

# Belt loop gastropexy in the management of gastroesophageal intussusception in a pup

Geoffrey N. Clark, DVM; Gary J. Spodnick, DVM; John E. Rush, DVM, MS;  
Minta L. Keyes, DVM

A 5-week-old male German Shepherd Dog was referred to the veterinary medical center for evaluation of persistent regurgitation. The pup had a history of regurgitation of fluid following nursing that had been noticed for several weeks. Prior to examination by the referring veterinarian, the dog had regurgitated 6 times during a 6-hour period. Lateral survey radiography revealed evidence of a soft tissue density mass in the caudal thoracic region of the esophagus. Positive-contrast esophagography by use of barium sulfate outlined an irregularly shaped intraluminal mass obstructing the caudal thoracic region of the esophagus (Fig 1). The dog was referred for further evaluation and possible esophageal surgery.

Physical examination revealed a depressed and lethargic pup weighing 3.0 kg. Heart rate was 150 beats/min, respiratory rate was 60 breaths/min, and rectal temperature was 39.0 C. Gagging was observed in the examination room and the pup regurgitated a small amount of tan fluid.

The differential diagnosis at this time included megaesophagus, esophageal foreign body, hiatal hernia, and gastroesophageal intussusception (GEI). Esophageal endoscopy was recommended to further define the condition, with possible exploratory surgery to follow. Preanesthetic medication consisted of butorphanol tartrate<sup>a</sup> (0.1 mg/kg of body weight) and glycopyrrolate<sup>b</sup> (0.01 mg/kg) administered iv. General anesthesia was induced with mask delivery of isoflurane<sup>c</sup> in oxygen, followed by endotracheal intubation and anesthetic maintenance with isoflurane in oxygen. Esophagoscopy examination revealed a pink, fleshy mass in the caudal portion of the esophagus. The endoscope could not be passed into the stomach. A tentative diagnosis of GEI was made. The owners were informed of the findings and given an extremely

poor prognosis for survival. The owners elected to pursue an exploratory celiotomy.

The pup was positioned in dorsal recumbency and the caudoventral portion of the thorax and ventral portion of the abdomen were prepared for surgery. A ventral midline incision was made, extending caudally from the xiphoid process to the prepuce. The stomach and spleen were not visualized within the abdominal cavity. The duodenum could be followed to the level of the diaphragm, just to the left of midline. It was concluded that the stomach had invaginated into the dilated thoracic esophagus and the spleen had herniated through the esophageal hiatus. The remainder of the abdomen was normal.

Gentle traction applied to the duodenum resulted in reduction of the intussusception, with both the stomach and spleen being returned to the abdominal cavity. No abnormalities or evidence of ischemic damage were noticed in either organ. The diaphragm and esophageal hiatus did not appear grossly abnormal, but the hiatus was palpably large for a dog of this size. A belt loop gastropexy<sup>1</sup> was performed to prevent recurrent GEI. A small gastric mucosal perforation occurred while separating the layers of the stomach during elevation of the seromuscular flap. This rent was closed with a simple interrupted suture, using 4-0 chromic catgut. The abdomen was lavaged and a routine 3-layer closure of the celiotomy incision was performed.

Recovery from anesthesia was uncomplicated and the pup was quiet and responsive the following morning. Supportive therapy included lactated Ringer's solution and supplemental potassium chloride (20 mEq/L), administered iv at a rate of 3 ml/kg/h. Food and water were withheld for 36 hours following surgery. Small amounts of pureed beef diet<sup>d</sup> then were offered, with the food bowl placed in an elevated position. Intravenous fluid therapy was discontinued on the third postoperative day because the dog had an excellent appetite. The pup had only 1 episode of regurgitation during the postoperative period and was discharged from the hospital 4 days after surgery. The owners were instructed to feed the dog a bland diet (pureed beef

From the Departments of Surgery (Clark, Spodnick) and Medicine (Rush, Keyes), School of Veterinary Medicine, Tufts University, 200 Westboro Rd, North Grafton, MA 01536. Dr. Clark's present address is Animal Surgical Clinic of Seattle, 4102 Stone Way North, Seattle, WA 98103.

