

RESPONDING TO BLOAT WITH A VIGILANCE

BY BARBARA FAWVER

The unmistakable signs of bloat in her 6 ½-year-old retired show champion male Great Dane made Tootie Longo's heart pound. An adrenaline rush seemed to take control as she and her husband quickly loaded the beautiful black Dane into their car for the 15-minute drive to the veterinarian.

The race against the clock to save the life of the beloved giant dog ended futilely. All too quickly, the bloated stomach had twisted, cutting off blood and oxygen to vital organs such as the heart, spleen and liver. The dog had gone into shock and could not be saved. One and a half hours earlier, Longo had left the Dane at home while she ran an errand only to return to find the dog standing in a pool of white foam and his loin swollen hard like a barrel. The look of pain and fear in his eyes was unforgettable.

Gastric dilatation-volvulus (GDV), more commonly known as bloat, is a disorder that affects large- and giant-sized, deep-chested dogs. Gastric dilatation is when the stomach fills like a balloon with gas, and gastric dilatation with volvulus is when the gas-filled stomach twists 180 degrees on its axis. Among the high-risk breeds, Great Danes

are believed to have a 25 percent risk of developing GDV in their lifetime. Sadly, one in four dogs does not survive bloat.

Years after the first incident, Longo, of Concord, Ohio, went through bloat with a 2 ½-year-old female Great Dane. "I had just put her out at 5:10 p.m., and when I brought her in the house at 5:20, she was bloated," she says. "I called the veterinarian to let him know we were coming. We battled rush hour, virtually driving up on sidewalks to get around stalled cars. Fortunately, we made it before the stomach twisted. They were ready and waiting for us. Emergency surgery saved her life."

Owners like Longo vividly recall the details of an episode of GDV, showing how horrific the experience can be. Their inability to stop an episode despite doing all they can to get a dog to an emergency facility is heartbreaking, especially when a dog dies.

These days, Longo, the 2013 AKC Working Group Breeder of the Year and the breeder of the top-winning Great Dane in breed history (Multi-BIS/Multi-BISS GCH Longo Miller N Lore's Diamond Lil), takes preventive measures into her own hands.

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“Bloat can happen so fast,” she says. “As soon as our dogs finish their championship around 1 year of age, we have a gastropexy performed. I encourage all my pet owners to do the same.”

Gastropexy is a surgery in which a dog’s stomach is tacked to the right side of the abdominal wall to prevent it from shifting or twisting. The cost for a gastropexy is around \$1,000, depending on the clinic and its geographical location, compared to \$6,000 to \$8,000 for emergency GDV surgery. Dogs receiving emergency surgery have a gastropexy performed at the same time to prevent a recurrence.

GDV has been recognized in dogs for more than 100 years. Other than a dog’s conformation — large and giant breeds with deep chests — there are more mysteries about what causes the disorder than facts.

Does the stomach bloat or twist first? Are there ways to determine if a dog is likely to survive? Is GDV due to genetics, environmental factors or both?

To learn more about GDV, **the AKC Canine Health Foundation announced the bloat initiative in 2013** and provided funding of more than \$500,000 for research to study the causes of bloat.

At Michigan State University, researchers hypothesize that gastric dysrhythmia may predispose at-risk breeds to gastrointestinal motility problems that lead to GDV. At Tufts University where a biobank of DNA samples from GDV-affected dogs worldwide has been started, investigators are evaluating the bacterial microbiome of gastric and fecal content to see if altered flora triggers bloat.

Lead investigators of these studies presented their work at the 2015 AKC Canine Health Foundation National Parent Club Canine Health Conference in August in St. Louis. They were among 21 speakers at the two-day program who provided the latest findings about canine diseases. Purina has sponsored the biennial conference since it began in 1995. Here are insights about GDV presented by Laura Nelson, DVM, MS, DACVS-SA, associate professor-health sciences at Michigan State University, and Elizabeth Rozanski, DVM, DACVECC, DACVIM, associate professor of clinical sciences at Tufts University.

