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EMERGENCY MANAGEMENT OF THE GDV PATIENT

Charlotte Donohoe, BA, RVT, VTS (ECC)
Ontario Veterinary College, Veterinary Teaching Hospital
University of Guelph, Ontario, Canada

CLINICAL SIGNS

Dogs that present with GDV may be walking, tail wagging, or may be recumbent and shocky. Typically, the patient has recently experienced episodes of non-productive retching, hyper salivation, discomfort and restlessness. Owners may have noticed signs of discomfort such as grunting, panting or reluctance to lie down.

PHYSICAL EXAM

It is important to understand that a patient presenting with a GDV may not appear clinical for this condition. Particularly in the early stages, vital signs may remain within normal limits (WNL). However, it is more typical to find that the patient is in some degree of shock.

Temperature

- Most often normal; however, some elevation may be seen due to increased respiratory rate, stress or pain
- Can be decreased due to hypoperfusion

Pulse

- Femoral pulses are often weak or thready
- Dorsal pedal pulses may not be palpable
- Heart rate most often elevated

Respiration

- Panting is frequently, but not exclusively observed

Mucous Membranes

- Membranes may be tacky (panting?) or moist (nausea? hypersalivation?)
- May appear pale pink or grey due to compromised circulation

CRT

- Typically prolonged, but may be normal (1–2 sec)

Electrocardiogram

- Sinus tachycardia
- May observe ventricular precontractions (VPCs); (occasional → strings → ventricular tachycardia)

Blood Pressure

- Dependant on presenting condition of patient
- May be normal, but most often reflects hypotension
- Recall that blood pressure should be measured using forelimbs

DIAGNOSTICS, STABILIZATION, AND TREATMENT

The course of action required for each given situation will vary based on the condition of the patient at presentation. In every case, however, intravenous (IV) access must be established. Relatively stable patients may only require one catheter, while patients that are

suffering moderate to severe cardiovascular compromise will require two catheters. It is generally accepted that peripheral catheters should not be placed in hind limbs as the venous return in these limbs is compromised. The expanding, gas filled stomach compresses major vessels delivering blood to and from the hind end. However, other schools of thought suggest that the venous circulation is not completely obstructed by the distended stomach and that hind legs are suitable for catheter placement.

Ideally, large bore catheters should be used. 18-gauge 2-inch catheters are easy to work with and are typically not resented by the patient. Larger catheters can be used. Pre-fluid bloodwork can be collected from the IV catheter at time of placement, before any fluid or flush has been administered. Minimum database should include PCV/TS, BUN stick, activated clotting time (ACT) where facilities permit, and blood glucose. Our hospital includes blood gases, lactate and electrolytes in the minimum database as we have the means to do so at bedside. Lactate levels can be helpful in establishing prognosis as levels climb with decreased perfusion and increased tissue hypoxia. Studies have shown that lactate levels below 6.0 mmol/L are associated with a good outcome. Lactate levels greater than 6.0 mmol/L are associated with increased mortality.

If possible, we strive to collect blood for complete blood count and biochemical profile that can serve as a baseline for comparison in the future.

Crystalloid fluid support should be initiated and tailored to each individual patient. Patients needing immediate cardiovascular support will benefit from boluses in increments of 10–15 mL/kg. Fluids can be administered at shock rate (canine: 90 mL/kg/hr), but it is recommended that smaller boluses be given to allow reassessment of the patient in between. Intravascular volume can be severely depleted in some cases of GDV. Fluid therapy including 7% NaCl (hypertonic saline) (4mL/kg over 10 minutes) or synthetic colloids (dextran, hetastarch or pentastarch) (5–10 mL/kg over 15 minutes; maximum dose of 20 mL/kg) may be useful in patients that would otherwise require excessive amounts of crystalloids to obtain an improved vascular volume. Regardless of which fluid regime is chosen, the patient should be reassessed frequently throughout fluid therapy. The absence of tachycardia, a near normal blood pressure and improved perfusion suggest that treatment is heading in the desired direction.

Analgesics

Gastric dilation volvulus is an extremely painful condition. Analgesics should be administered as soon as possible. Some clinicians may express concern with respect to opiates, as there is a tendency to witness vomiting upon their administration. With proper technique and careful selection, vomiting can be avoided. Once IV access has been established, opiate analgesics can be slowly titrated to effect. There is no need to administer an entire dose as a bolus. Generally speaking, these patients are painful and will benefit from opiates. In rare cases, the patient is not as painful as we

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perceive and may experience a slight degree of nausea with opiate administration. At the earliest sign of nausea, the titration may be stopped. If the patient continues to experience negative side effects, the opiate may be reversed using naloxone (see notes for dose).

Most often, our drug of choice (in the ICU) is Hydromorphone. A dose of 0.05–0.1 mg/kg IV is SLOWLY titrated. We will start with the low end of the dose and repeat as needed. Fentanyl and butorphanol are other alternatives, but each has drawbacks. Fentanyl is an incredibly short-acting opiate and will most often only last approximately 20 to 30 minutes. In order to maintain the effectiveness of fentanyl, the bolus must be followed with a continuous rate of infusion (CRI). Butorphanol is a slightly less potent analgesic that may not meet the patient's needs. In addition, the disadvantage to using Butorphanol is its ability to partially reverse opiates that may be used for analgesia, premedication, anesthetic induction and maintenance at time of surgery.

