



The Acute Abdomen

Mini Series

Session Three: How to Manage a Haemoabdomen

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Acute abdomen mini series

HOW TO MANAGE A HAEMOABDOMEN

Haemoabdomen occurs most often secondary to a ruptured splenic neoplasm. The majority of patients will present due to collapse and hypovolaemic shock and many may have had an episode of weakness within the preceding weeks. It is not commonly a painful condition; however a small proportion of animals will have abdominal pain. Haemoabdomen may also occur secondary to trauma and this should be carefully evaluated in the history and by thorough physical examination to identify external evidence of a traumatic event.

Diagnosis

Abdominocentesis and peripheral blood work

The PCV of the fluid from the abdomen will be similar to or greater than peripheral PCV. The PCV of effusions that appear haemorrhagic grossly should always be measured: fluids with a PCV of 5-10% may grossly appear very bloody. However these cases do not represent true haemoabdomen and an alternative cause for their effusion should be sought. Note that the blood should not clot; if it does it is possible the spleen may have inadvertently been penetrated.

Differential diagnoses for haemoabdomen

- Splenic neoplasm
- Hepatic neoplasm
- Traumatic injury to spleen, liver, kidneys or great vessels
- (Coagulopathy)



Acute haemoabdomen associated with angiostrongylosis

(Willesen et al., 2008, Humm & Boag, 2008)

The incidence of Angiostrongylosis is on the increase in the United Kingdom. The coagulopathy caused by this parasitic infestation is not fully understood but it seems to be able to manifest in many different ways, including as a haemoabdomen. Whilst in the past in the UK, diagnosis of haemoabdomen by abdominocentesis was a reasonable basis on which to perform an exploratory laparotomy without further abdominal imaging, this is no longer the case. It is important not to get caught out by Angiostrongylosis, where surgery would not be the most appropriate course of action. Examine a faecal smear for Angiostrongylosis larvae if you have any doubts or routinely if possible.

Management of haemoabdomen

- Rapid aggressive blood volume expansion
- Early definitive control of haemorrhage by surgical exploration

Blood volume expansion

- Place two large-bore intravenous catheters
- Intravenous fluids (crystalloids) are started up to a maximum of 60 to 90 ml/hour for the first quarter of an hour; this should be re-evaluated every 15 minutes and adjusted as based upon the patient's response. Mucous membrane colour, capillary refill time, heart rate blood pressure and PCV and TP are evaluated every 15 minutes while the patient is being stabilised.
- External pressure may be applied to limit ongoing haemorrhage by placing a well padded bandage around the abdomen; this is only a temporary measure.
- If ongoing haemorrhage is occurring then a blood transfusion and surgical intervention will be required. Blood transfusions are necessary when the PCV falls rapidly below 25%.

Staging for neoplastic disease

Thoracic radiography should be performed prior to surgery to identify evidence of metastatic disease. Metastasis of haemangiosarcoma occurs to the right atrium and can lead to pericardial effusion; echocardiography is likely to be unrewarding in the absence of a pericardial effusion and therefore thorough physical examination and cardiac auscultation are sufficient to screen for active cardiac disease, however if in any doubt a basic ultrasound scan of the heart will confirm or refute the presence of pericardial effusion. Evidence of cardiac or pulmonary neoplasia are indications that euthanasia should be considered. If abdominal ultrasound is performed pre-operatively, the identification of hepatic nodules should not be a basis for recommending euthanasia. Regenerative hepatic nodules are common in older dogs; biopsy should be obtained at surgery. Pre-operative abdominal ultrasound can be reassuring for the inexperienced surgeon who may be happy to perform a splenectomy but would struggle to address a bleeding adrenal neoplasm or hepatic mass.

