SUCCESS FACTORS IN SURGERY OF THE SPLEEN AND LIVER

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Splenic Tumors in Dogs

Canine Splenic Tumor Types: Hemangiosarcoma (HSA) is the most common tumor of the canine spleen. The tumor occurs most commonly in large breed dogs, but on rare occasions can occur in small breed dogs as well as cats. Other relatively common sites include the right auricular appendage, the liver, the skin, and the subcutaneous tissues and underlying musculature. The metastatic rate of splenic HSA approaches 100 percent. Common metastatic sites include the liver, omentum and mesentery, lungs, and other sites.

Presentation and Rule-Outs: Dogs with HSA are presented either for chronic nonspecific signs such as lethargy, anorexia, and weight loss, often with abdominal distension; or for acute weakness/collapse and shock related to spontaneous intra-abdominal bleeding. Weakness can occasionally be episodic. On radiographs, the classic splenic mass is located in the mid-ventral abdomen and displaces intestines dorsally. Abdominal ultrasound is very reliable for confirming that the spleen is the origin of the mass, and is particularly valuable when there is significant hemoabdomen. Ultrasound is not reliable for distinguishing liver metastases from nodular hyperplasia. Rule-outs for splenic masses include hematoma, other sarcomas such as fibrosarcoma and leiomyosarcoma, histiocytic sarcoma, and lymphoma. All of these are relatively rare in comparison to HSA. Spontaneous hematomas can occur in middle-aged and older dogs of all sizes, are typically not associated with hemoabdomen (but can be!), cause nonspecific signs, and are associated with an excellent prognosis following splenectomy. They do not result from trauma or coagulopathies, but appear to arise spontaneously within nodular hyperplastic lesions.

The veterinarian’s educated guess as to whether a splenic mass lesion is likely to be HSA can be valuable to owners attempting to decide whether or not to opt for splenectomy. In general, abdominal fluid analysis or aspiration of the mass lesion is unlikely to be helpful: most splenic masses do not readily exfoliate cells. The 2/3, 2/3 rule states that approximately 2/3 of splenic masses are malignant, and that of these, approximately 2/3 are HSA. Approximately 70 percent of all dogs with a splenic mass and hemoabdomen have HSA, and if the patient is a large breed dog, the odds of HSA are probably slightly higher.

Preoperative Considerations: Preoperative care for patients with hemoabdomen and varying degrees of hemodynamic instability may include crystalloids, colloids, and blood products. A significant proportion of HSA/hemoabdomen patients have consumption-related coagulopathies including thrombocytopenia and prolonged PT and/or PTT. Coagulopathies are difficult to completely normalize by administration of blood products, and surgery is often performed in the face of some degree of clotting dysfunction, paying close attention to good hemostasis. Dogs with HSA and hemoabdomen are prone to ventricular tachyarrhythmias: blood loss and the presence of a large abdominal mass compromise venous return to the heart and in turn impair cardiac output, which reduces coronary blood flow and causes myocardial hypoxia. These factors may be worsened by anesthetic drugs, by positioning the dog on his back, and by reperfusion injury following removal of the mass. For these reasons, dogs with hemoabdomen should have continuous ECG monitoring, should be moved quickly to surgery once anesthesia is induced, and should not be positioned in dorsal recumbency until absolutely necessary.

Technique for Splenectomy: Splenectomy is usually a straightforward surgical procedure. Care must be taken not to rupture the splenic mass as the spleen is being exteriorized—this is best prevented by making a large incision, introducing both hands into the abdomen, and carefully lifting the spleen from below. Any omental adhesions are divided before ligating the blood supply to the spleen itself. Rather than ligating individual branches of the splenic artery and vein close to the spleen, the splenic, left gastroepiploic, and short gastric arteries and veins can be divided to save time. The left gastroepiploic artery supplies the greater curvature of the stomach, but there is adequate collateral circulation to assure that gastric necrosis will not occur. Ligations can be performed by hand, with an LDS stapling device (Covidien), or with a vessel sealing device such as a Ligasure (Covidien) or harmonic scalpel (Ultracision, Ethicon).
Prognosis: Histopathologic reports pertaining to dogs with splenic masses must be interpreted carefully. While a diagnosis of HSA can be believed, a diagnosis of hematoma should be considered suspicious, particularly if the patient is a large breed dog with hemoabdomen. When a large splenic mass is submitted, the histology technician typically prepares only 3–4 sections from the mass: if the mass consists of mostly hematoma adjacent to a relatively small area of HSA, an incorrect diagnosis may result. In patients with histologically confirmed HSA, reported median survival times range from 2 to 3 months, and survival beyond 1 year is unusual. Most dogs die or are euthanized because of bleeding liver metastases, or metastases to other sites. The rate of decline prior to death or euthanasia tends to be rapid, so that while quantity of life following splenectomy is limited, the quality of the majority of the remaining time is excellent. A number of reports have suggested that survival times can be extended by administration of conventional or metronomic chemotherapy following splenectomy.

