

Incisional Gastropexy to Prevent and Treat Canine Gastric Dilatation-Volvulus

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Abstract: Gastric dilatation-volvulus (GDV) is a life-threatening emergency in large-breed and deep-chested dogs. This article describes a technique for incisional gastropexy that can be used during emergency surgical treatment or, preferably, as a preventive procedure in a healthy, GDV-susceptible dog. Gastropexy can be done during a traditional laparotomy, as described here, or as a laparoscopically assisted procedure, as described elsewhere.

Gastric dilatation-volvulus (GDV) is a life-threatening emergency in large-breed and deep-chested dogs.¹⁻⁷ Signs of GDV include abdominal distention, retching without vomiting, excessive salivation, and abdominal discomfort. The dog may become weak and recumbent and develop signs of shock. Signs are often reported as developing soon after eating a large meal, drinking a large amount of water, eating from an elevated bowl, and being active or excited.¹ Whether life-threatening bloat develops depends on whether the stomach is only distended or is distended and rotated (volvulus). When the stomach rotates, venous return from the abdomen is obstructed, and hypovolemic and toxic shock develop.⁷ Bloat signs are usually reversible if the stomach is only distended and excess gas and fluid are expelled. Although a wide variety of management procedures are touted as preventing gastric distention, only a gastropexy can prevent GDV once distention develops.

Any GDV-susceptible dog with acute abdominal distention or pain after eating should be considered an emergency. Emergent care focuses on diagnosis and initial treatment of shock or dyspnea, when present. Treatment for shock requires rapid administration of intravenous fluids. Sedatives and narcotics are administered to facilitate passing a large and relatively rigid stomach tube. If the tube cannot be passed, gastrocentesis may be required. For some bloated dogs, gastric intubation during heavy sedation can be achieved by suspending them from their front legs and holding them erect with their head up. If decompression using a stomach tube is successful, radiography should be performed. If volvulus is present, emergency surgery is indicated.

Successful surgery requires continued shock treatment, general anesthesia, and abdominal surgery to reposition and evaluate the stomach and abdominal organs, followed by a gastropexy, which secures the gastric antrum to the right side just caudal to the last

rib. I have also performed laparoscopic correction of GDV in carefully selected dogs. Some dogs require additional surgery, such as partial gastrectomy, removal of gastrointestinal foreign bodies, biopsy of masses, or even splenectomy. Even with surgical treatment, mortality from GDV has been reported as 16%,⁸ 18%,⁸ and 24%³ in large, retrospective studies. Without a gastropexy, >80% of affected dogs experience recurrence and die within a year; recurrence is less than 5% in dogs receiving a gastropexy.⁴ Medical treatment carries a guarded prognosis, which provides an indication for emergent surgical exploration and gastropexy in patients with GDV. Even dogs treated successfully without surgery should have a gastropexy in the near future.

Gastropexy can be done electively to prevent GDV, using the same techniques as those developed for emergency surgery.^{6,9,10} A secure gastropexy can help prevent gastric volvulus when gastric dilatation occurs. Gastropexy techniques that have proven to be strong, can be quickly performed by experienced surgeons, and have minimal complications include incisional, circumcostal, and belt-loop gastropexies.⁷ Gastropexy can be done during a traditional laparotomy, as described here, or as a laparoscopically assisted procedure, as described elsewhere.¹¹⁻¹³ Other less invasive gastropexy techniques include a minilaparotomy by a right-side grid approach,¹⁴ gastroscopic-assisted gastropexy,¹⁵ and laparoscopically sutured gastropexy.¹⁶ Many technical variations of these procedures have been developed according to the surgeon's experience. My preferred technique is described below.

