

SURGICAL MANAGEMENT OF GDV
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If you would like a video of this surgical procedure go to www.videovet.org.

Key Points

- Survival is generally determined by early and appropriate presurgical management
- Patients referred for surgery should be decompressed prior to referral with continued decompression provided during transport
- Incisional gastropexy results in a fast, easy, permanent adhesion
- Ventricular tachycardia is a common postoperative complication
- Gastric necrosis signals an unfavourable prognosis

Introduction: Patients with GDV are considered critical care cases; every minute of presurgical treatment is vital to a successful outcome. Survival is generally determined by early and appropriate presurgical management and urgent surgery as soon as the patient is stabilized. Efficient presurgical treatment usually involves a minimum of two people. Gastric decompression and shock therapy should be done simultaneously. If this is not possible; decompression should be performed first. It is stated that gastric decompression is the single most important factor in reversing cardiovascular deficits in patients with GDV.

Decompression: Generally, orogastric intubation can successfully be performed in 80 - 90% of GDV patients. If orogastric intubation is unsuccessful decompression via right flank needle puncture is indicated. It is also suggested that right flank needle puncture is recommended as a first attempt at decompression in severely depressed, metabolically deranged patients.

Orogastric Intubation Technique: The stomach tube is measured to the last rib and marked with a piece of tape. A stiff GDV, foal or mare stomach tube with a smooth bevelled tip works best (having several diameter and stiffness tubes is ideal). Apply generous lubrication to the tube. Place a functional mouth speculum; generally a roll of 2" tape secured in the mouth with tape encircling the muzzle. As the stomach tube is passed, you will often meet resistance at the lower esophageal sphincter. Pass the tube firmly in a twisting manner to encourage the tube to pass through the lower esophageal sphincter.

If unsuccessful, place the patient in various positions and attempt to pass the tube (i.e., elevate animal at 45 degree angle with hind limbs on the floor and front limbs on the table, right lateral recumbancy, and left lateral recumbancy). This movement may encourage the stomach to rotate enough to allow the tube to pass into the stomach. Be careful not to position the patient in dorsal recumbancy as this will increase abdominal visceral pressure on the caudal vena cava and thus exacerbate signs of shock.

If still unsuccessful, try different diameter tubes; try a smaller diameter, more flexible tube and proceed as described above.

If still unsuccessful, attempt to remove some of the air in the stomach by placing an 18 gauge needle at the point of distention in the right flank region. Ping the area to make sure the spleen is not under the proposed trocarisation site. After trocar decompression, attempt to pass the stomach tube as described above.

If still unsuccessful, sedate the dog with a narcotic (e.g., Oxymorphone) and try to pass the tube again. Mild sedation is recommended if the patient strongly resists physical restraint.

Success in passing a stomach tube depends on the skill of the operator and available assistants.

If you are successful at passing a stomach tube and plan to refer the patient to a referral surgical center for gastropexy, transport the patient with the tube remaining in the stomach (i.e., taped to the mouth) or bring the tube out through a pharyngostomy incision or place a nasogastric tube.

If a stomach tube was successfully passed, stomach contents should be evaluated for color and presence or absence of necrotic looking gastric mucosa. This may give an impression of gastric viability.

Fluids: Shock dosage of polyionic isotonic fluid is carefully administered to expand the vascular compartment. Patients are frequently monitored during fluid administration to help determine ultimate fluid rate and amount. One or two indwelling cephalic catheters are generally placed.

Referral: If you are successful at passing a stomach tube and plan to refer the patient to a referral surgical center for gastric derotation and gastropexy, transport the patient with the tube remaining in the stomach (i.e., taped to the mouth) or bring the tube out through a pharyngostomy as described below.

Pharyngostomy tube placement:

- a. Orally palpate the fossa lateral to the hyoid apparatus until a lateral bulge is seen
- b. Make a small skin incision over the bulge and press a curved forceps (substitute for finger) through the soft tissues and skin incision.
- c. Pull the stomach tube through the incision with curved forceps; then pass the tube over the arytenoid cartilages, down the esophagus, and into the stomach (measure to the 13th rib).

Disadvantages include: heavy sedation or general anesthesia is necessary for placement of the tube.

