

PERSISTENT RIGHT AORTIC ARCH WITH LEFT LIGAMENTUM ARTERIOSUM IN A GERMAN SHEPHERD PUP

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SUMMARY

A 3 month old female German shepherd pup was presented with a history of regurgitation since weaning. A plain chest radiograph diagnosed the condition as the persistent right aortic arch. The condition was surgically corrected through the left 4th rib resection technique and the pup made an uneventful recovery.

Keywords: Barium Swallow, Persistent Right Aortic Arch, Regurgitation, Thoracotomy, Weaning

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Vascular rings are the developmental anomalies of the great vessels leading to encircling of the oesophagus and trachea by a complete or incomplete ring causing constriction and partial obstruction of the oesophagus (Runge and Culp, 2013). In young dogs, 95% of vascular ring abnormalities can be persistent right aortic arch (PRAA) with a left ligamentum arteriosum and is reported to be hereditary in greyhounds and most common in German Shepherds, Irish Setters, and Boston Terriers (Fossum, 2013) breeds. The clinical sign of postprandial regurgitation is common and is seen soon after weaning (Quessada *et al.*, 2010). Affected animals will be emaciated with slow growth compared to their littermates despite a voracious appetite. The current case study describes the surgical management of persistent right aortic arch.

A 3 months old intact female German Shepherd pup weighing 6 kilograms was presented to Department of Veterinary Surgery and Radiology, Teaching Veterinary Clinical Complex, GADVASU, Ludhiana with the history of regurgitation immediately after taking food from the time of weaning. The animal was bright, alert but underweight with sparse hair coat and mild respiratory distress.

Right lateral plain chest radiograph revealed a soft tissue sac cranial to and overlapping heart containing air and radio-opaque ingesta (Fig. 1a). Mild ventral displacement of the trachea was also seen. Surgical correction was advised to the owner after explaining the surgical risk, to which the owner gave consents.

The pup was premedicated with a combination of Inj. Butorphanol @ 0.2 mg/kg and Inj. Atropine sulphate @ 0.04 mg/kg intramuscularly. Induction was done using Inj. Propofol @ 4 mg/kg intravenously (till effect)

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followed by maintenance with isoflurane.

The pup was positioned in right lateral recumbency and was prepared aseptically for surgery. The thorax was approached by rib resection thoracotomy of the left 4th rib to visualize the contents. The caudal chest was packed with moistened surgical sponges for better exposure. The dilated portion of the oesophagus which was tapered focally over the base of the heart was identified with the help of an oesophageal/gastric tube (placed through the mouth). In this configuration, the ligamentum arteriosum was compressing the oesophagus against the trachea and base of the heart as it passes from right (aorta) to left (pulmonary artery) resulting in oesophageal dilation. The ligamentum arteriosum was gently separated from the oesophagus (Fig. 2a), doubly ligated with Polydioxanone 3/0 and transected (Fig. 2b). A gastric tube was inserted further while directing to cross the constricted area which ensured adequate dilatation. The chest wall was closed using Polydioxanone 2/0 in a simple continuous pattern. Throughout the operating procedure, the pup was maintained on intermittent positive pressure ventilation (6 breaths/min). At the last stitch of chest closure, the lungs were hyperinflated to relieve pneumothorax created during the procedure. The subcutaneous fascia and skin were closed routinely followed by application of a loose padded chest bandage.

The pup recovered uneventfully from anaesthesia. Butorphanol was repeated after 2 hrs to help relieve pain. Cefotaxime @25 mg/kg BID for 5 days along with Meloxicam @0.2 mg/kg initially on day 1 followed by 0.1 mg/kg OD for 2 days were advised as antibiotics and analgesic, respectively. The owner was advised to feed the pup a slurry diet on an elevated platform. To promote oesophageal emptying, this posture was advised to be

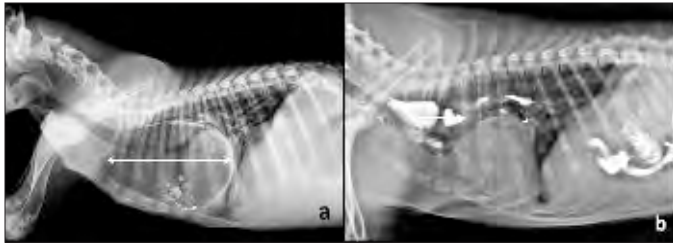


Fig. 1. (a) Radiograph showing large soft tissue opacity (yellow line) cranial to and overlapping heart along with ventral deviation of trachea. (b) The 90th day positive contrast oesophagography showing a significant reduction in the size of the sac (yellow line).

maintained for at least 10 minutes after every meal. The skin sutures were removed on the 12th postoperative day. After 5 weeks of surgery, the water content of the food was reduced gradually. The animal had an improved activity and gained a total weight of 18.5 kilograms on the 90th day of surgery. The barium contrast radiograph on this day revealed a marked reduction in the size of the oesophageal diverticulum (Fig. 1b).

Generalized megaesophagus, foreign body obstruction, stricture, mass or Hiatal hernias are the most common differential diagnosis for PRAA (Fossum, 2013). On the lateral radiograph, oesophageal dilation with gas and food contents can be visualized cranial to heart which can be confirmed as PRAA on barium swallow oesophagography (Rallis *et al.*, 2000). Dogs afflicted are advised to be neutered due to parental and breed inclinations (Kyles, 2013).

Oesophageal dilatation and lack of motility are reported following surgical intervention; however, they may improve noticeably so that the animals are free of clinical symptoms (Rallis *et al.*, 2000). Persistent regurgitation is the most common problem which can result in aspiration pneumonia and death postoperatively.

Early surgical correction is advised to decrease the size of oesophageal dilatation and subsequent muscular atony; however, there is no definite affirmation that dogs treated at a young age have a better long-term prognosis (Kyles, 2013). The degree of oesophageal constriction and dilatation, debilitation, aspiration pneumonia before correction, and medical management pre and post-

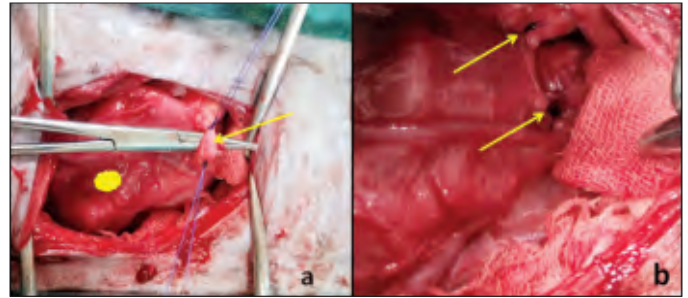


Fig. 2. Serial photographs of surgery. (a) Dilated oesophagus cranial to heart (yellow cloud) and the ligamentum arteriosum (yellow arrow) with two ligatures placed on both sides of ligamentum arteriosum, (b) Photograph showing transected ligamentum arteriosum.

operatively may have a great impact on the prognosis of surgical correction (Muldoon *et al.*, 1997). Correct anaesthetic protocol with a positive pressure ventilation facility is a must for the success of the surgery.

The present study concludes that an early diagnosis and surgical correction of PRAA results in an excellent long-term outcome.

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