Patient Selection for Elective Gastropexy

A prophylactic gastropexy should be discussed with the client at the first examination of a breed-susceptible puppy or at the initial visit for a new pet or new client. This topic should be integrated into discussions involving nutrition, training, immunization, parasite control, and sterilization. One study found that large-breed (Akita, bloodhound, collie, Irish setter, rottweiler, standard poodle, and

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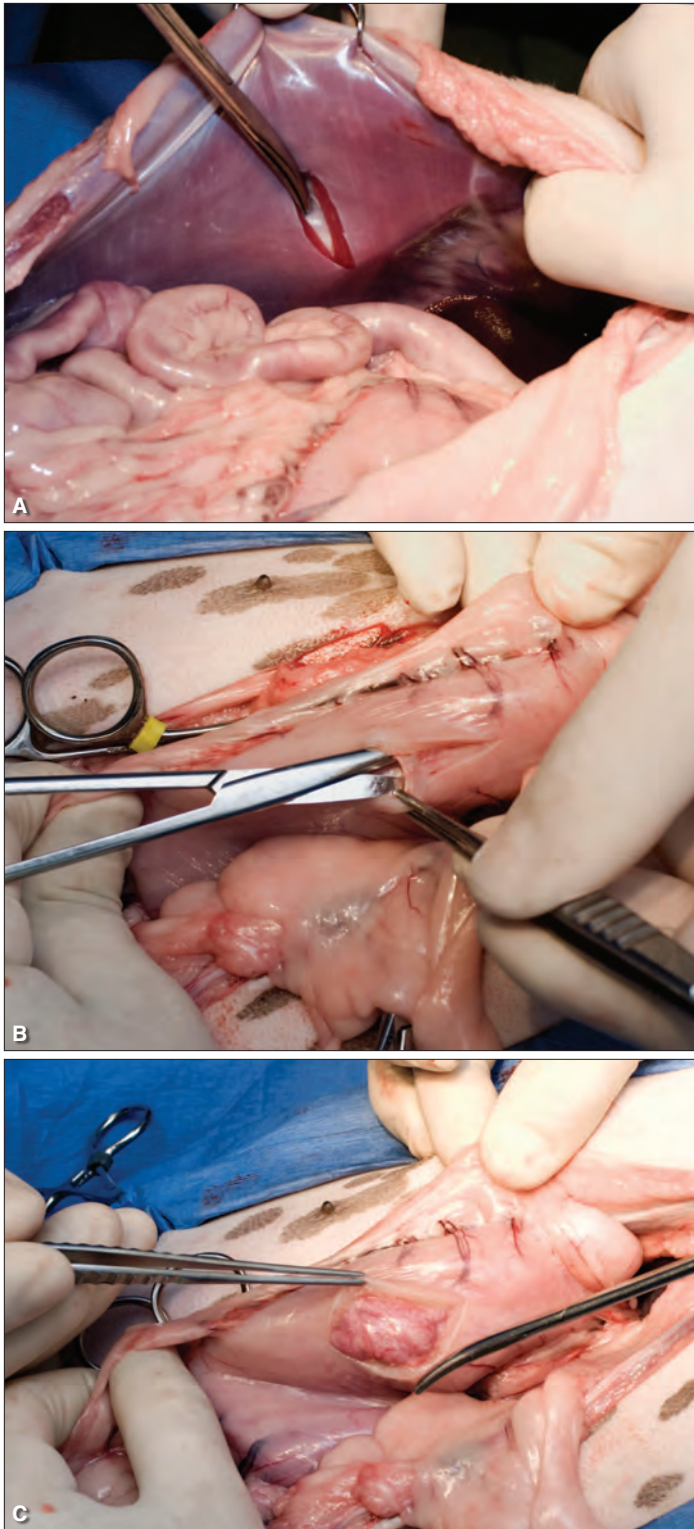


Figure 1. Preparation of gastropexy site. (A) The abdominal wall incision is 4 to 5 cm long, through the transversus abdominis, and 2 to 3 cm caudal to the last rib, taking care to avoid the diaphragm. (B) The antral incision is midway between the lesser and greater curvatures, with the aboral end approximately 6 cm oral from the pylorus. The incision is of a length similar to that in the transversus abdominis (4 to 5 cm). Only the serosal and muscularis layers are incised, being careful to avoid penetration of the lumen. After the initial antral incision, a Metzenbaum scissors is used to reflect the seromuscular layer from the submucosa as the incision is extended. (C) The submucosa should bulge from the antral incision and be easily separated from the seromuscular layers.

rottweilers to 36.7% (25.2% to 44.6%) for Great Danes.⁶ Mixed-breed dogs with a body size and shape similar to those of GDV-susceptible breeds are also susceptible. Some dogs inherit a risk for GDV; dogs that have a first-order relative (parent or sibling) with GDV have a marked increased likelihood of developing GDV.¹⁸ Most affected dogs are middle-aged, with dogs older than 7 years being at least twice as likely to develop GDV as 2- to 4-year-old dogs.¹ Because middle-aged and older dogs are more frequently affected, and because the incidence increases with age, older dogs remain candidates for prophylactic gastropexy. Other candidates include dogs with behaviors linked to gastric dilatation, including gulping large amounts of dry food, drinking copious amounts of water right after eating, and exercising vigorously soon after meals.

