RESOLUTION OF A PERSISTENT RIGHT AORTIC ARCH BY THORACOSCOPY ASSISTED BY ESOPHAGOSCOPY IN A DOG

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RESUMEN CORTO/RESUME

A 5-month-old, intact female, Labrador retriever was referred to our hospital with chronic regurgitation. There was high suspicion of persistent right aortic arch (PRAA) seen on an esophagram showing cranial esophageal dilatation. Computed tomography (CT) was performed confirming the diagnosis of PRAA. Thoracoscopy with concurrent esophagoscopy and selective intubation was performed to break down the ligamentum arteriosum (LA) and to dissect the fibrotic tissue constricting the esophagus. No complications befell during the procedure. An esophagram following surgery was performed and revealed an improvement of the cranial esophageal dilatation compared to the esophagram prior to surgery. Although after surgery there was still cranial esophageal dilatation the dog has not had any regurgitation episode.

In contrast to previous studies this is considered a success due to the results in the quality of life of our patient. Due to the advantages of thoracoscopy assisted by esophagoscopy in contrast to intercostal thoracotomy, this technique should be considered for surgical treatment of PRAA.

The use of thoracoscopy assisted by esophagoscopy should be considered for surgical treatment of persistent right aortic arch due to the advantages it has showed compared to intercostal thoracotomy.

INTRODUCCIÓN / INTRODUCTION

Vascular ring anomalies (VRA) are congenital defects of the aortic vasculature that result in cranial esophageal dilatation caused by focal extramural esophageal constriction. According to different studies, 95% of clinical VRA consist of a persistent right aortic arch (PRAA) with a left ligamentum arteriosum (LA), also named type I. In dogs, the main clinical sign is regurgitation, due to the esophageal constriction caused by the LA traversing from the right aortic arch to the main pulmonary artery. VRAs commonly affect purebred dogs, according to recent studies, the most prominent breeds are German Shepherd, Labrador Retriever, Greyhound, and Cocker Spaniel.

Diagnosis of VRAs is based on the patient history, clinical signs, thoracic radiographs, barium esophagram and computed tomography (CT) which reveal cranial esophageal dilatation caused by an apparent constriction and left side displacement of the trachea.

Although the diagnosis might be achieved by other imaging techniques, computed tomographic angiography is recommended to confirm the type of anomaly, to allow veterinary surgeons to plan an optimal surgical approach.

Esophagoscopy can be used before surgery to rule out other causes of esophageal constriction, reveal mucosal lesions and to identify the presence of an aortic pulse, on the right side of the esophagus. The presence of an aortic pulse increases the index of suspicion for a PRAA.

Due to the poor clinical outcome associated with medical therapy alone, surgical treatment of PRAA, is indicated, but does not necessarily lead to complete resolution of clinical signs. However, short and long-term outcomes were analyzed in a study and the results showed that 76% of the dogs had an overall
acceptable outcome to owners. Traditionally, an intercostal thoracotomy has been performed for the surgical management of the PRAA, however, minimally invasive approach using thoracoscopy is gaining popularity.

DESCRIPCION CASO CLINICO / CASE REPORT DESCRIPTION

A 5-month-old, intact female, Labrador presenting chronic regurgitation which manifested at the time of weaning, was referred for further diagnostic imaging tests and surgical treatment for highly suspicious of PRAA. This suspicion was based on an esophagram showing cranial esophageal dilatation. In the physical examination, only poor body condition was found, body condition score (BCS) was 2/5, no other abnormalities were found. A CT was performed confirming a type I persistent right aortic arch.

Thoracoscopy and Esophagoscopy

One-lung ventilation was performed under endoscopic guidance to increase the working space and reduce the risk of damage to the lung parenchyma. For surgical treatment, thoracoscopy with concurrent esophagoscopy were performed. The dog was positioned in right lateral recumbency, and 5mm and 3mm-cannula were placed in the eighth left intercostal space, for the optic and instruments, respectively. Other two 3 mm and 5mm-cannulas were placed, one ventrally to the optic in the seventh left intercostal space, and the other one in the fifth left intercostal space to use a lung retractor to displace the left cranial lung lobe, respectively.