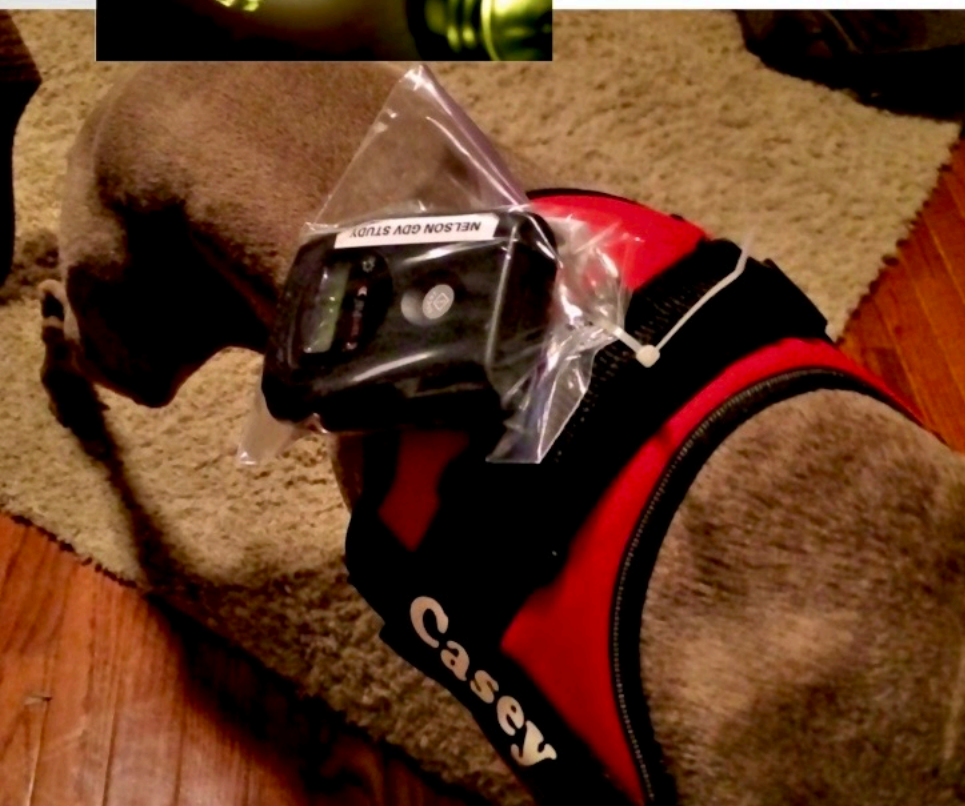
UNDERSTANDING GASTRIC MOTILITY

Emergency veterinarians act fast when a dog arrives with GDV. “It is definitely an all hands on deck situation,” says Dr. Rozanski, director of Tufts University’s critical care program, which sees about 60 cases of GDV a year. “The first thing we usually do is treat a dog for shock by giving fluids, and then we try to get the dog into surgery as quickly as possible. These dogs go into shock due to the twisting of the stomach.”

A complex process, gastric motility is controlled by hormones, the central nervous system, an enteric nervous system, the automatic nervous system, and cells within the GI tract, factors that determine the strength, speed and pattern of GI contractions. Dr. Nelson explains, “To make things even more complicated, the fat-to-protein level and carbohydrates in a dog food, as well as the calories a dog consumes and whether the food is solid or fluid, and the kinds of bacteria and other microorganisms in the gut also play a role in GI motility.”

Insights about how gastric motility may cause bloat are being shaped by **a capsule-sized wireless motility device called a SmartPill™** first used to diagnose gastrointestinal motility disorders in humans. In the study underway at Michigan State University, about 80 dogs have swallowed the \$600 SmartPill that measures gastric motility, relaying information to a SmartPill recorder worn in a harness or vest. The technological device picks up on

A capsule-sized wireless motility device called the SmartPill™ is being used by researchers at Michigan State University to study whether gastric dilatation-volvulus (GDV) risk and gastrointestinal motility are linked. Dogs swallow the SmartPill, which relays information to a recorder worn in a harness or vest.



changes in pressure, temperature and acidity as the pill passes through the gut and can record episodes of bloating, constipation, abdominal pain, vomiting, and nausea.

Importantly, the SmartPill tells how long it takes for solids to pass through the gastrointestinal tract. “The pill may stay in the stomach of one dog for 21 hours and another one for only 10 minutes before reaching the small intestine,” says Dr. Nelson. “Prolonged transit of material through the stomach may stretch gastric ligaments to allow the stomach to twist. In addition, we know that the gas in the stomachs of dogs with GDV is a product of bacterial fermentation similar to what happens in cattle that bloat. With the SmartPill, we seek to learn if GDV risk and gastrointestinal motility are linked.”

Researchers at Michigan State also are evaluating the relationship between levels of two hormones, motilin (MLN) and ghrelin (GHRL), and GDV risk. Previous studies have shown that the phase III motility of dogs with GDV is weaker than in unaffected dogs. During phase III, contractions should be strongest to push nondigestible solids out of the stomach into the small intestine. The Michigan State team also is conducting a genetic analysis to evaluate the genes that encode MLN and GHRL in affected and low-risk dogs to determine if a mutation in one of the genes is more common in dogs that have bloated.

