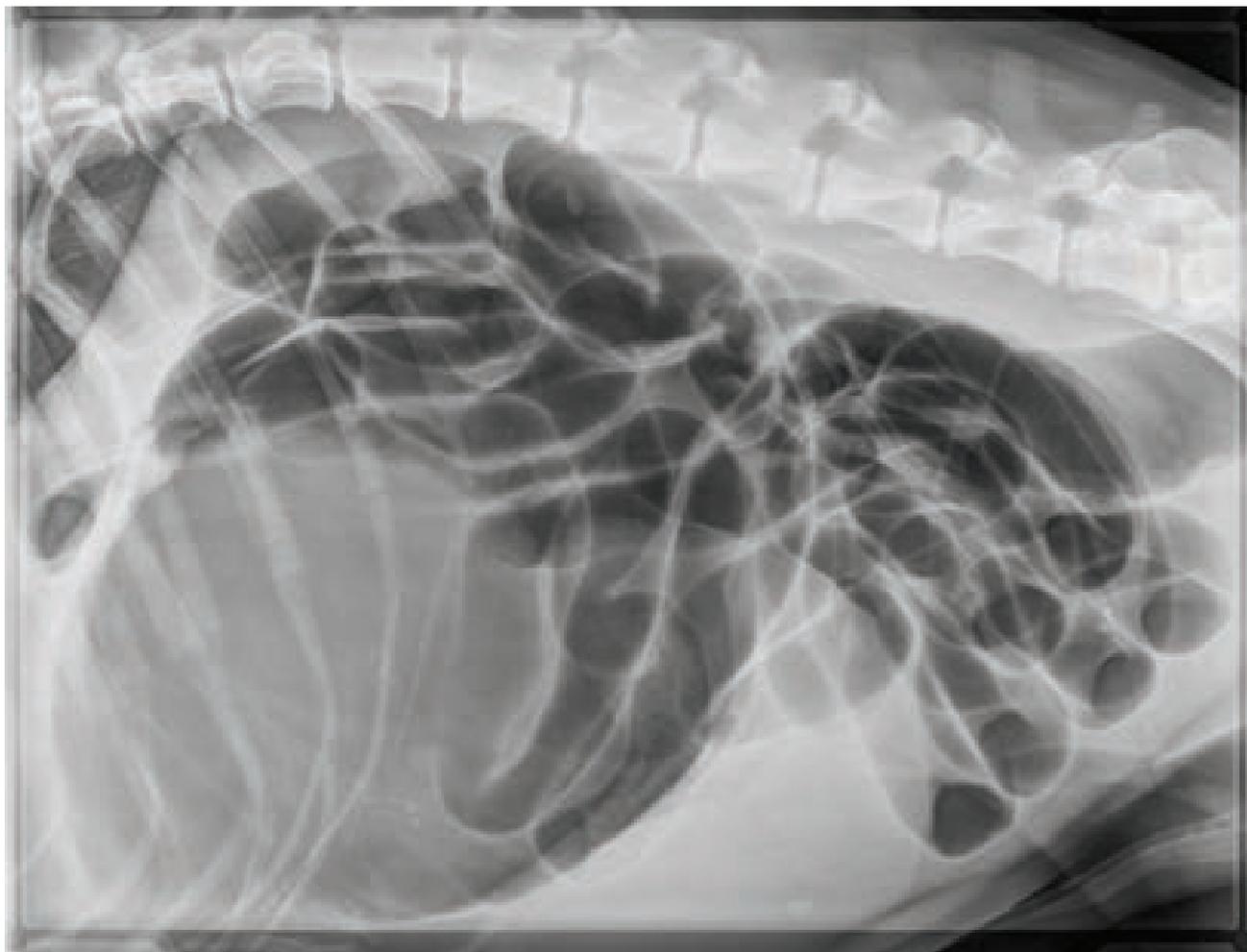


# Intensive care nursing – the gastric dilatation volvulus patient

Helen McGlone Dip VN RVN, discusses the emergency nursing care of one of the true emergencies encountered in small animal veterinary practice



**Figure 1: X-ray showing gastric dilatation and torsion (volvulus) in a German Shepherd dog. The large, dark area is gas trapped in the stomach.**

Gastric dilatation volvulus (GDV) in its most severe form, is the dilation and rotation of the stomach upon its mesenteric axis, into abnormal position, leading to the build up of stomach contents and gases.

Upon admission to the ICU, the GDV patient will present with unproductive retching, abdominal distension and tympany, cyanosis, poor peripheral pulses, hypothermia, tachycardia, tachypnoea or collapse.

First aid should be commenced while the veterinary surgeon performs his/her clinical examination.