During discussions with owners of GDV-susceptible dogs, clinicians should reference the statistics of lifetime risk factors for GDV and the mortality rate in affected dogs, based on studies such as those mentioned above.^{17,18} Clients who search for information about GDV on the Internet should be cautioned to look for evidence-based rather than anecdotal reports. A December 2011 Google search produced more than 60 pages of Web sites and blogs about GDV and gastropexies. While some sites were evidence based, many stressed that GDV-susceptible dogs will not bloat if they are fed non-cereal dry diets in combination with recommended feeding and exercise guidelines, which is not always true. Even when some evidence-based guidelines are practiced, many dogs still experience GDV. Owners need to further appreciate that even with aggressive treatment, many dogs with GDV die, and emergency surgery for GDV is costly. Another concern is the idea that, because the risk for GDV may be inherited, GDV-susceptible breeding dogs should be given the opportunity to develop GDV to help determine whether they should be bred. This approach is not practical because most dogs that experience GDV are past their prime reproductive age. I encourage clinicians to discuss the rationale for a preventive gastropexy with owners of GDV-susceptible dogs, even if a dog is middle-aged.

Preoperative Patient Management

Most patients that undergo a prophylactic gastropexy are healthy or have only mild systemic disease, thus permitting the general anesthesia technique favored by the practice. As with any gastrointestinal surgery, appropriate management should reduce the likelihood and complications associated with vomiting. The patient should be fasted in an effort to avoid reflux during anesthesia.

Weimaraner) and giant-breed (Great Dane, Irish wolfhound, greater Swiss mountain, Newfoundland, and Saint Bernard) dogs had a 6% cumulative incidence of GDV, with GDV accounting for 16% of all deaths in these breeds.¹⁷ The lifetime risk for bloating (95% confidence interval) ranged from 3.9% (0% to 11.2%) for

