

CANINE GASTRIC DILATATION-VOLVULUS
Part 3 – Surgical Intervention/Post-Operative Care
Fax Continuing Education Series
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Surgical Preparation

Surgical preparation of the abdomen, ventral thorax, and inguinal area is best performed prior to anesthesia to minimize the time under anesthesia. The lateral abdomen is prepared for possible gastrotomy or jejunostomy feeding tube placement. The inguinal area is prepared in case central femoral vascular access is required intraoperatively.

Rapid intravenous anesthetic induction is performed so that immediate control of the airway can be taken. Ketamine (5 mg/kg) and valium (0.25 mg/kg) have few negative cardiovascular effects compared to barbiturates and propofol. The amount of pressure placed on the diaphragm by the dilated stomach will hinder effective chest expansion. Assisted ventilation is recommended regardless of spontaneous ventilatory efforts.

Appropriate intraoperative monitoring includes constant ECG for dysrhythmia detection. Blood pressure monitoring is important, especially when the stomach is decompressed completely, and the pressure on the central vein is released. A sudden decrease in preload can produce acute hypotension. In addition, many anesthetic agents augment hypotension (iso-, sevo-flurane) or potentiate arrhythmias (halothane). End-tidal CO₂ helps monitor for adequate ventilation. Pulse oximetry monitors trends of change in hemoglobin oxygen saturation.

Arterial blood gas analysis confirms that the instruments are working adequately and allows an assessment of the pH status. PCV/TS are essential in assessing the need for red blood cell and/or plasma transfusions, especially in the actively hemorrhaging patient. A PCV < 25% (hemoglobin < 8 g/dL) indicates the need for red cells/hemoglobin to provide oxygen carrying capabilities, and a TS < 3.5 g/dL indicates a need for plasma to provide albumin and other proteins. Lactate levels that are not decreasing following resuscitation suggest continued maldistribution of blood flow, and extreme elevations (> 10 mmol/L) may suggest hepatic failure.

Surgical Intervention

A routine approach to the abdomen is made from xyphoid to pubis. This approach allows adequate exposure for complete evaluation of the abdominal organs. If there is significant hemorrhage, sterile laparotomy pads may be required for packing. An attempt is made to pass an orogastric tube. The surgeon can gently guide the tube into the stomach after palpation of the gastric antrum and cardia. Most stomachs will be rotated with the pylorus traveling ventrally and to the left, so one hand is used to press the right side of the dilated stomach down and the pyloric region is grasped with the other hand and gently pulled up ventrally and to the right. If passage of the tube is not possible, and the stomach is not able to be derotated, a large bore catheter stylet or needle can be used for centesis or attached directly to a suction apparatus for gas and fluid removal. If there is a large amount of food in the stomach, a gastrotomy is performed and the ingesta shoveled out.

Hemorrhage is controlled with packing and/or ligation. Any questionable stomach wall integrity is noted, and the rest of the abdomen is explored. Gastrectomy may not be required once blood flow is reestablished. The spleen is often congested and may be displaced.

Evaluation for thromboses is made by palpation of the splenic arteries and inspection of the color of the parenchyma. Lack of blood supply or dark-purple color means the tissues have lost their blood supply and a partial or complete splenectomy is warranted. The pancreas is inspected for loss of blood supply and edema. The remaining intestines are inspected for pathology. The genitourinary organs are routinely evaluated.

Once the exploratory is completed the stomach is re-inspected. Most commonly the trauma to the gastric wall occurs along the fundus and cardia. If there are any black or dark purple regions, these should be removed with staples or resection. Any area that does not bleed bright red blood is suspect and should be removed. Large invaginations of ischemic tissues are not recommended because of potential life-threatening hemorrhage that can occur when the tissues slough. In contrast to the serosa, when the mucosa is black resection is not always necessary. The mucosa will regenerate if there is a healthy submucosa. However it is the author's experience that removal of compromised but viable tissue results in decreased hospital stay. Postoperative monitoring for intragastric hemorrhage is important. The spleen is re-inspected and either partially or completely removed if infarcted areas exist.

The type of gastropexy performed is completely dependant on the surgeon's preference and the time involved. If there has been any removal of gastric tissue, a tube gastrostomy, or combination tube gastrostomy and incisional gastropexy should be performed to permit continuous decompression and microenteral nutrition administration. Most catastrophic GDV patients will require on-going postoperative gastric decompression and gastrostomy tube placement is necessary.

The incisional gastropexy is rapidly performed and provides reliable adhesion. It is not recommended to suture the gastric wall to the midline abdominal incision, even in the critical GDV patient. Any future abdominal surgeries will be severely compromised by the adhesions formed.

Maintaining gastric decompression post operatively is recommended in the critical GDV patient. Gastrostomy tube placement allows large volume decompression and removal of large clots that can occur with large resections. Nasogastric tubes are appropriate when gastric resection is not required. Nasogastric tubes are preferably placed intraoperatively with proper placement assured by palpation. Small volume infusion of electrolyte/glucose/glycine containing fluids feeds the gastric mucosal cells, which rely on intraluminal contents for nutrition.

It is recommended that a jejunostomy or nasojejunostomy tube be placed if any significant gastric resection or pancreatic trauma occurs. Placed appropriately, intestinal feeding tubes provide immediate intestinal feeding postoperatively. It allows home care if gastric feeding is not possible once the animal is ready to be discharged. It also reduces the cost of parenteral nutrition because caloric requirements can usually be supplied within a few days.

Copious saline lavage and suction of the abdomen is necessary. A routine 3-layer closure is performed and placement of dressing over the incision site and ostomy tube sites. Any evidence of peritonitis warrants culture and sensitivity of the peritoneum and abdominal drainage.

Postoperative Care

It is not unusual for the post-operative GDV patient to continue to require large volumes of fluid replacement due to loss into the GI tract. Continuing colloid infusion at a maintenance rate promotes intravascular fluid retention during the healing process. Monitoring nasogastric tube suction volumes assists in more accurately determining volumes lost. When suction volumes decrease, this may indicate when re-feeding may be initiated. Infusion of a

balanced electrolyte/carbohydrate solution into the stomach promotes gastric mucosal healing and feeding.

Continuous or intermittent monitoring of the vital signs will detect development of hypotension and/or dysrhythmias that may require immediate therapy. Monitoring PCV/TS, glucose, BUN, albumin, electrolytes, acid/base status, coagulation, and lactate levels may uncover organ decompensation.

Intravenous analgesia and antibiotic administration is continued until oral feedings and medications are tolerated. The use of promotility agents such as metoclopramide and cisapride may improve gastric emptying more rapidly than without.

Serial monitoring of the postoperative GDV patient should include the following:

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| Fluid balance | Oncotic pull | Glucose, electrolytes, acid/base |
| Blood pressure | Mentation | Oxygenation and ventilation |
| Albumin | Coagulation | Heart rate, rhythm, contractility |
| Renal function | GI function | Red blood cell/hemoglobin |
| Nutrition | Drug admin | Immune status/WBC count |
| Incision site/bandages | Mobility | Pain recognition/control |