SHORT-TERM OUTCOME OF A DOG FOLLOWING SURGICAL CORRECTION OF THE PERSISTENT RIGHT AORTIC ARCH PATHOLOGY

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Abstract. A 1,8 year-old, 13 kg intact male Boxer was referred for evaluation of a persistent right aortic arch with concurrent megaesophagus. Contrast radiography of the oesophagus revealed contrast material accumulating in the oesophagus at the thoracic inlet and cranial to the heart. An ultrasound was performed to rule out any heart pathology. Surgical correction of the vascular ring anomaly (VRA) was performed. Four weeks after surgery, the dog was eating soft dog food with no vomiting or regurgitation.

Key words: dog, outcome, pathology, right aortic arch.

INTRODUCTION

Persistent right aortic arch (PRAA) is a common cause of regurgitation in young dogs and cats. The esophageal constriction is caused by the ligamentum arteriosum traversing from the right aortic arch to the main pulmonary artery, accounting for 95% of clinical vascular ring anomaly (VRA) in dogs (Buchanan, 2004). Clinical symptoms may include stunted growth despite polyphagia, postprandial regurgitation soon after weaning, and repeated episodes of aspiration pneumonia (Kyles, 2003; Buchanan, 1968; Holmberg and Presnell, 1979; Wowk and OLSON, 1980). Diagnosis of a VRA is achieved by barium contrast radiography. If the animal has a PRAA, radiographs will show variable dilation of the esophagus proximal to an esophageal constriction at the base of the heart (Buchanan, 1968; Hedlund, 2007; White *et al.*, 2003). Usually, maximal dilation is observed in the cranial mediastinal area (Buchanan, 1968). Angiocardiography is often required for definitive diagnosis of a PRAA, but in some cases, the diagnosis can only be made by surgical exploration (Buchanan, 1968; Holmberg and Presnell, 1979; Wowk and Olson, 1980). Additional vascular abnormalities can also occur concurrently with PRAA, the most frequent of which is an aberrant left subclavian artery (LS), occurring in 33% of cases (Buchanan, 2004). Medical management of this condition is generally unsuccessful (Ellison, 1980). Surgical ligation and division of the ligamentum arteriosum is advocated to relieve the compression on the esophagus and improve clinical signs. Reports of long-term outcome following surgical correction are variable; a recent study found that 92% of dogs had complete resolution of clinical signs even though cranial megaesophagus persisted (Muldoon, 1997). Potential disadvantages associated with surgical correction of PRAA include leaving fibrotic bands across the esophagus, esophageal perforation, hemorrhage, and postoperative pain.

MATERIALS AND METHODS

A 1,8 year-old, intact male Boxer was referred to the Department of Surgical Techniques, Faculty of Veterinary Medicine of Cluj-Napoca, for evaluation because of chronic regurgitation and poor weight gain. The dog was thin, had a poor hair coat, and was mildly lethargic. Lung fields auscultated clear, and the dog was normothermic (38,6°C). At the time of admission, the dog weighed 13 kg. No other physical examination abnormalities were noted. Contrast radiography of the oesophagus, using a liquid suspension of barium sulphate, revealed contrast material accumulating in the oesophagus at the thoracic inlet and cranial to the heart, consistent with a vascular ring anomaly (Fig.1). There was no evidence of aspiration pneumonia.

The animal was surgically treated through a fifth intercostal thoracotomy, performed by a resident under supervision of a Diplomate. The left ligamentum arteriosum was ligated with suture and transected (Fig.2). Remaining bands restricting the esophagus were dissected. Additional intraluminal esophageal dilation was performed at the discretion of the surgeon.