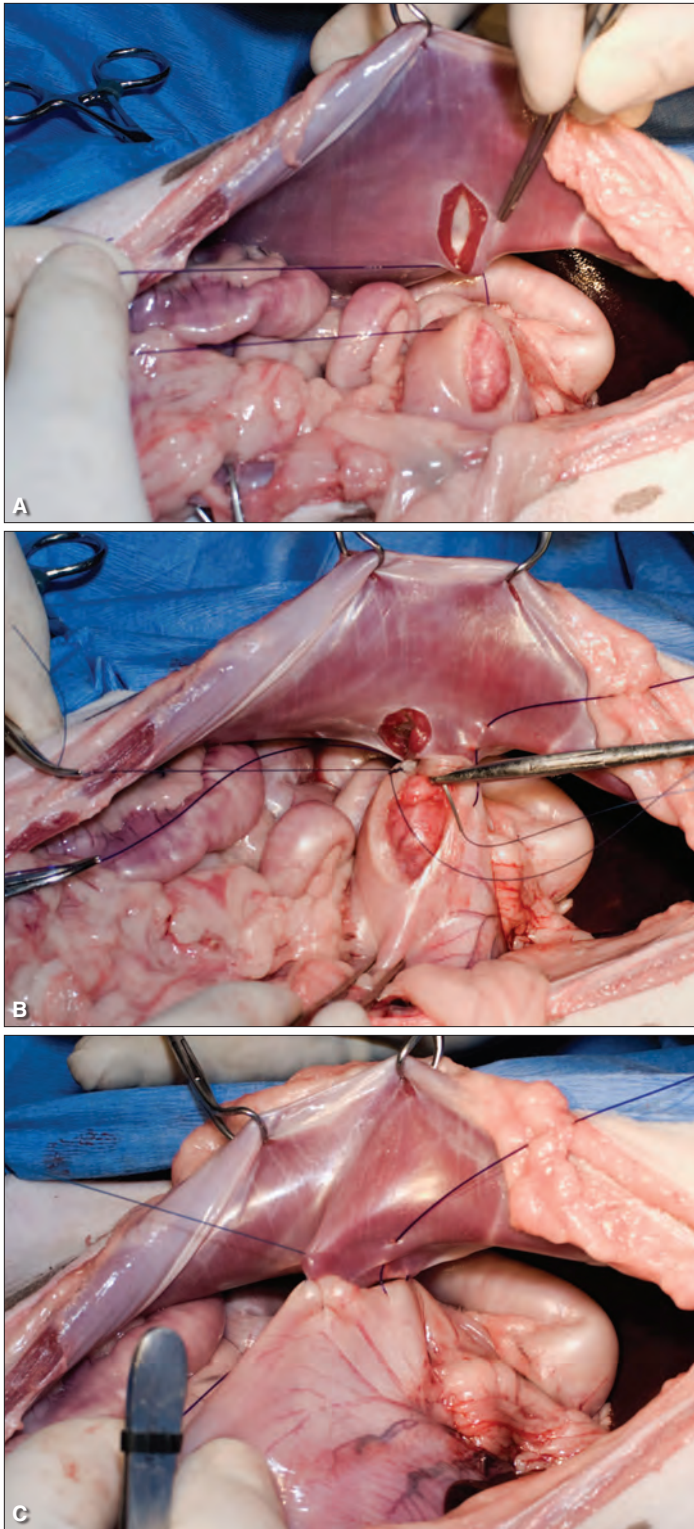


Figure 2. Apposition of the cranial margins of the antral and abdominal wall incisions. (A) A reinforcing suture line is used to maintain apposition during gastropexy suturing and reduce tension on the primary closure after surgery. This reinforcing line can be placed as a series of interrupted sutures or a continuous suture pattern. It positions the antrum to the abdominal wall, simplifying suturing of the primary closure. It is started dorsally and continued ventrally. The gastric lumen must not be entered as in a Connell pattern. (B) Once the reinforcing suture line is started, the primary closure is started. The needle enters from the incisional side, being careful to avoid the mucosa and to obtain a substantial bite of the submucosal and serosal layers. (C) Both suture patterns are continued to the ventral (medial) commissure, where they are tied before proceeding along the caudal side.

Because a prophylactic gastropexy is a quick, noncontaminated procedure, antibiotics are usually not appropriate. If the gastric lumen is entered during dissection or suturing, antibiotics may be administered. Perioperative analgesia should be provided.

Operating Technique for Incisional Gastropexy

The dog is placed in dorsal recumbency, and the primary surgeon stands on the patient’s left side. The technique described here is markedly enhanced when an assistant stands on the right side of the patient to retract and position viscera.

For a prophylactic gastropexy, the abdominal incision is made on the cranial midline and should be long enough to permit the surgeon to easily insert a hand into the abdomen for identification and retraction of the antrum. A longer incision and self-retaining retractor are required to do a complete abdominal exploration. Tissues are periodically moistened, but I rarely use laparotomy sponges and retractors for elective gastropexies.

The oral and aboral ends of the gastropexy are determined so that the gastropexy aboral commissure is approximately 6 cm from the pylorus and the gastric antral incision is 4 to 5 cm long. Traction sutures should be placed at each end of the antral incision. Traction sutures can be secured with a figure-of-eight pattern to provide greater anchoring. The incision into the antrum can be preceded by rolling the antral wall to “slip” the membranes, developing a plane between the seromuscular and the submucosal layers. A #10 blade is used to make the initial incision through the seromuscular layer to nearly the gastric mucosa. A Metzenbaum scissors is then used to dissect the submucosa from the seromuscular layer and to extend the seromuscular incision. The submucosa and mucosa should “bulge” without any restriction from submucosal fibers. Two towel clamps are used to retract the right abdominal wall, which requires one hand of the assistant surgeon. Exposure can be improved by using the fingertips to apply pressure to the abdominal wall while pulling laterally on the towel clamps. A mirror image of the antral incision is made through the transversus abdominis muscle, running parallel and 4 to 5 cm caudal to the caudal rib (FIGURE 1 and VIDEO 1*).^a