<sup>a</sup>Torbugesic injectable, Fort Dodge Laboratories Inc, Fort Dodge, Iowa.

<sup>b</sup>Robinul-V, AH Robins Co, Richmond, Va.

<sup>c</sup>AErrane, Anaquest-BOC Health Care, Madison, Wis.

<sup>d</sup>Pureed Chicken/Pureed Beef, HJ Heinz Co, Pittsburgh, Pa.

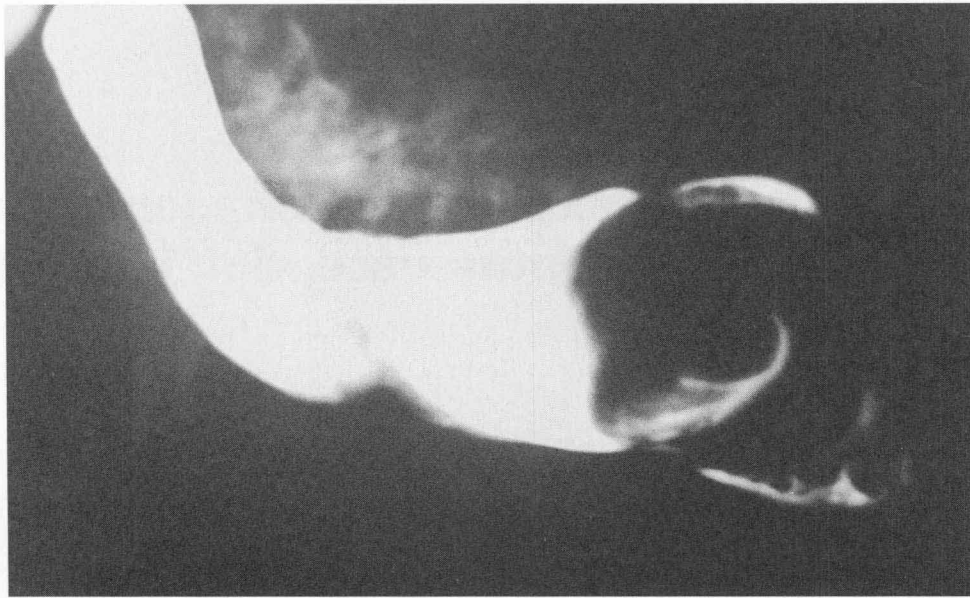


Figure 1—Right lateral thoracic radiographic view of barium sulfate contrast study of esophagus of a pup with megaesophagus and obstruction in the caudal thoracic portion of the esophagus.

or chicken)<sup>d</sup> 4 times daily with the food bowl in an elevated position. The owners were also advised to observe the dog closely for signs of abdominal discomfort, changes in breathing, and recurrence of regurgitation.

The pup was examined 13 days after surgery for suture removal and follow-up thoracic radiography. The pup had occasionally regurgitated at home, especially when it was fed larger amounts or more frequently than recommended. Survey radiography revealed a gas-filled, dilated esophagus with a stippled opacity in the craniodorsal portion of the thorax, consistent with the presence of food material within the esophagus. Barium paste<sup>e</sup> was administered orally and swallowing was observed fluoroscopically. The barium bolus passed normally into the cervical portion of the esophagus and then stopped. Both primary and secondary esophageal peristaltic waves were absent. Radiography performed 5 minutes following the fluoroscopic examination revealed a dilated esophagus with retention of barium and food material. The dog was sent home and the owners were instructed to continue feeding with the food bowl in an elevated position and to gradually increase the amount of dry dog food in the diet.

