

## **ACUTE ABDOMINAL HEMORRHAGE**

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Abdominal hemorrhage can result from disruption of a “blood” organ such as the liver or spleen, damage or avulsion of an abdominal artery or vein, or coagulation defect. The presence of blood in the abdomen can result in acute and severe pain from the abdominal cavity, abdominal organs or the nerves, muscles, fascia or skin associated with the abdomen. The most common etiologies are rupture of a splenic or hepatic mass, abdominal trauma or coagulation defects.

### **Physical Examination**

The clinical signs exhibited by the animal can depend upon whether the onset of abdominal hemorrhage is acute or chronic. Acute pathology typically causes signs of hemorrhagic shock with mucous membrane pallor, prolonged CRT, rapid heart rate in dogs, and weak or absent peripheral pulses. A chronic onset may allow adequate cardiovascular compensation for the blood loss and instead show restlessness or reluctance to lie down, abdominal distension or arched back, fever, anorexia, and/or depression and malaise. A heart murmur may be auscultated due to anemia. It is important to localize any pain and assess the severity. Umbilical and peritesticular skin discoloration can be seen when intra-abdominal hemorrhage dissects through the abdominal muscles and subcutaneous tissues.

Abdominal palpation is carefully performed to detect free abdominal fluid, abdominal distension, mass lesions, organ enlargement, or bowel distension. At least 40 ml/kg of peritoneal fluid is required to detect a fluid wave.. Focal pain suggests involvement of nearby structures. Generalized pain implies a diffuse disorder of the abdominal cavity. Palpation that causes retching or vomiting implies irritation of regional organs. Severe pain suggests visceral and parietal peritoneal involvement. Dull, poorly localized pain suggests a diffuse inflammatory process.

The presence of gastric or bowel sounds implies gastrointestinal (GI) motility is present. A silent abdomen suggests hypo motility, ileus, fluid accumulation, or diffuse peritonitis. Rectal examination is important to detect blood, pelvic fractures, and involvement of the prostate or urethra. Careful examination is made for evidence of back pain which may lead to signs of an acute abdomen. And a careful assessment of the body wall is made, looking for evidence of trauma, contusion, ecchymosis or petechiation.

### **Diagnostics**

An emergency data base should provide: PCV and total protein; serum color for icterus, lipemia or hemolysis; serum for glucose, electrolytes, blood urea nitrogen; platelet estimate, activated clotting time; urine specific gravity and evidence of glucose, protein, bacteria, white blood cells and renal tubular cell casts. The complete data base will include: complete blood count, biochemical profile, amylase, lipase, coagulation profile, antithrombin III, and arterial blood gases, and electrocardiogram. A paracentesis is often done prior to radiographs to evaluate any free peritoneal fluid. When hemorrhagic fluid is obtained, it is evaluated by cytologic examination, hematocrit, and total protein. Abdominal radiographs are evaluated for generalized loss of detail as a sign of diffuse peritoneal disease if there was no fluid obtained by paracentesis. Thoracic radiography can be indicated for dogs with hemoperitoneum to detect concurrent thoracic trauma or hemorrhage, and as a screen for metastatic disease (3 view thoracic study).

A focused abdominal sonography for trauma (FAST) protocol has been described for dogs. The dog in left lateral recumbency quickly scanned in 4 abdominal regions: immediately caudal to the xiphoid process; on the ventral midline over the bladder, over the right flank (gravity-independent region), and over the most gravity-dependent area of the left flank. Though the source of hemorrhage may not be apparent, the abdomen can be scanned for intra-abdominal masses and evaluation of organ parenchyma.

Diagnostic peritoneal lavage is done when the diagnosis is uncertain with paracentesis and ultrasonography. A peritoneal catheter is placed and 10-20 ml/kg of sterile isotonic saline is infused into the abdomen: the animal is rolled and gently palpated to move the fluid. A sample is withdrawn and evaluated as described above. A WBC count and differential of the lavage fluid is indicated, particularly if repeated lavage is going to be used to help make the decision concerning the need for surgery. Centrifugation a collection of the sediment is required for the cytologic exam of the lavage sample. Plasma is added to the lavage fluid (1:1) before centrifugation. This helps preserve cellular morphology and obtain a better concentration of cells on the slides as they adhere better to the slides surface. If plasma can not be used the sample must be spun down immediately and the sediment spread in the slides within 20 to 30 minutes of collection to avoid cytolysis from the use of a severely hypo osmotic fluid that the cells are suspended in.

A peritoneal catheter can be inserted into the abdomen and left in place during resuscitation.

Fluid is collected on a periodic basis and evaluated for an increasing PCV. When the PCV is found to increase by 5% during fluid resuscitation, there is strong evidence for on-going intra-abdominal hemorrhage.

### **Treatment**

The immediate goals of treatment are to ensure airway, breathing and circulation. Abdominal distension with blood can cause hypoxemia and/or impair ventilation, requiring oxygen support and possibly intubation and ventilation during stabilization. Fluid therapy for poor perfusion can require one or more large bore indwelling intravenous(IV) catheters and fluid replacement with crystalloid, plasma expanders such as hetastarch or oxyglobin, and whole blood or packed red blood cell therapy for blood loss. It is important to identify and treat any conditions contributing to shock such as vasovagal reflex and bradycardia, cardiac arrhythmias, hypovolemia, and sepsis. Resuscitation from shock should bring blood pressure back to low normal range only to avoid exacerbation of bleeding. This is accomplished by selecting "hypotensive resuscitation: end-points reached using small volume resuscitation techniques. Analgesics are often required during fluid resuscitation. Injectable analgesics such as butorphenol (0.01 mg/kg IV) or oxymorphone (0.05-0.1 mg/kg IV in dogs; 0.02 mg/kg IV in cats given with tranquilizer) are given. They may be combined with a tranquilizer such as diazepam (0.2-0.6 mg/kg IV).

Animals with ongoing hemorrhage may require rear limb and abdominal counter pressure to tamponade the bleeding occurring within the peritoneal or retroperitoneal space. Emergency surgery is often required as part of the immediate stabilization for on-going abdominal hemorrhage. It is often necessary to apply rear limb and abdominal counter pressure with ongoing intra-abdominal hemorrhage to get the patient stable enough for anesthesia.

When coagulopathy is the cause of abdominal hemorrhage, whole blood transfusions may be required to stabilize the cardiovascular status. When anticoagulant rodenticides are the cause, vitamin K1 should be administered orally or subcutaneously. Antibiotics are a part of the resuscitation plan when there is severe shock. Translocation of gram positive and negative aerobes and anaerobes can occur with shock and injury to any of the abdominal organs. Broad spectrum antibiotics (such as cefazolin 40 mg/kg IV and then 20 mg/kg IV TID-QID) are administered after samples of blood, urine and/or septic focus are taken for culture. Any suspicion of liver or splenic involvement warrants the administration of metronidazole 7-10 mg/kg given over 30 min IV TID.

### **Patient monitoring**

Establishing a check-off list ensures that complications are detected and treated early. The Rule of 20 includes monitoring the following parameters: fluid balance, oncotic pressure, albumin, blood pressure, heart rate and function, ventilation and oxygenation, electrolytes, renal function, red cell mass/hemoglobin, mentation, glucose, immune status and function to include antibiotic selection, liver function and drug dosages, nutrition, coagulation, wound care and bandages, nursing care and orders, analgesia, GI function and motility, and tender loving care.

Worsening of the animal's condition is indicated by the following: failure to maintain blood pressure and fluid volume; appearance of multiple organ dysfunction; increase in pain intensity or distribution; development of shock in a previously stable animal; failure of respiratory system; death.