Radiography

Radiographs should only be taken once the patient has been stabilized. If there is any doubt as to the condition of the patient, radiographs are useful to confirm the presence of dilation and volvulus if not completely evident on presentation. Remember that the degree of technical difficulty involved in radiographing a painful, stressed, large to giant breed dog will be lessened by providing analgesia. Right lateral radiographs are most useful in diagnosing GDV. Presence of a large, gas-filled stomach is characteristic. The pylorus is positioned (abnormally) in the dorsal aspect of the abdomen, on a lateral radiograph, creating a distinct "shelf" between pylorus and fundus.

Decompression

Occasionally a patient will present in an immediately life-threatening state of cardiovascular compromise. In this case, the patient's stomach must be decompressed immediately. Radiography is not necessary. Decompression may be achieved by trocarizing the stomach.

The patient must be placed in lateral recumbency (left recommended, but can be right). The stomach is percussed. The tympanic area, usually at the highest point of the body, is clipped and surgically prepared. Areas that percuss with a dull sensation should not be trocarized, as they are most likely an organ. It is possible for the spleen to be involved in the torsion and be positioned abnormally as a result. A large bore catheter (14- to 16-gauge) is passed through the skin into the stomach. The catheter should be inserted right up to the hub since the stomach will fall away from the body wall as it decompresses; allowing the catheter tip to fall out of the gastric lumen. Large volumes of fetid gas and moisture are expelled through the catheter.

If patient's condition is fragile but not immediately life threatening, decompression can be attempted via orogastric intubation and gastric lavage. The patient is placed in sternal recumbency, preferably on an elevated

surface. A large role of tape can be fashioned as a mouth gag. The tube is measured from the tip of the rostrum to the last rib or the xiphoid process. The tube is lubricated and gently passed through the mouth gag. Observe for signs of swallowing. If moderate amount of resistance is encountered, do not force the tube. It is possible to rupture the esophagus if too much force is exerted on the tube. It may not be possible to pass a stomach tube in all cases.

Successful passage of stomach tube into stomach does NOT rule out the possibility of torsion. Gas is allowed to escape; warm water lavage may be performed to facilitate removal of food material and ingesta.

Electrocardiogram

It is not uncommon for GDV patients to experience arrhythmias. Ventricular premature contractions (VPCs) and ventricular tachycardia are the most common. Surgical correction of the torsion +/- splenectomy often eliminates the cardiac arrhythmias. However, in other cases, poor perfusion and hypoxia have affected the myocardium and the arrhythmias will persist. Arrhythmias are of utmost concern postoperatively as they can progress to ventricular fibrillation and death. Ideally, postoperative patients should be maintained on continuous ECGs.

Occasionally, postoperative patients are placed on CRIs of antiarrhythmic medication preventatively. This varies with clinician preference. If occasional VPCs are noted, it is most common not to treat the disturbance at this point. Strings of VPCs can quickly progress to ventricular tachycardia and we often initiate treatment at this stage.

In our hospital, ventricular tachycardia (v-tach) is treated based on certain criteria. If the rate of the v-tach reaches >140 bpm, there is sustained v-tach causing poor blood pressure, there are R on T complexes, or the animal is otherwise symptomatic (weak, lethargic, depressed), antiarrhythmic therapy will be instituted.

Anesthesia

Due to the compromised state of the GDV patient, anesthesia can be complicated. These patients are often hypotensive, hypoxic and experiencing cardiac arrhythmias prior to induction of anesthesia. Since these conditions can be further antagonized by anesthetics, careful selection of sedative agents and anesthetic drug protocol is necessary. Cardiovascular side effects of agents should be evaluated as well as arrhythmogenic potential. Generally speaking, narcotic agents are safer choices than barbiturates. Sedatives that potentiate hypotension should be avoided (ie, acepromazine). Inhalant agents such as Isoflurane and Sevoflurane are preferred, while halothane and nitrous oxide should be avoided.

Ideally, ECG, blood pressure and oxygen saturation should be monitored throughout anesthesia. Serial PCV/TS, blood gases and electrolytes should be performed, where possible, throughout surgery.

Patients should be maintained on i.v. crystalloid fluid therapy at rates of 10–15 mL/kg/hr during anesthesia. However, fluid rates must be adjusted to meet individual patient needs. In severely hypotensive animals, IV vasopressors may be necessary.

Surgical Correction

Surgery is needed to correct the malpositioned stomach +/- spleen. The stomach is decompressed via orogastric intubation and/or gastrocentesis. The abdomen is evacuated and lavaged. The stomach and spleen are examined for signs of devitalization, and avulsed or thrombosed blood vessels. Gastric or splenic resection may or may not be necessary.

Gastropexy

This procedure can be performed using many different techniques. Ultimately, the stomach wall is surgically fastened to the abdominal wall to prevent reoccurrence of the torsion. A scar forms between the two surfaces; acting as a permanent anchor. Dilation of the stomach is still possible, but if the scar remains intact, volvulus should not be possible.

POSTOPERATIVE CARE

Continuous care is mandatory in post operative GDV patients. The potential for complications is ever-present. These patients require continuous monitoring of all parameters, with an emphasis on pain management and cardiac rhythm. It is not appropriate to surgically correct a GDV and leave the patient alone in the postoperative period. Patients may be referred for postoperative care if the facility performing the emergency surgery is not operational 24 hours per day.

A gradual return to normal feeding can be achieved in small increments. Initially, small amounts of water can be offered. If these are well tolerated, the patient can be offered small meals with increasing frequency. A bland, easily digestible diet is preferable. There is a variation in opinion amongst clinicians with respect to how long patients are maintained NPO (nothing per os) after surgery. Most often, the patient is offered a small amount of water within the first twenty four hours. If water is tolerated, small quantities (a meatball) of canned food are offered between twenty four and forty eight hours.

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