For esophagoscopy, flexible videogastroscope was inserted in the proximal esophagus to locate the aortic pulse and transillumination was used to determinate the location of the esophageal constriction to help locate the LA.

The fibrous tissue overlying the esophagus and the LA were identified. With a vessel-sealing device the LA was broken down and the fibrotic tissue restricting the esophagus was dissected. To confirm that there was no esophageal constriction a balloon was inflated and moved up and down the esophagus, it was not necessary to perform esophageal dilatation. A thoracic drain was placed in the eighth left intercostal space.

Postoperative care

Postoperative analgesia consisted of methadone and robenacoxib. Antibiotic therapy was based on cefazoline sodium. As antithrombotic therapy, enoxaparin sodium was used. The thoracic drain was removed 24 hours after surgery when there was not discharge of air or liquid.

The dog was discharged 48 hours after surgery with a 5 days course of cefazoline and enoxaparin; and robenacoxib for 2 days. Dietary instructions included soft food in a small amount every 6 hours for the first 4 weeks and to introduce normal diet transitionally.

Follow-up

An esophagram was performed after surgery and revealed a cranial esophageal dilatation, but with notable improvement comparing with the esophagram performed prior to surgery. Although there was still cranial esophageal dilatation, the dog has not had any regurgitation episode, continues eating normal diet three times daily and BCS has improved to 3/5, since the surgery was performed 6 months ago.

DISCUSIÓN / DISCUSSION

Recent studies report the multiple advantages of the thoracoscopy, compared to intercostal thoracotomy, for the treatment of PRAA. These advantages include improved visualization of the vascular anomaly and
Constricting fibers, decreased intraoperative hypothermia, important in pediatric patients\textsuperscript{1,2,5,6}, less postoperative pain\textsuperscript{2,5,6}, and shorter recovery time\textsuperscript{5,6}.

Conversely, thoracoscopy also has important risks associated, the most life-threatening complications are hemorrhage (associated to the dissection of great vessels), esophagus perforation (associated either to over insufflation during esophagoscopy or to thermal burn associated to vessel-sealing device)\textsuperscript{1,2,5} or thermal burn of the lung parenchyma\textsuperscript{1,5}. Complications secondary to vessel-sealing devices can be avoided by using other ligation techniques such as vascular clips\textsuperscript{1,2,5}. The risk of damage the lung parenchyma can be reduced with the selective intubation\textsuperscript{1,6}.

Intraoperative esophagoscopy is used to guide surgical dissection by illumination of the constricting bands and consequently localization of the LA; and it is also useful to confirm the removal of the constriction\textsuperscript{1,2,5}. Because secondary esophageal perforation can occur, care during esophageal insufflation should be taken\textsuperscript{1,2}.

However, a recent study compared three groups of dogs with PRAA that underwent intercostal thoracotomy, thoracoscopy or thoracoscopy converted to thoracotomy\textsuperscript{5}. This study revealed there was no significant difference in duration of surgery, in the incidence of postoperative complications and in duration of the hospitalization\textsuperscript{5}.

The results from this case are successful compared to the results of a study published in 2014 that analyzed short and long-term outcomes of dogs following surgical correction for PRAA, in which only 30% of long-term survivors were completely free from clinical signs, and this patient has not had any regurgitation episode during the 6 months follow-up since the surgery was performed.

In conclusion, the use of thoracoscopy with concurrent esophagoscopy as surgical treatment for PRAA in dogs allows a reliable visualization of intra-thoracic structures, and allows a correct dissection of the fibrotic tissue constricting the esophagus and to seal the LA. Therefore, minimal invasive surgical technique could be a potential, alternative to intercostal thoracotomy as surgical procedure for PRAA in dogs.

\textbf{BIBLIOGRAFÍA /BIBLIOGRAPHY}
