Key Points

- Several common and uncommon diseases in veterinary medicine are now able to be treated with the use of minimally invasive fluoroscopically-guided techniques.
- The non-oncologic vascular interventions, while lacking in long-term data, are demonstrating early promise and the morbidity associated with these procedures tends to be significantly less than historical surgical treatment options.

Intrahepatic Portosystemic Shunts

Intrahepatic portosystemic shunts (IHPSS) present an important disease state in dogs and cats. While medical management is usually involved in the treatment regimen for IHPSS, permanent occlusion is often recommended for dogs with IHPSS as long-term outcome is poor due to persistent clinical signs and continued poor liver perfusion. (Tobias 1996) Surgical treatments depend on the location of the shunt, and both extravascular and intravascular options have been described.

The use of transvenous coil embolization has been recently documented in several veterinary studies. (Partinton 1993, Gonzalo 2000, Leveille 2003, Asano 2003, Bussadori 2008) This procedure generally involves the placement of a stent within the caudal vena cava combined with thrombogenic coils within the shunt itself. The goal of the procedure is that the shunt will close down progressively over time allowing the portal vein time to develop.

This procedure is performed with the patient under general anesthesia and placed in dorsal recumbency. A tiny incision is made over the jugular vein, and the entire procedure is performed through a vascular access sheath that is placed in the jugular vein. Due to the minimally invasive nature of the procedure, morbidity is considered low, and pain is limited post-transvenous coil placement.

Arteriovenous Fistulae/Malformations

An arteriovenous fistula (AVF) is a single anomalous connection between an artery and a vein whereas an arteriovenous malformation (AVM) involves multiple arteries and veins. These abnormalities occur very uncommonly and are usually congenital, although surgery, neoplasia and trauma can result in AVF/AVM. The most common location for AVF in dogs has been reported to be the liver. (Chanoit 2007)

Treatment has historically involved the surgical resection of AVF; surgical treatment of AVMs is often not possible due to the extensive nature of the disease. (Chanoit 2007) Recently, the use of embolization in the treatment of AVF, specifically in the liver, has been investigated. For this procedure, the hepatic artery is selected with a guidewire and catheter, and sterile glue is injected into the AVF to cause embolization. In a small case series comparing surgical resection to glue embolization, the use of glue embolization was considered a good alternative to surgery as hepatic AVF-related death occurred less frequently. (Chanoit 2007)

Intravascular Foreign Body Retrieval

One complication of intravascular catheterization includes breakage or dislodgement of part or all of the intravascular catheter subsequently resulting in an intravascular foreign body. In
human medicine, the removal of IV foreign bodies is considered a necessity. (Kidney 1998) When foreign bodies are left intravascularly, the reported overall major complication or mortality rate ranges from 21-71%. (Richardson 1974, Fisher 1978) Major complications (including causes of mortality) identified in humans include arrhythmias, sepsis, catheter-associated thrombosis, pulmonary emboli, endocarditis, ventricular perforation, adrenal infarction and caval syndrome. (Richardson 1974, Fisher 1978) Human studies have shown that clinical signs may be delayed by up to one year following embolization (Fisher 1978).

If surgical intervention is necessary for intravascular foreign body removal, either a lateral thoracotomy or median sternotomy is typically necessary. These procedures may involve considerable morbidity and potential complications should be considered. (Yang 1994) The use of a minimally invasive technique for foreign body removal is an attractive alternative to these more invasive procedures. Percutaneous intravascular foreign body removal in humans has a success rate of 90-100%. (Dondelinger 1991, Egglin 1995, Uflacker 1986)

While intravascular foreign bodies are still an uncommon entity, the use of more minimally invasive interventional techniques in veterinary medicine will likely lead to increased encounters. A recent report documented the percutaneous removal of intravascular foreign bodies in 5 dogs, a goat and a horse. All devices were successfully removed with the use of a snare that was controlled under fluoroscopic guidance. (Culp 2008)

Idiopathic Epistaxis

Epistaxis is a potentially life-threatening condition that may occur secondary to severe nasal inflammation, trauma, neoplasia or coagulopathy. (Gieger 2004) Additionally, idiopathic epistaxis has also been reported. (Bissett 2007) For conditions where the underlying cause is known, treatment for that cause is pursued. In cases of idiopathic epistaxis, methods that may be tried to eliminate the bleeding include packing with sponges coated with vasoconstrictive medications, ligation of carotid artery(ies) and embolization of the supplying arterial supply. (Weisse 2004)

Arterial bland embolization involves the delivery of an agent to the bleeding vessel that stimulates thrombosis in that vessel. To perform arterial embolization, a patient is placed under general anesthesia. An artery (likely femoral) is catheterized and a wire/catheter combination is steered toward the vessel that is bleeding. Upon reaching the vessel, an agent (particles, coils, liquid) that stimulates thrombosis is delivered to the vessel and results in cessation of blood flow through that vessel. Reports of this treatment in animals are rare, but this treatment has been performed successfully in three dogs with intractable epistaxis. (Weisse 2004)

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