I prefer to place a continuous reinforcing suture line to appose the abdominal wall to the antrum, approximately 2 cm distal to the incisions. This line is started in the deepest part of the site before

Additional treatment to reduce the effects of reflux may be attempted using products such as famotidine, pantoprazole, or omeprazole. In emergency and bloated patients, drugs such as prokinetics (e.g., metoclopramide) and histamine-2 receptor antagonists are used in an attempt to reduce the risk of aspiration pneumonia.

*To watch the videos referred to in this article, please visit www.vetlearn.com.

^aAll photographs and videos are as viewed by the primary surgeon standing on the left side of the patient, and the patient’s head is to the right.

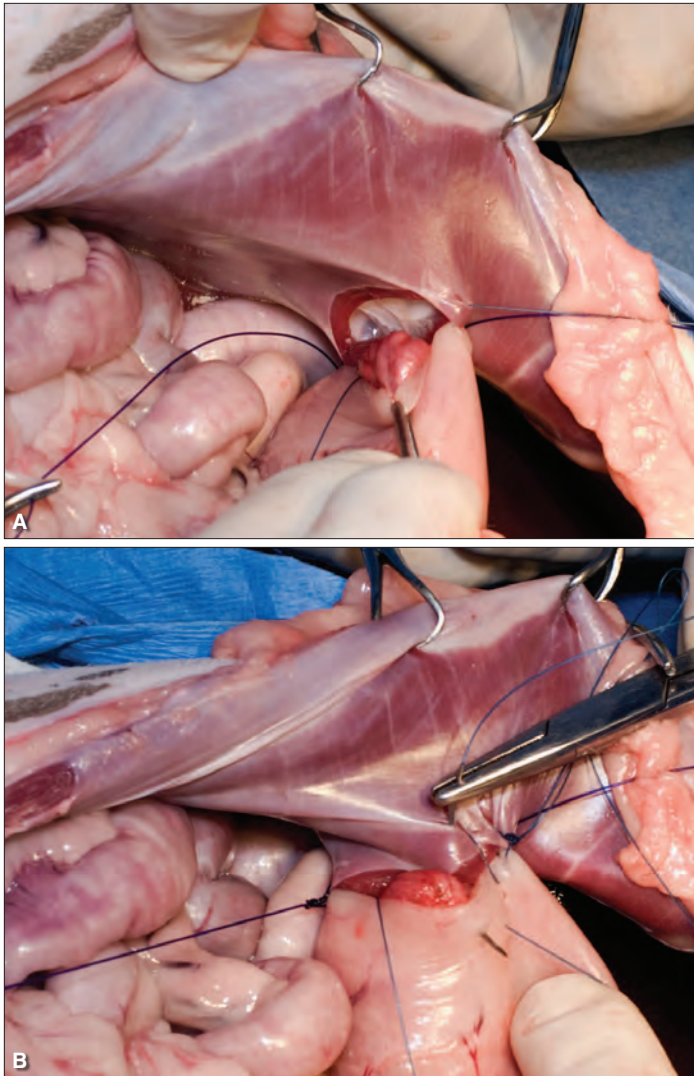


Figure 3. Primary closure of the caudal margin. (A) The gastropexy site is repositioned to expose the caudal margins. (B) The primary suture is continued medially to laterally, where it will be tied to the tag from the starting knot for the primary closure.