The dog was reevaluated 6 months following the gastropexy. The owners reported that the dog had been eating from a normal position without regurgitation for the previous 4 weeks. Physical examination revealed no abnormalities and the dog was in excellent condition with a body weight of 30.5 kg. Positive-contrast esophagography was repeated and swallowing was observed fluoroscopically. Esophageal motility was normal and post-

esophagogram thoracic radiography revealed complete clearance of barium from the esophagus (Fig 2) and no evidence of megaesophagus. As barium passed into the stomach, the pyloric antrum could be visualized in the normal postoperative position adjacent to the right lateral abdominal wall (Fig 3).

Gastroesophageal intussusception is a potentially life-threatening condition in dogs that has been described infrequently in the veterinary literature.<sup>2-7</sup> Leib and Blass<sup>2</sup> reported 1 case and also reviewed 22 cases of GEI that had been previously reported. The majority of dogs (81.8%) experiencing GEI were < 3 months old and only 1 dog was older than 1 year at the time of the intussusception. Fourteen (60.9%) of the 23 reported cases of GEI were in German Shepherd Dogs and in only 1 other breed, the condition has been reported 2 times.<sup>2</sup> German Shepherd Dogs have also been reported to have a high incidence of megaesophagus,<sup>8-10</sup> a condition that may predispose dogs to gastroesophageal intussusception. Preexisting esophageal disease has been documented in > 50% of dogs with GEI and only 3 dogs have been reported to have a normal esophagus at the time of invagination.<sup>2</sup>

Clinical signs associated with GEI include vomiting or regurgitation, dyspnea, hematemesis, abdominal discomfort, and shock. In most cases, affected animals deteriorate quickly, resulting in extremely high mortality.<sup>2</sup> Twenty-two of the 23 dogs (95.7%) with GEI have died or were euthanized because of their disease; 19 of these dogs (82.6%) died within 3 days of the onset of signs.<sup>2</sup> A correct antemortem diagnosis of GEI was made in only 5 of the 23 reported cases (21.7%).<sup>2</sup> Two of the dogs for which the cases were correctly diag-

<sup>e</sup>Esophatrast, Armour Pharmaceutical Co, Kankakee, Ill.

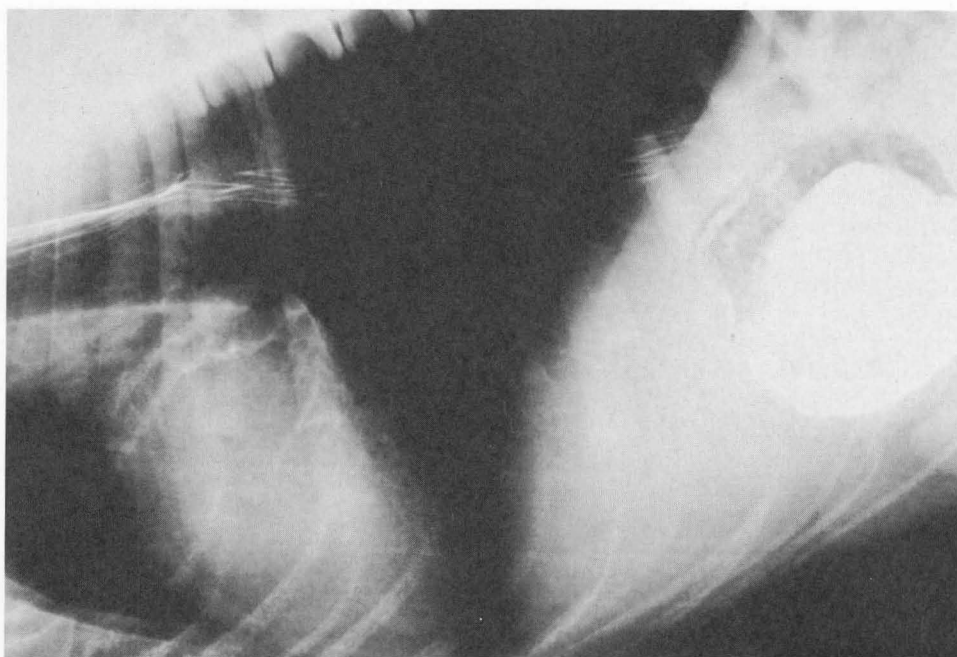


Figure 2—Right lateral thoracic radiographic view of barium sulfate contrast study of esophagus at 6 months following surgery. Notice no retention of barium within the esophagus.

