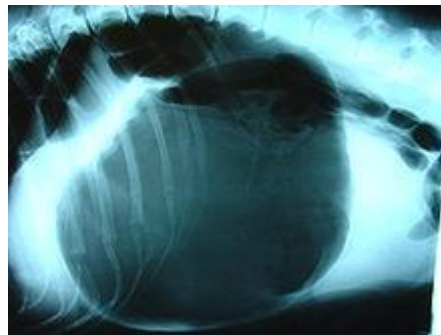
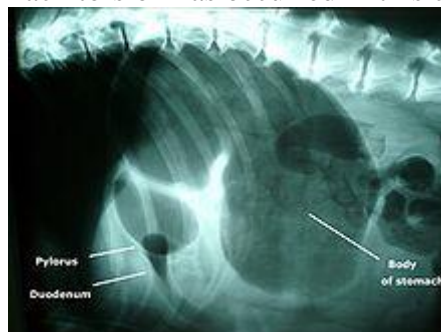


Gastric dilatation volvulus in dogs

Gastric dilatation volvulus (also known as **twisted stomach**, **gastric torsion** and **GDV**) is a medical condition in which the stomach becomes overstretched and rotated by excessive gas content. The word *bloat* is often used as a general term to cover gas distension without twisting and is often a normal change after eating or with aerophagia. It is sometimes used incorrectly to indicate gastric torsion. Gastric dilatation volvulus always involves the twisting of the stomach and is a life-threatening condition that requires prompt treatment. The condition occurs commonly in domesticated animals, especially certain dog breeds. Deep-chested breeds are especially at risk. Mortality rates in dogs range from 10 to 60 percent, even with treatment.^[1] With surgery, the mortality rate is 15 to 33 percent.^[2]



x-ray of a dog with bloat. Note the classic "double bubble" pattern indicating that stomach torsion has occurred in this case.



Bloat in a dog, with "double bubble" sign.

Causes[edit]

Gastric dilatation volvulus in dogs is likely caused by a multitude of factors, but in all cases the immediate prerequisite is a dysfunction of the sphincter between the esophagus and stomach and an obstruction of outflow through the pylorus.^[3] Some of the more widely acknowledged factors for developing gastric dilatation volvulus include increased age, breed, having a deep and narrow chest, stress, eating foods such as kibble that expand in the stomach, overfeeding, too much water consumption in a small period of time; before or after exercise and other causes of gastrointestinal disease and distress. Studies have indicated that the risk of bloat in dogs perceived as happy by their owners is decreased, and

increased in dogs perceived as fearful. This may be due to the physiological effects of the dog's personality on the function and motility of the gastrointestinal system;[4] alternatively perhaps the dogs become unhappy/uncomfortable as a consequence of the conditions that lead up to exhibiting bloat. Dogs with inflammatory bowel disease may be at an increased risk for bloat.[5]



Dietary factors[edit]

One common recommendation in the past has been to raise the food bowl of the dog when it eats. However, studies have shown that this may actually increase the risk of gastric dilatation volvulus.[6] Eating only once daily^[7] and eating food consisting of particles less than 30 mm in size also may increase the risk of gastric dilatation-volvulus.^[8] One study looking at the ingredients of dry dog food found that while neither grains, soy, nor animal proteins increased risk of bloat, foods containing an increased amount of added oils or fats do increase the risk, possibly due to delayed emptying of the stomach.^[9]

Breed susceptibility[edit]

As a general rule, gastric dilatation-volvulus is of greatest risk to deep-chested dogs. The five breeds at greatest risk are Great Danes, Weimaraners, St. Bernards, Gordon Setters, and Irish Setters.^[10] In fact, the lifetime risk for a Great Dane to develop gastric dilatation-volvulus has been estimated to be close to 37 percent.^[11] Standard Poodles are also at risk for this health problem,^[12] as are Irish Wolfhound,^[13] Doberman Pinschers, Rottweilers,^[14] German shorthaired pointer, German Shepherd Dogs and Rhodesian Ridgebacks. Basset Hounds have the greatest risk for dogs less than 23 kg/50 lbs.^[1]