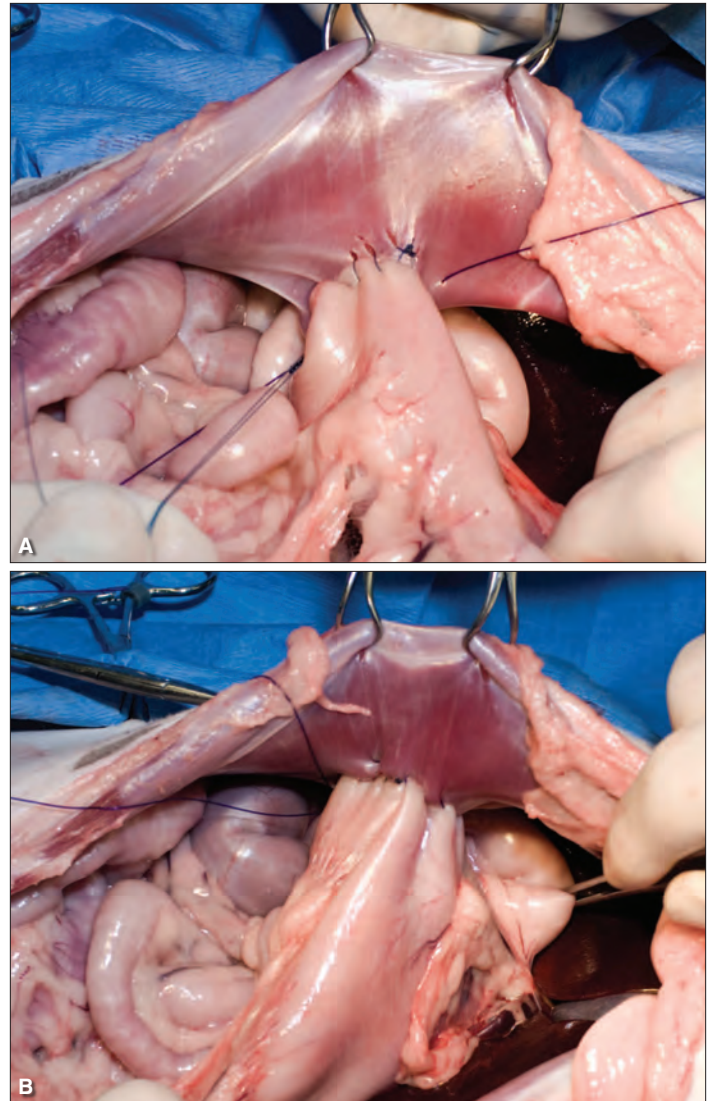


Figure 4. Reinforcing suture for the caudal margin. (A) After completion of the primary suture line, the reinforcing suture line is tied medially and continued around the caudal side. (B) The gastropexy is completed.

the primary closure is started. This reinforcing suture maintains the antrum in the appropriate position near the transversus abdominis incision and relieves tension on the primary gastropexy sutures. Some surgeons prefer not to use this second suture line, but at least a few interrupted sutures aid in maintaining position while the primary closure is completed. Both patterns are continuous, using a 2-0 synthetic slowly absorbable suture, such as polydioxanone, and a taper-point needle. I prefer to do the cranial suturing first, starting with the reinforcing layer and then the primary closure (FIGURE 2 and VIDEO 2). The sutures are each tied at the medial commissure, and the cranial side of the primary gastropexy suture line is then continued around the caudal side. It will be tied to the tag left from the knot that started the cranial side (FIGURE 3 and VIDEO 3). The reinforcing suture is then continued around the caudal side (FIGURE 4 and VIDEO 4). Extreme care should be taken

to ensure a wide bite of the seromuscular layer without entering the gastric lumen. Avoiding needle and suture penetration of the gastric lumen is facilitated by dissection with the Metzenbaum scissors when making the initial incision, consistent needle entry from the gastric incision side, and good exposure of the seromuscular layer while suturing.

Before the abdomen is closed, the gastropexy site is examined and lavaged. There should be no evidence of twisting or extraluminal obstruction. The abdomen is closed in a standard three-layer fashion.

Patient Management After Surgery

Injectable analgesia is routinely administered for the first few hours after surgery, and an NSAID is provided after discharge. Most elective patients are discharged the morning after surgery with instructions to feed small meals on that day. Management of

emergency patients after surgery frequently requires extended critical care based on clinical signs. Abdominal ultrasonography performed 6 to 12 months after surgery is recommended to identify adhesions typical of a gastropexy.^{12,19}

Dogs with a gastropexy can still develop gastric dilatation, but an effective gastropexy should prevent volvulus. When these dogs develop gastric dilatation, medical treatment should be adequate for resolution. If a gastropexy is known to be present, the emergency clinician should start medical treatment and examine the patient for radiographic signs of volvulus before making a decision to operate.

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