An airway must be maintained. Oxygen therapy should be commenced via facemask or flow-by if the patient is stressed.

Intravenous (IV) access should be established – two wide bore IV catheters can be inserted into each cephalic vein as aggressive fluid therapy is commenced. Saphenous veins are unsuitable for use in these cases due to the obstruction

of the caudal vena cava.

Early decompression can be attempted by gastrotomy to stabilise the animal and return blood flow back to the heart as soon as possible, limiting ischaemic injury. A stomach tube may be passed to facilitate decompression but the veterinary team should be aware of the drawbacks of inserting a stomach tube prior to anaesthesia which are inadvertent inhalation of gastric contents or accidental gastric perforation.

A diagnosis is usually reached by the clinician after clinical examination and confirmed by radiographic imaging of the abdomen.

Analgesia should be commenced as soon as possible.

The analgesic regime should be at the discretion of the veterinary surgeon. An opioid analgesic followed by a constant rate infusion (CRI) of fentanyl, ketamine and lidocaine CRI, is one of the most favoured analgesic

## I NURSING

regimes for GDV amongst clinicians.

Lidocaine as well as being an anti-arrhythmic, has known cytoprotective properties, good for use in patients at risk of endotoxaemia.

The condition is typically seen in large and deep-chested breeds of dog, but can occur in any breed. It is thought to be related to having ingested a large meal or substantial amounts of water immediately before/after engaging in heavy exercise. Genetics and chest or abdomen configuration have been thought to play a role.

Dilation of the stomach is due to fermentation of gastric contents causing gastric dilation and pressure on the hepatic portal vein and caudal vena cava – thus, causing reduced venous return, ventilatory restriction, and visceral ischaemia. This condition results in severe circulatory collapse and shock – hypovolaemic shock, obstructive shock, and or septic shock.

### TYPES OF SHOCK

#### HYPOVOLAEMIC SHOCK

A presentation as a severe form of shock resulting from decreased circulating blood volume, which requires rapid correction.

#### OBSTRUCTIVE SHOCK

Due to impaired venous return to the heart by the dilated

and torsioned stomach, thus, leading to reduced cardiac output and obstructive shock. This type of shock is best treated with gastrocentesis and the patient sent to theatre for surgical de-rotation.

#### SEPTIC SHOCK

This can occur as a sequela to severe tissue damage causing bacterial translocation from the gastrointestinal tract into the bloodstream. Ischaemic tissue injury leads to cell death, causing white blood cells (WBCs) to be drawn to the site of injury and the release of inflammatory mediators. This presents with clinical signs of pyrexia, vasodilation, hyperaemic mucous membranes and hypotension.

#### CORRECTION OF SHOCK

Aims of therapy are; correct hypoperfusion and increased oxygen delivery. Reperfusion with crystalloid IV therapy is initially recommended, typically 7.5% hypertonic saline at 5ml/kg given in five minutes is the fluid of choice to increase intravascular volume, followed by rehydration with crystalloid administration at 20ml/kg/hr as per response to treatment.

However, fluid resuscitation can lead to haemodilution; if the PCV is below 25 the clinician may consider administration of a blood transfusion. Oxyglobin (currently unavailable in Ireland) may perfuse remote tissues better than whole blood, due to the particle size in oxyglobin being smaller than a red blood cell.

Aggressive crystalloid IV therapy can result in hypokalaemia; this should be monitored and supplemented as required as it can lead to cardiac arrhythmias and cause ileus – which can lead to anorexia post-operatively for the patient.

Warming should be initiated in the initial stages of treatment to correct hypothermia resulting from shock.

Warming methods that may be useful are:

- Forced air warming system blankets;
- Heat pads placed underneath the patient;
- Thick blankets placed over the patient;
- Warmed crystalloid administration;
- Heated kennel environment; and
- Bubble wrap placed around extremities.

Close monitoring of core temperature is required. As hypoxia can very much contribute to hypothermia, ongoing oxygen supplementation may be required.

#### COMPLICATIONS OF GDV

Shock, even without infection present, causes an inflammatory response and can spread from a local to a widespread systemic response. This is called systemic inflammatory response syndrome (SIRS). Classic signs are vasodilation, hypotension, tachypnoea, tachycardia, pyrexia, and increased WBC count.

SIRS causes endothelial damage, platelets then become activated and the clotting cascade is initiated. Tiny microscopic clots form in the bloodstream causing further impairment of blood flow to the tissues. Furthermore as clotting mechanisms are taken up, normal clotting



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mechanisms become impaired and this can lead to spontaneous bleeding. This thrombotic condition disseminated intravascular coagulopathy (DIC) is commonly associated with septic patients.