Rarely a temporary gastrostomy may need to be performed. The patient is placed in left lateral recumbancy with the right flank area clipped and surgically prepared. Heavy sedation and local infiltration of lidocaine or light general anesthesia is performed. A 4 - 5 cm incision is made in the skin over the point of greatest gastric distention (generally 1 - 2 cm caudal to the 13th rib and 2 - 3 cm distal to the transverse processes of the lumbar vertebrae). A grid technique is used to gain entrance into the peritoneal cavity. Due to severe gastric distention the stomach wall is pressed against the abdominal wall and thus easily identified through the flank incision. The stomach wall is sutured to the skin using a simple continuous pattern with 3-0 Maxon. This is done prior to incising into the stomach lumen. A #11 BP scalpel blade is used to puncture into the lumen of the stomach. Gas and stomach contents are expelled under pressure so stand back! The gastric mucosa is evaluated for viability. Disadvantages of gastrostomy include: the stomach is sutured in its rotated position and more time is required when definitive surgical treatment is performed due to the necessity of closing the gastrostomy.

Successful stomach tube placement: Once the stomach tube has been passed into the stomach or gastrostomy performed, the stomach is lavaged with warm water. If a stomach tube was successfully passed, the stomach contents should be evaluated for color and presence or absence of necrotic gastric mucosa. This may give an impression of gastric viability.

Surgical Treatment:

A specific 'Surgical Plan' should be in mind before entering the operating room theatre. This will improve the efficiency of surgery and thus decrease overall surgery time. The 'authors' surgical plan is as follows:

Stand on the right side of the patient.

Provide generous abdominal exposure via xyphoid to pubis midline laparotomy.

Remove of all of the falciform ligament to the level of the xyphoid.

Place a 10" Balfour self-retaining abdominal retractor (metal frame toward the patients head) with full retraction.

Confirm that the omentum is draped over the exposed surface of the stomach (pathagnumonic for GDV).

Attempt derotation by:

Standing on the patients' right side, first reach your right hand across the abdomen and place it between the left body wall and dilated stomach.

Slide your right hand along the sublumber body wall and grasp the deep (dorsal) aspect of the stomach at the level of the spine.

Next, place the open palm of your left hand on the exposed surface of the right side of the dilated stomach.

Using both hands simultaneously, pull the deep part of the stomach with your right hand to begin derotation whilst you push the right surface of the stomach down toward the patients sublumber body wall with your left hand. This maneuver will be successful in the majority of cases.

See this maneuver performed on the Emergency Surgery I, Gastrointestinal Surgery I, and Soft Tissue Surgery II surgery videos available at www.videovet.org.

Once the stomach is derotated, evaluate gastric viability (particularly the greater curvature and fundus) and for evidence of gastric motility.

Next, exteriorize the spleen from the abdominal cavity. Evaluate color, texture, blood flow (splenomegaly is often present and is NOT an indication for splenectomy). Gently palpate the splenic veins for evidence of venous thrombosis. Splenectomy is rarely performed but may be necessary if splenic vessels are thrombosed (veins feel like threads or rubber bands).

If the stomach is full of air or fluid it should be emptied prior to attempting derotation.

If the stomach is full of food and several attempts to derotate (see author's technique above) are unsuccessful, perform a gastrotomy and manually remove the food from the stomach lumen. Suture the gastrotomy and attempt derotation again.

Commence your gastropexy procedure.

Incisional gastropexy: This technique is based on a 3-4cm long seromuscular antral incision sutured to a similar length incision in the transversus abdominus muscle. This is the authors' technique of choice for permanent gastropexy.

With the Balfour retractors still in place visually locate the ideal position for the antral wall incision. It should be located equidistant between the pylorus and gastric incisure and equidistant between the greater and lesser curvature of the stomach. A 4cm longitudinal sero-muscular incision is made in this antral location. An easy way to safely make the sero-muscular incision is to grasp the full thickness antral wall with your thumb and finger at the site of the proposed incision, gently retract the wall of the stomach until you feel the mucosa and submucosa 'slip' out of your thumb and finger. The tissue remaining between your thumb and finger is the sero-muscular layer of the antral wall. Using a straight or curved Metzenbaum scissors cut the tissue remaining in your thumb and finger resulting in a perfect depth of the sero-muscular incision. Extend the incision to a 4cm length and gently undermine the edges to allow generous suture bites in the stomach wall during gastropexy.

