Double aortic arch in a dog

Maria L. Vianna, DVM, and D. J. Krahwinkel Jr, DVM, MS, DACVS, DACVA, DACVECC

The dog was positioned in right lateral recumbency, and a left lateral thoracotomy was performed at the fourth intercostal space. Exploration of the mediastinal structures revealed that the left aortic arch was normal. The esophagus was dilated and filled most of the cranial portion of the mediastinum. Further dissection of the right side of the dilated esophagus revealed a second slightly smaller aortic arch. The brachycephalic and left subclavian arteries originated from the left aortic arch normally. The right aortic arch was dissected from the mediastinum, double ligated with 2-0 silk, and transected between the ligatures (Figure 3). Additional dissection of the mediastinum around the transected right aortic arch completely freed the entrapped esophagus. An inflated 5-mL Foley catheter...
was passed down the esophagus to ensure that there was no additional obstruction. The thoracic duct was torn during the procedure, but no attempt was made to ligate the duct. An 8-F thoracic catheter was placed in the thorax at the sixth intercostal space. The catheter was sutured in place with 3-0 nylon stay suture. The ribs were opposed with 4 ligatures of 4-0 polydioxanone. The serratus ventralis muscle, scalenus muscle, and subcutaneous tissue were closed with 4-0 polydioxanone in simple continuous patterns. The skin was closed with 3-0 polysilcaprone in a continuous subcuticular pattern and 3-0 nylon in a simple continuous pattern.

Metoclopramide (0.2 mg/kg [0.1 mg/lb], PO, q 8 h), ranitidine (2 mg/kg [0.9 mg/lb] IV, q 8 h), amoxicillin-clavulanic acid (20 mg/kg [9 mg/lb], PO, q 12 h), sucralfate (0.5 g, PO, q 8 h), and morphine (0.2 mg/kg, IV, q 4 h) were administered after surgery. The thorax was aspirated every 2 hours, and the catheter was removed 2 days after surgery. Morphine was discontinued the day after surgery. The dog was fed a slurry of a gruel diet in an elevated position and continued medical management may be required for the condition persists, the esophagus dilates cranial to the constriction. Clinical signs are caused by esophageal constriction with dilation of the esophagus cranial to the constriction. Clinical signs are usually seen at the time of weaning. The most common clinical sign is regurgitation associated with eating. As the condition persists, the esophagus dilates cranial to the heart base. Dilation is usually pouch-like, and continued medical management may be required for months or for the entire life on the animal after surgical correction because dilation and hypomotility of the esophagus are often irreversible. The prognosis for...
surgical correction of persistent right aortic arch in dogs varies. Some dogs continue to regurgitate, and clinical signs in others resolve after surgery. However, the prognosis is generally regarded as poor for dogs after surgical correction of double aortic arches because no dogs have reportedly survived after surgical correction of double aortic arches. The severity of esophageal dilatation before surgery is also an important prognostic factor, and it is believed that esophageal dilatation rarely resolves completely. However, in the dog reported here, clinical or radiographic evidence of esophageal dilatation was not seen after surgical correction of the vascular ring. This indicates that megaesophagus caused by vascular ring anomalies can resolve with early surgical correction. Severe hypertension after ligation of 1 arch has also been reported. When there is no appreciable difference in size between the 2 arches, it is believed that ligation of 1 arch results in hypertension, with increased afterload and work on the left ventricle eventually leading to left heart failure. In the dog in this report, ligation of the smaller right aortic arch was performed and complications were not seen.

Radiography of the thorax and an esophagram are typically performed to confirm a vascular ring anomaly. However, they do not provide information as to what type of vascular ring anomaly is present before surgery. Although 95% of the vascular ring anomalies in dogs are type I persistent right aortic arch with ligamentum arteriosum, choosing the appropriate surgical approach is important for surgical correction of the less common vascular ring anomalies. Angiography may provide an accurate evaluation of the aortic arch anatomy and thus a diagnosis of the rare types of aortic arch anomalies. Angiography is also helpful in determining the diameters of both arches and thus the surgical approach to the smaller arch. Two-dimensional echocardiography has also been useful and fairly specific in humans with double aortic arches but is less frequently used in dogs and cats. Vascular ring anomalies are uncommon in humans and represent <1% of congenital cardiovascular defects. In humans, many imaging modalities are useful for diagnosing double aortic arches. Imaging modalities used in humans include esophagrams, angiography, computed tomography (CT), and magnetic resonance imaging (MRI). However, the preferred method for diagnosing congenital heart disease in humans is MRI. Magnetic resonance imaging defines anatomic structures better than echocardiography and is less invasive than angiography. Magnetic resonance imaging is considered advantageous over CT because CT requires contrast enhancement to depict the vessel lumen, whereas MRI can be used with or without contrast. Although MRI is not as readily available in veterinary medicine, use of MRI for the diagnosis of aortic arch anomalies would provide information about vascular anatomy and permit determination of the appropriate surgical approach. Without this information, it is preferable to perform a left thoracotomy because most vascular ring anomalies are persistent right aortic arches.

In humans, various risk factors that influence surgical outcome have been identified. Results of a retrospective study of patients with interrupted aortic arch indicated that low cardiac output required inotropic support and low blood pressure often led to renal insufficiency or failure. Of those patients, 55% died postoperatively. Sepsis and weight <2.4 kg (5.3 lb) also negatively influenced surgical outcome. However, early surgical intervention is the preferred treatment for dogs and cats because this will help normalize esophageal function.

References

References