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Case Report

Left subclavian artery dissection associated with connective tissue abnormalities resembling Marfan-like syndrome in an English bulldog

Ilaria Biasato, DVM*, Renato Zanatta, DVM ,
Lorella Maniscalco, DVM, PhD , Rocchina Evangelista, MLT ,
Bryan Iotti, DVM , Selina Iussich, DVM, PhD

Department of Veterinary Sciences, University of Turin, Largo Paolo Braccini 2, 10095,
Grugliasco (TO), Italy

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Abstract The unexpected demise of a 12-year-old male neutered English bulldog solicited a gross examination, which revealed a blood-filled space occurring in the proximal left subclavian artery (LSA). It originated about 1 cm from the branching point of the vessel and progressively dilated for 3 cm distal to this origin. Histopathological investigation showed that the tunica media of the LSA was more than 50% split, with the blood-filled space dissecting through the arterial wall. In the tunica media of the LSA, severe multifocal fragmentation and/or loss of the elastic fibers was observed. The retained disorganized elastic fibers were separated and disoriented due to accumulations of acid mucopolysaccharide. Marked, diffuse medial, and adventitial fibrous tissue deposition was also identified. The cause of death was attributed to acute hemorrhagic and necrotizing pancreatitis with pulmonary edema, suggesting that LSA dissection was an incidental finding. Subclavian artery dissection is extremely rare in humans, where the involvement of the LSA in cases of aortic dissection both with or without Marfan syndrome has been reported. Aortic and pulmonary artery dissection in bovines and aortic aneurysm and dissection in dogs have been reported to be associated with Marfan and Marfan-like syndromes, respectively. Histopathological findings suggestive of underlying connective tissue abnormalities resembling Marfan-like syndrome (i.e., the

* Corresponding author.

E-mail address: ilaria.biasato@unito.it (I. Biasato).

appearance of the elastic tissue and the degenerative changes of the tunica media) were detected in the first case of LSA dissection in dogs and veterinary medicine, herein described.

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A 12-year-old male neutered English bulldog weighing 19.8 kg was referred for a routine follow-up visit at the Veterinary Teaching Hospital of the Department of Veterinary Sciences (University of Turin). A diagnosis of leishmaniasis had been made nearly 2-and-a-half years before, and the animal was clinically cured using miltefosine (2 mg/kg PO q 24 h, for 28 days) and allopurinol (20 mg/kg PO q 24 h, throughout the follow-up period). During the follow-up period, the dog did not show any clinical symptoms indicative of a renewed clinically active leishmaniasis. During the last visit, the owners reported occasional episodes of nausea and vomiting, but the animal appeared to be in overall good health conditions. General physical examination and blood analyses (complete blood count, biochemical analysis, and serum protein electrophoresis) showed no significant abnormalities. In the days after the visit, the owners observed a spontaneous resolution of the symptoms and the dog stayed healthy for the following two months. Unexpectedly, the animal was found dead by the owners at the end of the second month. A written consent for necropsy was signed by the owners and a complete post mortem investigation was performed.

At post mortem examination, the left subclavian artery (LSA) was moderately and diffusely dilated, starting about 1 cm distal to its branching point (Fig. 1A). Multifocal to coalescing ecchymotic hemorrhages were also observed on the adventitial surface of the vessel wall (Fig. 1B). Serial cross sections of the dilated proximal segment of the LSA revealed a longitudinal blood-filled space affecting more than 50% of the arterial wall. This blood-filled space progressively dilated lengthwise for 3 cm distal to its origin (Fig. 1C–D). The aorta and pulmonary artery showed no significant gross abnormalities. To evaluate all cardiac structures, the heart was externally examined and opened following the inflow and outflow tracts after transverse sectioning at the level of the middle third of the ventricles. Heart weight (163.3 g) and its percentage relative to body weight (0.82%) fell within the normal reference values reported in adult dogs [1], presenting no signs of cardiac hypertrophy.

Both atria and ventricles were not dilated and the atrio-ventricular and semilunar valves showed normal morphology. The lungs were severely and diffusely enlarged, dark red, wet, and exuded fluid on sectioning. The pancreatic parenchyma was markedly and diffusely red with multifocal to coalescing ecchymotic hemorrhages being observed throughout the cut surfaces. The surrounding peripancreatic mesenteric adipose tissue displayed fat necrosis with saponification. Both kidneys were moderately and diffusely pale and firmer than normal. No significant gross abnormalities were detected in other organs. Samples of LSA, aorta, pulmonary artery, heart, lungs, spleen, liver, kidney, stomach, intestine, thyroids, adrenal glands, and pancreas were collected and fixed in a 10% buffered formalin solution. Organ samples were successively processed by routine methods, embedded in paraffin wax blocks, sectioned at 5 μ m thickness and stained with Haematoxylin & Eosin. Selected serial sections of the LSA were also stained with Masson's Trichrome, Elastic Red Picro Sirius, and Alcian Blue/Periodic Acid-Schiff to investigate collagen, elastic fibers, and mucopolysaccharide deposition. Tissue sections were examined by light microscopy. The tunica media of the LSA was split for more than 50% of its thickness, with the blood-filled space dissecting through the arterial wall (Fig. 2A). In the tunica media of both dissected and non-dissected regions of the LSA, severe multifocal fragmentation and/or loss of the elastic fibers was observed (Fig. 2B). The retained disorganized elastic fibers were separated and further disoriented due to accumulations of acid mucopolysaccharide (Fig. 2C). Within the tunica media of the dissected regions of LSA, marked and diffuse fibrous tissue deposition was identified, along with smooth muscle nuclei loss and moderate multifocal chondroid metaplasia. The tunica adventitia of the dissected LSA also showed severe diffuse deposition of tight and concentric fibrous tissue (Fig. 2D). In the tunica intima of the dissected and non-dissected LSA, moderate diffuse fibromuscular hyperplasia was observed. No significant alterations were detected in the aorta and pulmonary artery. The lungs showed marked diffuse bronchoalveolar edema

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