Two homeostatic forceps spaced 1 cm apart were placed proximal and distal to the isolated ligamentum arteriosum. The ligamentum arteriosum was ligatured with 2.0 surgical silk. After division of the ligament, releasing the oesophagus from the vascular ring, the oesophagus does not immediately re-expand at the stenosis. There was no haemorrhage when the homeostatic forceps were subsequently removed. Closure was accomplished by placing interrupted circumcostal sutures of 1- polyglycolic acid around the ribs immediately cranial and caudal to the incision. Before the final the interrupted circumcostal sutures were tightened and tied, pneumothorax was eliminated by inflation and expansion of the lung to re-establish negative intrathoracic pressure. The ventral serratus, latissimus dorsi, scalene, external abdominal oblique, and cutaneous trunsi muscles and skin were closed using standard techniques. A chest tube with a Heimlich valve was also placed. Anesthetic recovery was uneventful.

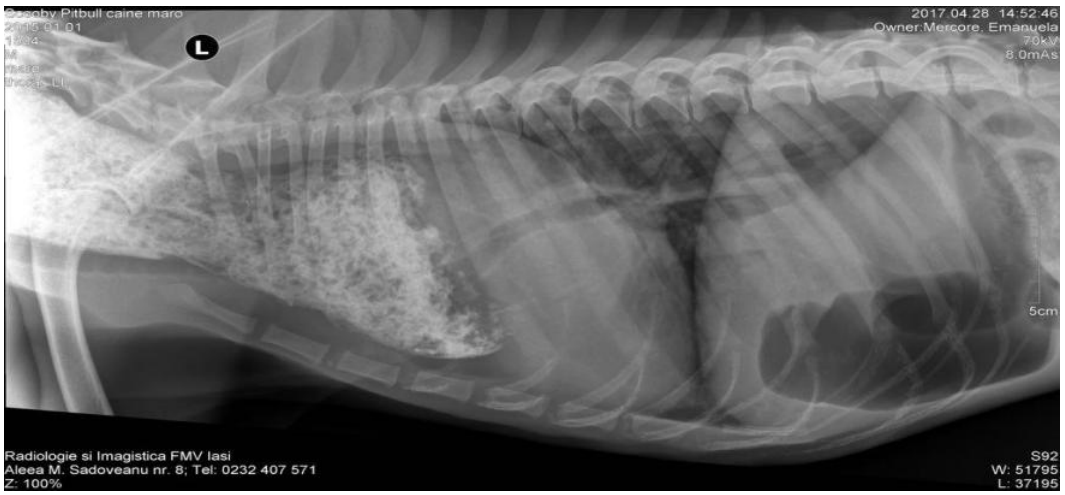

Fig.1. A right lateral radiograph taken during an esophageal contrast study showed dilation of the esophagus anterior to the base of the heart.