nosed died before surgery could be attempted and a third dog was euthanatized after exploratory surgery confirmed the diagnosis of GEI. The other 2 dogs underwent emergency surgery for reduction of the intussusception and prophylactic gastropexy.<sup>2</sup> One of these dogs developed an intestinal intussusception 3 days later and was operated on a second time before subsequent euthanasia because of a deteriorating condition complicated by aspiration pneumonia. In the 1 dog that survived surgery, diagnosis was made promptly because a littermate had died of gastroesophageal intussusception 1 week earlier.<sup>2</sup>

The surgical management of GEI has not been described extensively. Therapy should be aimed at initially treating for shock and then restoring the normal anatomic position of the stomach. Gastropexy has been recommended to maintain the stomach in a normal position.<sup>2,11-13</sup> Specific recommendations for surgical technique include circumcostal gastropexy<sup>2</sup> and left-sided gastropexy.<sup>11</sup> Combination of the gastropexy with surgical alteration of the esophageal hiatus, using sutures<sup>11</sup> or fundoplication,<sup>13</sup> also has been advocated. The small number of animals managed surgically precludes an accurate evaluation of which technique is the most effective.

Belt loop gastropexy is performed commonly in adult animals; however, to our knowledge, this technique has not been reported in young dogs. Because of the small size of the pup of this report, the seromuscular flap that was elevated was smaller than the 2.5 × 4-cm flap originally described.<sup>1</sup> In addition, the layers of the stomach wall, which usually separate easily in the adult, were more dif-



Figure 3—Ventrodorsal-abdominal radiographic view of esophagus after barium sulfate administration. Notice pyloric antrum in close association with the right lateral abdominal wall.

ficult to separate in this pup. This resulted in inadvertent penetration of the gastric mucosa. The flap

was also thinner and appeared to have less tensile strength than similarly elevated flaps in adult dogs. This may have predisposed the flap to a small tear near its center. These 2 minor complications did not compromise the usefulness of this technique.

Follow-up evaluation of the gastropexy site was performed at the 6-month postoperative re-evaluation. Positive-contrast gastrography revealed the pyloric antrum to be in close association with the right lateral abdominal wall, suggesting an intact gastropexy site. The belt loop gastropexy technique appeared to be successful in creating a permanent adhesion of the pyloric antrum to the body wall despite the dog's young age and the delicate nature of the seromuscular flap.

Even though a standard right-sided belt loop gastropexy was successfully performed in this dog, an alternative technique could have been performed by use of the left lateral abdominal wall. This would require elevation of the tongue-shaped seromuscular flap from the greater curvature of the stomach rather than the pyloric antrum and creation of the belt loop in the transversus abdominus muscle caudal to the left costal arch. The esophageal hiatus is located to the left of midline, therefore, a gastropexy on the left side may actually have an anatomic advantage over a right-sided gastropexy in preventing recurrent GEI.

The apparent spontaneous resolution of megaesophagus in the dog in this report is unusual. In a review of 79 cases of megaesophagus in the dog, Harvey et al<sup>8</sup> found that 40% were euthanized because of factors related to the megaesophagus and another 34% died of complications. Of the 13 dogs still alive at the time of the review, only 5 had no persistent problems with regurgitation. In another review of 50 cases, 18 dogs were considered to have the congenital form of megaesophagus.<sup>10</sup> None of these dogs had clinical signs of improvement and only 13 were still alive 3 months following initial diagnosis. The congenital form of

megaesophagus has been attributed to the immaturity of the esophageal innervation and/or esophageal musculature.<sup>14</sup> Postnatal maturation was considered to account for the clinical improvement in some dogs.<sup>14</sup> It has been concluded by several investigators that the overall prognosis for dogs with congenital megaesophagus is poor.<sup>9,10,15</sup>

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