Liver Tumors in Dogs and Cats
Rule-Outs for Canine Liver Masses: The two most common primary liver tumors in dogs are hepatocellular carcinoma (HCC) and hepatocellular adenoma. Both of these tumors most commonly present as a large, solitary liver mass. HCC has a very low metastatic rate, and hepatocellular adenoma does not metastasize.

Clinical Signs: Dogs with liver tumors typically present with nonspecific signs such as anorexia, weight loss, lethargy, and abdominal distension. Primary liver tumors are occasionally discovered as incidental findings on an abdominal ultrasound performed for other reasons. The combination of a liver mass and hemoabdomen is highly suggestive of liver HSA. Because liver masses typically do not significantly reduce the amount of functional liver tissue, they usually are not associated with impairment of liver function.

Imaging and Assessment of Resectability: Radiography may reveal a space-occupying mass in the cranial abdomen; centrally located masses may displace the stomach caudally. Abdominal ultrasound is the key imaging test. While AUS is very reliable for confirming the presence of a liver mass, it is not reliable for determining resectability. The major determinant of resectability is whether the mass invades the hilus or base of the liver; because the divisions between lobes and the junctions of the lobes with the hilus are indistinct on all imaging tests, resectability is usually uncertain prior to surgery. However, most liver masses are confined to a lobe and do prove resectable.

Surgery: Liver masses are treated by liver lobectomy. The main potential complication of this procedure is hemorrhage, which can be life-threatening if uncontrolled. Lobectomy is generally easier to perform on the left side of the liver than on the right, because the left-sided lobes have a long, narrow hilus and are distant from the vena cava, whereas the right-sided lobes have a broad hilus and are situated near the vena cava. Available techniques for liver lobectomy include the encircling ligation technique, surgical stapling, and vessel sealing devices. The encircling ligature technique is the most versatile and reliable technique, and will be demonstrated in the lecture.

Prognosis: The prognosis for dogs undergoing successful resection of HCC or HC adenoma is excellent. In a retrospective review of 42 dogs undergoing resections of HCCs, 2 dogs, both with right-sided tumors, died from intraoperative hemorrhage, and 2 developed distant metastases. The MST for all dogs was over 4 years (Liptak et al. 2004).

Liver Masses in Cats: The most common primary tumor arising from the liver in cats is hepatobiliary cystadenoma. This lesion has been referred to in the literature by a variety of names, including biliary cyst, bile duct cystadenoma, and others. It is a benign, slow-growing liver lesion that typically causes lethargy and abdominal distension in older cats. Multiple liver lobes can occasionally be involved. The prognosis with surgical removal is excellent, and because the lesion is slow-growing, even incomplete excisions can provide extended survival.

Management of Gall Bladder Mucoceles in Dogs
Background: Gall bladder mucoceles were first recognized in the early 1990s, and have become one of the most common causes of extrahepatic biliary disease in dogs. They are characterized histologically by hyperplasia of mucus-secreting glands within the gall bladder (GB) mucosa, and abnormal accumulation of mucus within the GB lumen. Extension of bile-laden mucus into the cystic, hepatic, and common bile ducts may result in varying degrees
of extrahepatic biliary obstruction. Marked GB distension can result in eventual acute rupture of the GB; in one series of patients undergoing surgery for GB mucocele, approximately 60 percent had GB rupture. GB mucoceles usually affect older dogs (mean age 10 years); however, dogs as young as 3 years of age can be affected. Middle sized dogs are affected most commonly and Cocker spaniels appear to be overrepresented. While approximately 25 percent of GB mucoceles are discovered as incidental findings on abdominal ultrasound examinations performed for other reasons, most dogs present for signs of systemic illness such as vomiting, anorexia, and lethargy. Most dogs have elevations in one or more liver enzymes. Approximately 65 percent of dogs with GB mucoceles have elevations in total serum bilirubin; among dogs with GB rupture, 85 percent have bilirubin elevations.