Outcome for splenic haemangiosarcoma

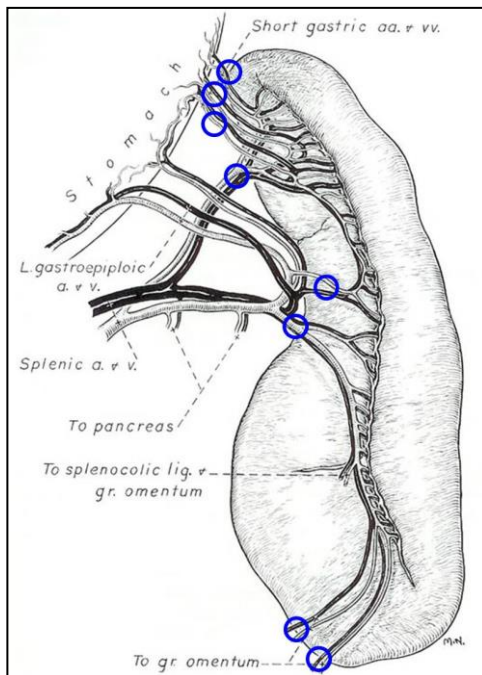
The long term outcome is poor, with the average survival times post-operatively to be around 3 months. The use of adjuvant chemotherapy may increase this survival time to around 6 months. Whilst this is a short period of time to gain from surgical intervention, as there are often no clinical signs other than related to haemorrhage, once the splenectomy has been performed and the patient has been stabilised they often recover quickly and are soon able to return home. This often provides the owners with some time to come to terms with the condition. Whilst euthanasia, based upon the assumption that there is a high chance a bleeding splenic mass is haemangiosarcoma, is acceptable if that is the client's wish, exploratory surgery, splenectomy and histopathology are required to achieve a definitive diagnosis. On the basis of retrospective studies, around two thirds of dogs presenting with a ruptured splenic mass and haemoperitoneum will be due to haemangiosarcoma.

Surgery for haemoabdomen

Suction is very important to aid management in patients with haemoabdomen, to allow prompt identification of the site of haemorrhage.

A large ventral midline laparotomy is performed. Temporary occlusion of the descending aorta can be achieved by passing a hand along the left abdominal wall to a position cranial to the left kidney. This can be performed briefly whilst blood is being suctioned from the abdomen to allow identification of the site of bleeding. If neoplastic disease is suspected, because there is not a history of trauma, then the spleen should be immediately lifted from the abdomen to allow inspection. Prompt placement of artery forceps on the splenic pedicle can be performed to stop ongoing haemorrhage. Bleeding from the liver can be controlled by performing the Pringle manoeuvre. Traumatic injury to the liver or spleen often requires a lobectomy or total splenectomy. Bleeding from a ruptured splenic mass requires a total splenectomy.

Splenectomy can be performed by ligating and dividing all of the vessels along the splenic hilus, however this is time consuming and unnecessary. Understanding the anatomy of the blood supply to the spleen (below) reveals that you can ligate just 7-8 vessels away from the hilus. Double ligation with a transfixing ligature is recommended for the splenic artery and vein. Whilst it is quicker to perform a splenectomy in this way, note that the blood supply to the left limb of the pancreas runs in the gastrosplenic ligament. It is important to preserve this when performing splenectomy to avoid ischaemic necrosis of the pancreas. This is more likely to occur if you choose to ligate the 7-8 major blood vessels away from the hilus, however providing you are aware of this complication it is straightforward to avoid.



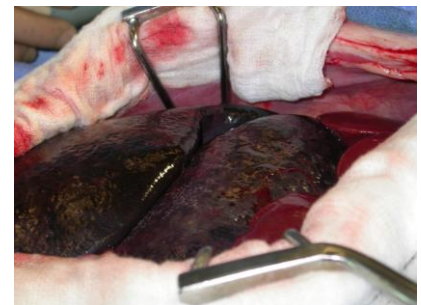
A schematic diagram of the anatomy of the spleen, revealing the vascular anatomy. The blue circles indicate the appropriate site for ligation and division of the splenic pedicle to achieve a more rapid splenectomy compared to ligation and division of all the hilar vessels (from Miller's Anatomy of the Dog).

Cats with haemoabdomen have been reported to have a poor prognosis, despite a greater tendency to non-neoplastic conditions when compared to dogs (Culp et al, 2010).

Splenic torsion

Splenic torsion occurs when the spleen rotates around its vascular pedicle. This initially causes compression and occlusion of the thin walled veins and consequently the spleen becomes very engorged. Subsequently, the splenic arteries become thrombosed, leading to infarction and necrosis of the spleen.

The majority of cases of splenic torsion occur in conjunction with Gastric Dilatation and Volvulus, however it is also seen in isolation. This tends to be in deep chested dog and may be associated with an episode of partial gastric dilatation that increases mobility of the spleen.