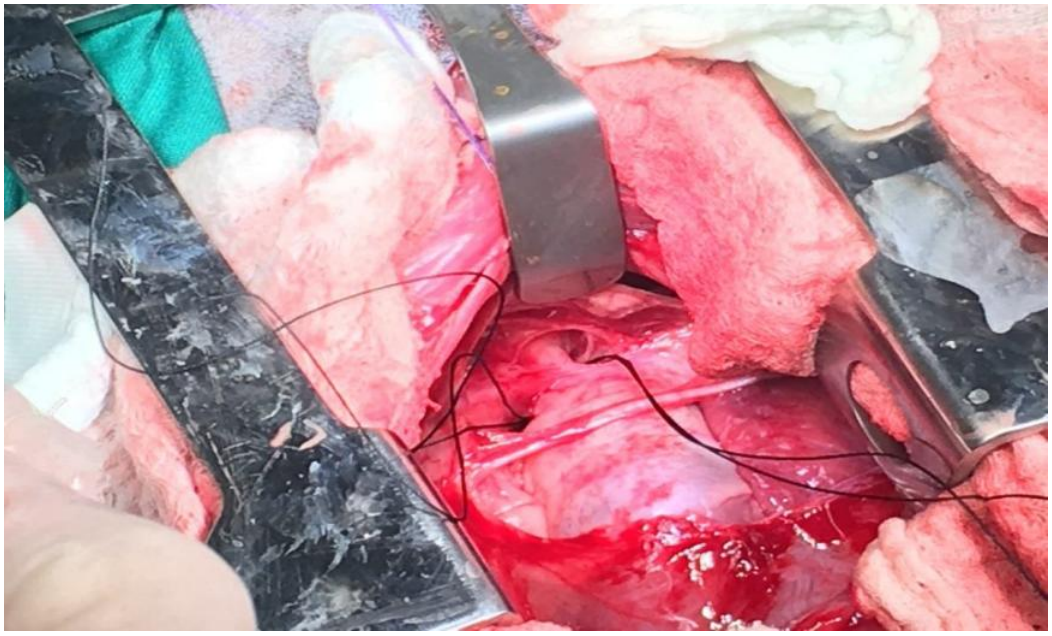

Fig. 2. Intraoperative photograph of the dog with persistent right aortic arch. A left fifth intercostal thoracotomy was performed, and the left ligamentum arteriosum has been dissected out with right-angled forceps. The aberrant arch was dissected free from underlying tissues and double ligated with 2-0 silk suture. Fibrous bands which continue to constrict the esophagus have been removed

RESULTS AND DISCUSSIONS

Postoperatively, the dog was recommended to be fed in an elevated position of a blenderized or liquid diet. The dog was discharged the following day and the owner was instructed to feed the dog frequent, small meals in a vertical position for 4 weeks. Four months after discharge, the dog was re-examined. It had gained 2.5 kg in this time.

PRAA and retention of the left ligamentum arteriosum is the most common vascular ring anomaly in both dogs and cats (Hurley *et al.*, 1993; MearS and Jenkins, 1997; Muldoon *et al.*, 1997; Van Den Ingh and Van Der Linde-Sipman, 1974; McCandlish *et al.*, 1984). Other vascular ring anomalies, including double aortic arch, left aortic arch and right ligamentum arteriosum, persistent left or right subclavian arteries, ductus arterious with normal aortic arch, persistent right dorsal aorta, and aberrant intercostal arteries, have been reported rarely (Hurley *et al.*, 1993; Van Den Ingh and Van Der Linde-Sipman, 1974; MCCandlishb *et al.*, 1984; Van Der Linde-Sipman and Van Der Gaag, 1981). PRAA is diagnosed most frequently in young, large breed dogs (Shires and Liu, 1981).

Dogs with a vascular ring anomaly usually have histories of postprandial regurgitation of solid foods after weaning. They typically are stunted, thin and unthrifty (Hurley, 1993; Muldoon *et al.*, 1997; Vangundy, 1989; Ellison, 1980).

The ultimate goal of surgical treatment is alleviation of the obstruction and resultant clinical signs (Vangundy, 1989; Ellison, 1980; Fingeroth, 1993; Holmberg and Presnell, 1979). In this case, the ligamentum anteriousum was identified, ligated and transacted, and the underlying oesophagus was freed of any residual extramural fibrous bands. Some authors have suggested that age at the time of surgical correction of PRAA is an important factor in long-term prognosis (Muldoon *et al.*, 1997; Helphrey, 1975; Berry *et al.*, 1984). Early

surgical intervention has been recommended, because it was thought that oesophageal dilation and motility disorders would worsen and possibly become irreversible if surgery were delayed (Muldoon *et al.*, 1997). However, Shires and Liu (1981) stated that dogs <2 months old at the time of surgical correction had a lower survival rate than did older dogs. In the present case, the dog was 1,8 years old at the time of surgical correction and the short-term results were satisfactory.

CONCLUSIONS

The short-term outcome for our patient was good with high owner satisfaction. Four weeks after the surgery the weight of the dog increased with 2.5 kilograms. The main recommendation for the owner was to feed the dog while standing on its hind legs, this position being maintained for 10 to 20 minutes after feeding to encourage esophageal emptying.

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