Cause: The etiology of GB mucoceles is unknown. While the appearance of the disease in the early 1990s may have reflected improving skills among ultrasonographers and increasing awareness of the condition, it is also possible that nutritional or environmental factors caused a true increase in the incidence of the disease. The observation that the disease appears to be more frequent in Cocker spaniels and certain other middle sized breeds suggests a role for genetic factors. A recent study indicated that the odds of GB mucocele were 3 times greater in dogs with hypothyroidism than in normal dogs, and 29 times greater in dogs with hyperadrenocorticism than in normal dogs. The mechanisms by which hypothyroidism and hyperadrenocorticism may contribute to mucocele formation are not currently understood.

Imaging: Abdominal ultrasonography is the key test for diagnosing GB mucoceles. The condition typically progresses slowly over a period of months to years. The earliest finding is often the presence of mobile or immobile debris or sludge within the GB lumen, which eventually becomes immobile, striated, and finally stellate in configuration. The stellate striations cause the GB to resemble a kiwi fruit in cross section, leading some to refer to the condition as “kiwi gall bladder.” Impending GB rupture may be indicated by the presence of hyperechoic (“bright”) fat around the GB and thinning of the GB wall. Outright rupture is suggested by discontinuity of the GB wall, free abdominal fluid in the cranial abdomen, and the presence of striated echogenic material outside the GB lumen. The sensitivity of AUS for GB rupture is approximately 85 percent.

Surgical Decision-Making: Discretion may be used in determining the timing of surgery for GB mucoceles. In asymptomatic older dogs with early ultrasonographic signs, surgery may be avoided altogether, although periodic AUS monitoring is recommended. Younger dogs without clinical signs and no signs of impending GB rupture can have surgery on an elective basis. Surgery should be considered more urgent in dogs with clinical signs and/or elevations in serum bilirubin, and documented rupture of the GB should be considered a surgical emergency. Prevention of secondary bacterial infection within the abdomen is an important rationale for early surgical intervention when GB rupture is suspected.

Technique for Cholecystectomy and Biliary Lavage: GB mucoceles are treated by cholecystectomy. Lavage of the extrahepatic biliary tree is indicated when serum bilirubin is elevated. While in most cases mucus in the extrahepatic biliary tree will pass following cholecystectomy, occasional dogs will experience rising bilirubin levels postoperatively when cholecystectomy is the sole treatment, and for this reason, I lavage the biliary tree via a duodenostomy following cholecystectomy in all dogs with elevated bilirubin levels. Cholecystectomy is a fairly straightforward procedure when the GB is intact. Distension of the GB by mucus simplifies identification of the appropriate dissection plane between the GB and the hepatic parenchyma. Once a dissection plane is created by sharp dissection at the junction of the liver and GB, the plane can be extended by blunt dissection with a finger or suction tip. Some bleeding should be expected during the dissection, and large vessels should be cauterized or clipped. Once the junction of the GB with the cystic duct is reached, the origin of the cystic duct can be ligated or stapled. For lavage of the biliary tree, a 3–4 cm antimesenteric duodenostomy is made approximately 3–4 cm below the pylorus, opposite the termination of the common bile duct. The major duodenal papilla is identified in the mucosa on the mesenteric side of the duodenum. A small diameter (5Fr) red rubber catheter is introduced several centimeters into the common bile duct, and the duct is flushed with saline. Use of a small diameter catheter allows mucus to pass around the catheter and through the papilla. Flushing is repeated until mucus is no longer obtained. In dogs with GB rupture, care should be taken to remove all mucinous bile from the abdominal cavity and to lavage the abdomen thoroughly. Abdominal drainage (closed suction drains or open abdomen) should be considered,
particularly when abdominal fluid obtained before or during surgery contains bacteria. The GB wall or bile should be cultured in all cases, and in dogs with rupture, abdominal fluid should also be cultured. Less than 10 percent of cultures are positive.

Prognosis: Overall perioperative mortality rates for dogs undergoing surgery for GB mucocele in early studies were approximately 20–30 percent; however, improved perioperative mortality rates (~7%) have been reported in more recent studies. There is no clear difference in mortality between dogs with and without GB rupture. Potential causes of death include bile leakage, hemorrhage, and sepsis. The long-term prognosis for dogs discharged from the hospital is excellent.

Reference