Multi-organ dysfunction syndrome is another complication after SIRS and DIC if enough organ damage occurs eg. kidneys, liver, heart and lungs can be permanently damaged or fail.

Ischaemia associated with obstructive and hypovolaemic shock in GDV patients can lead to anaerobic respiration of cells and lactic acid build up. Reperfusion injury ensues as lactate and reactive oxygen free radicals are released into the system. Plasma lactate levels should be monitored regularly. Free radical scavengers may be administered by the clinician also.

After decompression of a GDV rapid flow of blood back to the heart can cause myocardial depression and cardiac arrhythmias. An antiarrhythmic should be administered. Electrocardiogram (ECG) monitoring should be carried out by the ICU nurse for 24-48 hours and any arrhythmias should be reported to the veterinary surgeon.

Rhabdomyolysis is the breakdown of muscle tissue fibres, following ischaemic injury to muscle tissues. Myoglobin is released into the blood stream. Haemoglobinuria can be a clinical sign of rhabdomyolysis as it is attempted to be excreted by the kidneys, causing blockage of the renal tubules and kidney failure.

Visceral ischaemia can occur from ischaemic injury of the stomach, heart, liver kidneys and spleen.

Ischaemic injury to the stomach wall can lead to necrosis, perforation, and peritonitis as a result. Early antibiotic administration should commence.

Gastric ulceration can be a complication and can be avoided by administering a systemic proton pump inhibitor. Nursing intensive care patients is a focused and specialised role. Systematic delivery of nursing care should be provided, and the recording of patient assessment, planning for potential complications, nursing interventions required and later assessment of goals achieved. This cycle should be performed until all nursing outcomes have been reached.

### PATIENT MONITORING

Nurses need to spend more time with patients, and provide the clinician with crucial observations, necessary for successful patient treatment.

Maintaining homeostasis is vital and any changes in status must be reported, communication within team members is fundamental in the post-operative care.

Parameters that should be constantly checked and recorded are:

- ECG – variations may indicate cardiac arrhythmia;
- Blood pressure – central venous pressure is indicative of circulatory volume;
- Blood gases – to monitor for metabolic imbalances;
- Lactate levels – an indicator of perfusion and level of injury to the tissues;
- Total solids and PCV – as indicator of oxygen carrying capacity of the blood and plasma protein levels;

- Electrolytes – as an indicator of metabolic disturbance, will require correction;
- Temperature, pulse and respiration (TPR);
- Urine output – as indicator of renal function; and
- Blood urea nitrogen – often raised due to hypotension or hypovolaemia.

### PAIN SCORING

Indicators of pain should be monitored regularly eg. the Glasgow Pain Scoring Method. Opioid analgesia proves the safest for use in these patients. Using local anaesthesia at the pexy site and in the muscle wall, reduce requirement for opioid analgesia.

Patient comfort is essential when nursing inpatients. These patients are critically ill, any stress may lead to increased convalescence. The animal should be kept comfortable on thick, clean bedding. Orthopaedic mattresses can be used to provide cushioning, vet beds can be placed underneath patients as they are very absorbent and can draw any fluid away from the body. Rotation of the patient should be carried out regularly, which will reduce the risk of decubital ulceration.

Social interaction with caregivers can alleviate stress for the patient and increase their sense of wellbeing this will lead to a quicker recovery and improved outcome.

### NUTRITIONAL MANAGEMENT

Nutrition is an important consideration for the management of these cases. Adequate nutrition is essential to maintain metabolism, albumin production and immune function.

Early nutritional support has been beneficial in reducing lactic acid build up and the risk of SIRS or DIC. Nutritional supplementation is often required as many patients post-operatively experience pain leading to anorexia. Ideally, a gastric feeding tube will have been placed intraoperatively to supplement enteral feeding without stress to the patient.

Oral rehydration therapy should be started from two hours post-surgery, before food can be given. Early administration of electrolytes can supplement nutritional requirements for these animals and can be a source of fuel especially if the rehydration solutions contain glutamine – a readily available fuel source for the enterocytes.

It is recommended that food should be offered eight to 12 hours after surgery. A high-calorie recovery diet is preferable for the patient, and the patient should be fed little and often, to prevent overstretching of the stomach wall. Slowly increase intake of food.

Restriction of exercise should be advised at home and nutritional advice should be given to owners on how often and what to feed. If the animal is receiving tube feeds the owners should be well aware of how to carry this out at home. A buster collar should be worn to prevent the patient interfering with the wound, advice on wound management given and appointments for check-ups should be scheduled. Reoccurrence of GDV is not unheard of and owners must be advised of the potential for this as well as recommendations for prevention.