status of the tissues?" "Are the tissues healthy enough to allow recovery and normal function?" "Are the tissues too deteriorated to allow recovery and can additional surgery salvage the organs?"), and 3) prevention of recurrence
- The stomach should be carefully and gently derotated back into its normal position in the body
- If the spleen has twisted or moved out of its normal position, it should be carefully and gently untwisted and moved to its normal position in the body
- Once repositioned, the stomach and spleen should be assessed; if areas are not healthy appearing or if obvious areas of dead tissue (known as "non-vital areas") are present, surgical removal should be performed via removal of that part of the stomach (known as "partial gastrectomy") that is unhealthy or dead and/or by removing the spleen (known as "splenectomy")
- Prevention of recurrence is achieved through a permanent gastropexy (surgical attachment of the stomach to the abdominal wall); multiple techniques for performing gastropexy have been described and choice of technique is largely based on surgeon preference

MEDICATIONS
Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

- Antibiotics are indicated around the time of surgery; depending on severity and progression of disease itself, surgery may be considered "clean," "clean-contaminated," "contaminated," or "dirty"—it is often next to impossible to ascertain this information before the surgery is performed; these designations refer to findings of the status of the internal organs during surgery; the surgical procedure would be performed in a sterile surgery, but if the organs or tissues have died due to lack of adequate circulation, the surgeon may enter the abdomen and find infection already present (so called, "dirty" surgery)
- Antibiotic selection should be based upon potential bacteria that may cause infection in the patient; moderate-to-severe disease may expose the dog to intestinal bacteria due to tearing of the gastrointestinal organs (known as "visceral perforation") or loss of normal intestinal lining barriers to movement of bacteria from the gastrointestinal tract into the general circulation (known as "hematogenous bacterial translocation"); possible antibiotics include cefoxitin sodium and cefazolin sodium
- Agents to protect the stomach (known as "gastric protectants," such as H_2-blockers [cimetidine, famotidine, ranitidine]) or coating agents (such as, sucralfate) may be implemented to minimize or prevent ulcers in the stomach and/or intestines

FOLLOW-UP CARE

PATIENT MONITORING
- General nursing care; some patients may require recumbent care for several days before eventual recovery
- Adequate pain control is necessary
- Abnormal or irregular heartbeats (known as "premature ventricular contractions") commonly occur postoperatively in patients with GDV; these can be the result of poor blood flow to the heart muscle itself (known as "myocardial

hypoperfusion") and resultant damage, or due to damage to the spleen or removal of the spleen; monitoring of heart rhythm is recommended
- Correction of electrolyte abnormalities (particularly low levels of potassium in the blood [known as "hypokalemia"]) is often necessary
- Monitor urine production and kidney function postoperatively, particularly in patients that had sustained, significant low blood pressure (hypotension)

PREVENTIONS AND AVOIDANCE

- Elevation of food bowl is a matter of great debate; current literature suggests that elevating the food bowl actually may increase the risk of GDV; however, many owners/breeders continue to elevate food bowls
- Avoid strenuous exercise after eating or drinking
- Possibly slow down the rate of consumption of meals to reduce swallowing of air (aerophagia)
- Consider soaking dry food in water, before feeding or feed multiple, smaller meals

POSSIBLE COMPLICATIONS

- Gastric dilatation (stomach dilates with gas and/or fluid) may recur, even with successful surgical correction (known as "gastropexy") performed; recurrence of volvulus (twisting or rotation of stomach) with an appropriately performed gastropexy technique is exceedingly rare
- Failure to remove dead stomach tissue may result in eventual stomach tearing (perforation) and bacterial infection of the lining of the abdomen (known as "septic peritonitis")
- Irregular heartbeats (particularly premature ventricular complexes); blood-clotting disorder (known as "disseminated intravascular coagulopathy"); and ulcers of the stomach also may occur

EXPECTED COURSE AND PROGNOSIS

- Heightened awareness by dog owners combined with increased understanding by veterinarians of the complex events associated with GDV has reduced the mortality rate associated with this disease significantly over the past 30 years
- Prognosis in dogs treated appropriately that do not have dead stomach tissue (known as "gastric necrosis") is excellent with a reported survival rate of 98%
- Dogs with dead stomach tissue (gastric necrosis) have a more guarded prognosis, with a reported survival rate of 66%

KEY POINTS

- Gastric dilatation-volvulus ("GDV" or "bloat") is a potentially deadly disease that should be recognized and addressed immediately; failure to treat this disease quickly could lead to fatal consequences
- Initial efforts should be directed toward stabilizing the patient, as the disease often leads to severe circulatory problems
- Surgical intervention should be performed as soon as possible after initial stabilization
- Overall prognosis is fair, dogs without dead stomach tissue have a better prognosis than those with dead stomach tissue (gastric necrosis)