Splenic torsion can present as an acute presentation, in which the patient is hypovolaemic and has marked abdominal pain. A chronic presentation is seen more frequently, in which the patient has non-specific signs, such as vomiting, anorexia, depression and abdominal distension. Weight loss, polyuria and polydipsia and haemoglobinuria may often be seen. It is presumed that haemoglobinuria develops due to haemolysis triggered by splenic torsion and shear injury to red blood cells. Haemoglobinaemia can precipitate renal failure due to accumulation of haemoglobin pigment within the nephron and therefore it is important that this is recognised and that appropriate management is instituted with intravenous fluids.

Blood work generally shows anaemia, neutrophilia and leucocytosis and thrombocytopaenia. Serum biochemical findings are nonspecific. Abdominal radiography reveals a mid abdominal mass effect and loss of the normal outline of the spleen; the diagnosis is not always clear on the basis of radiography alone. In cases of chronic torsion, intrasplenic gas accumulation may be seen from proliferating bacteria. Abdominal ultrasound is very valuable to identify a large congested spleen with distended splenic veins; the use of Doppler can identify if blood flow is present.



Patients should be stabilised prior to surgery with intravenous fluid therapy; some patients may require blood products. Exploratory laparotomy and total splenectomy is required without derotating the spleen. Derotating the spleen risks releasing inflammatory mediators and microthrombi into the systemic circulation. Prophylactic gastropexy should be considered at the same time as splenectomy if the patient is stable.

Post-operative monitoring

All patients that suffer from splenic disease have a high incidence of ventricular dysrhythmias. They must be monitored post-operatively for evidence of weakness, tachycardia and hypotension. Repeated or continuous electrocardiogram measurement may be required in some patients. Specific treatment is only required if the arrhythmia is causing cardiovascular compromise.

Most do not require treatment. Treatment of cardiac arrhythmias is only instituted if there are indications that it is haemodynamically significant and affecting tissue perfusion, as determined by arterial blood pressure, peripheral pulse quality and capillary refill time. Specific indications are:

- documented hypotension
- Heart rate exceeding 180 bpm
- R on T phenomenon (superimposition of the QRS complex on the T wave on the ECG)
- Pre-existing cardiac disease

Initial treatment of ventricular arrhythmias includes a bolus of lidocaine (1-8 mg/kg IV) followed by a CRI (0.04 to 0.08 mg/kg/min), if successful conversion to sinus rhythm is achieved. Boluses of procainamide (0.5 to 4.0 mg/kg) can be used in dogs that do not respond to lidocaine, followed by a CRI (0.04 mg/kg/min)(Brockman et al. 1995).

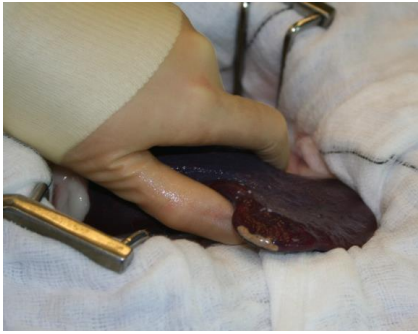
Hypokalaemia interferes with the action of lidocaine and procainamide, therefore serum electrolytes should be measured and supplementation administered as required.

Ensure adequate volume resuscitation is performed before considering anti-arrhythmic treatment.

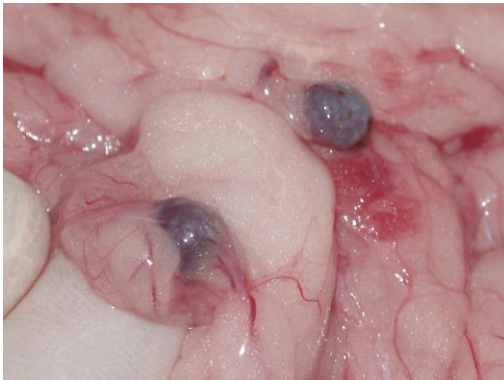
Following sustained sinus rhythm the anti-arrhythmic treatment should be stopped. Abrupt cessation is recommended as tapering the dose can lead to a proarrhythmic state.

Please refer to the lecture on Exploratory Laparotomy for the overview on post-operative management.

Miscellaneous photos



Siderotic plaques are a normal finding in middle to older age dogs; they occur due to the deposition of iron compounds on the surface of the spleen associated with the splenic capsule. These findings are sometimes mistaken for splenic pathology.



Ectopic splenic nodules. These are normal findings seen in many dogs. They may be congenital anomalies or could occur due to prior trauma. They should not be mistaken for metastases.

Further reading and references

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