Once the antral incision is completed remove the Balfour retractors. When selecting the location on the transversus abdominus muscle for the gastropexy, it is important to first visualize the location of diaphragmatic muscle fibers as they radiate into the abdominal cavity and attach near the costal arch. It is important that the gastropexy site be at least 2cm caudal to the diaphragm muscle insertion. After identifying the attachment of the diaphragm, the bleeding surface of the antral incision is brought to the right body wall. With the stomach in a normal position, the bleeding antral surface is touched to the peritoneal wall approximately 3-4 cm deep to the abdominal wall incision and 2cm caudal to the insertion of the diaphragm. A blood mark is created on the peritoneum at this proposed location. This will be the site for the permanent gastropexy. The peritoneum and transverses abdominus muscle are then incised creating a mirror image defect of the antral incision. The incisional defect in the stomach is then sutured to the incisional defect in the abdominal wall. The defects are sutured in two layers using a simple continuous pattern with 2-0 or 3-0 monofilament or multifilament synthetic absorbable suture.

Belt Loop Gastropexy: This technique is based on the construction of a sero-muscular antral flap attached around a segment of transversus abdominus muscle. A horseshoe shaped incision is made in the serosal layer of the antral portion of the stomach with its base at the greater curvature. The sero-muscular portion of the stomach is identified by grasping full thickness antral wall between the thumb and index finger and "slipping" the mucosal and submucosal layers away so only the sero-muscular portion of the wall remains between thumb and finger. The sero-muscular layer is incised with scissors and the horseshoe shaped sero-muscular antral flap is dissected and elevated of the submucosal layer. The stomach is replaced in the abdominal cavity in normal position and the sero-muscular flap lined up with the transversus abdominus muscle. Once this optimal location is discovered, two longitudinal incisions (along the fibers of the transversus m.) are made in the transversus abdominus m. The segment of muscle between the incisions is undermined. The sero-muscular flap from the stomach (i.e., belt) is passed through the transversus abdominus m. (i.e., loop) and sutured to itself to complete the "Belt-Loop" gastropexy. 2-0 or 3-0 monofilament absorbable synthetic suture in a simple interrupted or continuous pattern is used to secure the flap in place. Advantages of belt loop gastropexy include: it is relatively easy to perform alone and in the middle of the night, it can be performed quickly, and it is an effective means of permanent gastropexy.

Postoperative management

In most cases 3 to 4 days of intensive monitoring is necessary for the successful management of GDV patients. Postoperative considerations are listed below:

a. Shock is a postoperative possibility and the patient should be monitored and treated accordingly.

b. Patients are generally held off food and water for 24 hours following surgery. During this time maintenance fluids should be supplied using polyionic isotonic crystalloid fluid. Vomiting may occur following surgery; the NPO period should be extended accordingly. Gastritis and gastric motility disorder may be seen in post op GDV patients.

c. After 24 hours of no vomiting, oral alimentation should begin gradually with a sequence of ice cubes, water, and finally canned dog food. This should occur over a 2-3 day period.

d. Antibiotics should be continued for 7 - 10 days.

e. Routine surgical complications such as infection, dehiscence, seroma, etc. should be watched for and treated accordingly.

f. EKG monitoring: the most common severe postoperative complication is cardiac arrhythmia. Approximately 75% of GDV patients will develop arrhythmia's in the immediate postoperative period. Arrhythmia's can be present at the initial time of presentation but most often occur within 24 - 72 hours after surgery. Ventricular premature contractions, progressing to ventricular tachycardia is most common. Etiology is unknown but shock, hypoxia, acid base alterations, endotoxins, myocardial depressant factor (MDF), reperfusion injury, release of free radicals, and hypokalemia have been identified.

g. Gastric motility: occasionally GDV patients develop postoperative gastric motility abnormalities. Patients with gastric hypomotility or gastric stasis noted at the time of surgery should be treated with a motility modifier (i.e., metaclopramide, erythromycin, etc).