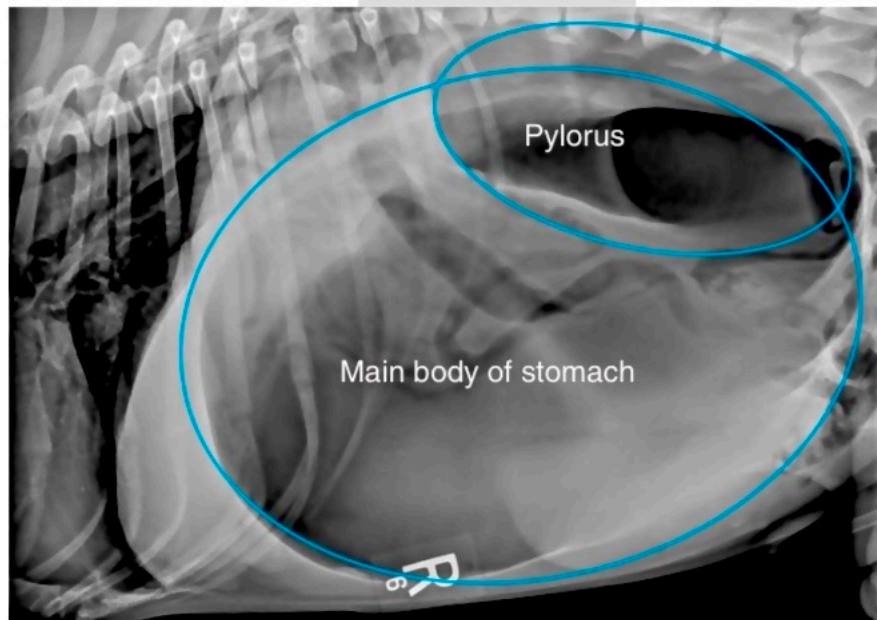
“As motilin is what seems to trigger phase III contractions in a dog’s stomach and ghrelin seems to end these contractions, potentially one or both of these hormones could cause the problem,” Dr. Nelson says.

The ability to predict which dogs are likely to respond well to surgery could be as simple as determining the amount of lactate in a dog’s blood, a measure of how effectively oxygen reaches body tissues. “When lactate goes up, it is a sign that tissues in the body have had to make energy without oxygen,” says Dr. Nelson. “The killer in GDV is more commonly related to shock, or the inability of the body to get oxygen and nutrients to the tissues, and thus not necessarily related to the stomach. Lactate indicates the severity of shock in a particular dog, but high lactate does not necessarily indicate a dog will survive or die.”

Dr. Rozanski agrees. “Preoperatively, increased lactate is associated with gastric necrosis, or tissue death, and ectopy, or abnormal heart beats. We have found that a long duration of GDV may be associated with a worse prognosis. Different organs such as

the heart, brain and lungs start to fail — a condition termed multiple organ dysfunction syndrome (MODS) — which complicates recovery.”

In a Tufts study of 26 dogs of various breeds with bloat, Dr. Rozanski reports that those with cardiac dysfunction largely had a poor outcome. “We are looking to see how to better characterize myocardial disease in dogs with GDV,” she says. “We have found that the biomarkers of echocardiography and electrocardiogram testing parallel the severity of disease.”



The biobank of hundreds of DNA samples of GDV-affected dogs being collected at Tufts is ongoing. The microbiome research, which includes the Broad Institute of MIT and Harvard, aims to determine if there is a difference in the bacterial flora of dogs with GDV compared to other dogs.

Given that bloat is a complex age-old disease, it is not surprising that answers don’t come quickly. Meanwhile, “early detection and planning ahead are key,” says Dr. Rozanski. “We can do more to help dogs with earlier detection, a more aggressive surgical approach and improved supportive care postoperatively. We want to learn how to prevent organ failure and infection in dogs with bloat.”

“The question for us is what causes bloat,” Dr. Nelson summarizes. “We need to clarify causative factors to guide preventive measures, improve medical treatment and implement selective breeding. The exciting thing about this devastating and significant problem is there are some new perspectives on this old disease.” ■

This radiographic image of a dog suffering from GDV shows the stomach, the large-egg-shaped structure, filled with gas and thus occupying most of the abdomen. The twisted pyloric sphincter at the top of the stomach indicates the stomach is twisted on its axis rather than simply distended.