Pathophysiology[edit]

The stomach twists around the longitudinal axis of the digestive tract, also known as *volvulus*. Gas distension may occur prior to or after the stomach twists.^[3] The most common direction for rotation is clockwise,

viewing the animal from behind. The stomach can rotate up to 360° in this direction and 90° counterclockwise. If the volvulus is greater than 180°, the esophagus is closed off, thereby preventing the animal from relieving the condition by belching or vomiting.^[12] The results of this distortion of normal anatomy and gas distension include hypotension (low blood pressure), decreased return of blood to the heart, ischemia (loss of blood supply) of the stomach, and shock. Pressure on the portal vein decreases blood flow to liver and decreases the ability of that organ to remove toxins and absorbed bacteria from the blood.^[15] At the other end of the stomach, the spleen may be damaged if the twisting interrupts its blood supply. If not quickly treated, bloat can lead to blood poisoning, peritonitis and death by toxic shock.

Symptoms[edit]

Symptoms are not necessarily distinguishable from other kinds of distress. A dog might stand uncomfortably and seem to be in extreme discomfort for no apparent reason. Other possible symptoms include firm distension of the abdomen, weakness, depression, difficulty breathing, hypersalivation, and retching without vomiting. A high rate of dogs with gastric dilatation-volvulus have cardiac arrhythmias (40 percent in one study).^[16] Chronic gastric dilatation-volvulus may occur in dogs, symptoms of which include loss of appetite, vomiting and weight loss.^[17]

Diagnosis[edit]

A diagnosis of gastric dilatation-volvulus is made by several factors. The breed and history will often give a significant suspicion of gastric dilatation-volvulus, and the physical exam will often reveal the telltale sign of a distended abdomen with abdominal tympany. Shock is diagnosed by the presence of pale mucous membranes with poor capillary refill, increased heart rate, and poor pulse quality. X-rays (usually taken after decompression of the stomach if the dog is unstable) will show a stomach distended with gas. The pylorus, which normally is ventral and to the right of the body of the stomach, will be cranial to the body of the stomach and left of the midline, often separated on the x-ray by soft tissue and giving the appearance of a separate gas filled pocket (double bubble sign).^[17]

Treatment[edit]

Gastric dilatation-volvulus is an emergency medical condition: having the animal examined by a veterinarian is imperative. Gastric dilatation-volvulus can become fatal within a matter of minutes.

First Aid[edit]

Gastric dilatation-volvulus is an emergency that requires treatment by a veterinarian as soon as possible. Some web sites document so-called bloat first aid kits and contain descriptions of the first aid a dog owner can provide at the time an attack of bloat is discovered.^{[18][19][20]} This is not a substitute for immediate veterinary treatment. There is risk of esophagus or stomach rupture if a tube is inserted too forcefully in an attempt to relieve pressure.

It is always advisable to seek veterinary advice before attempting any procedures at home as these may further worsen the animal's condition.^[21]



X-ray from the side of a dog with severe intestinal gastric dilatation-volvulus.

Regardless of the success of an at home treatment, veterinary intervention is always necessary, as the condition carries a poor to grave prognosis without treatment.

Veterinary treatment[edit]

Treatment usually involves resuscitation with intravenous fluid therapy, usually a combination of isotonic fluids and hypertonic saline or a colloidal solution such as hetastarch, and emergency surgery. The stomach is initially decompressed by passing a stomach tube, or if that is not possible, multiple trocars can be passed through the skin into the stomach to remove the gas, alternatively the trocars may be inserted directly into the stomach following anaesthesia in order to reduce the chances of infection. During surgery, the stomach is placed back into its correct position, the abdomen is examined for any devitalized tissue (especially the stomach and spleen). A partial gastrectomy may be necessary if there is any necrosis of the stomach wall.