



Latin Comparative Pathology Group

The Latin Subdivision of the CL Davis Foundation

Diagnostic Exercise

Case #: 63 Month: December Year: 2015

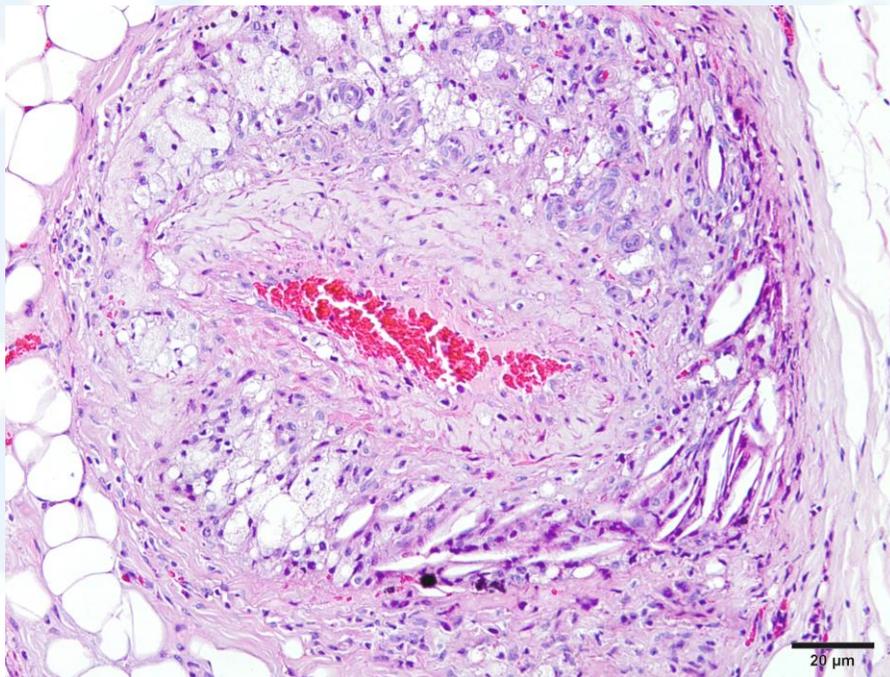
Answer Sheet

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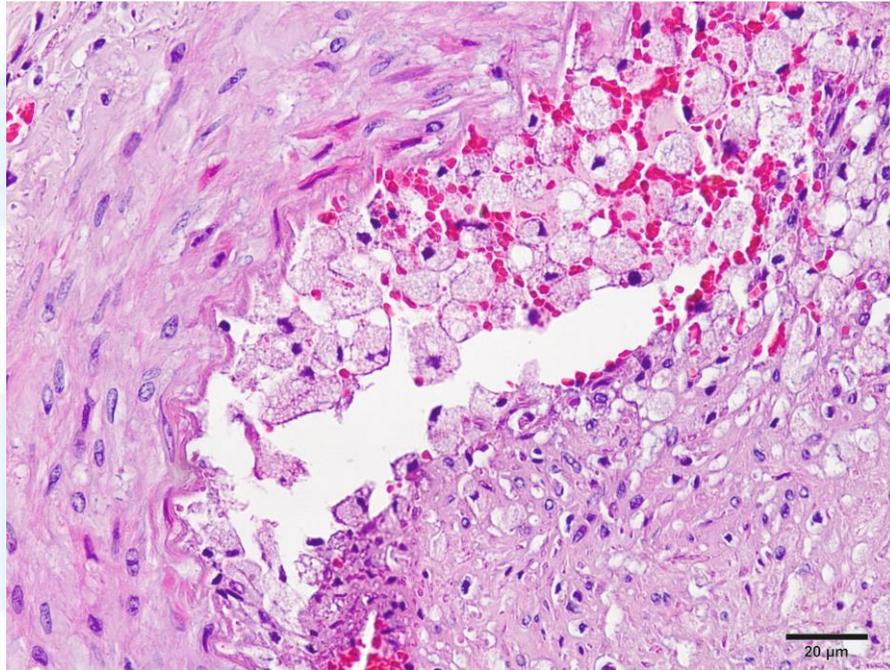
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Laboratory Findings: The biochemical abnormalities included hypercholesterolemia (861 mg/dL [125-300 mg/dL]) and increased triglycerides (554 mg/dL [15-380 mg/dL]). On thoracic radiograph, the heart was moderately enlarged. Due to progression of clinical signs, the owner elected euthanasia.

Microscopic Findings:



(Hematoxylin and eosin stain [H&E]; 10X)



(H&E; 40X)

Answers:

1. Name the disease and the most probable predisposing systemic condition in this case: atherosclerosis. Most probable predisposing factor in this case: hypothyroidism. The thyroid glands were severely atrophic on histologic examination, with decrease of the number and size of the follicles, associated with marked, multifocal, lymphoplasmacytic inflammation throughout the thyroid sections. These findings were interpreted as lymphoplasmacytic thyroiditis with severe atrophy and consequent hypothyroidism.
2. Name the most severely affected organs in dogs with this disease: small muscular arteries of the heart, brain and kidney. In this case, the white foci observed in the renal cortex consisted histologically of injured arteries. In addition, several affected arteries were seen in the spleen, occasionally associated with foci of splenic infarct (corresponding to the purple, raised areas seen on gross exam).
3. Name a predisposed breed in dogs: Miniature Schnauzers.

4. What is the main histologic difference between affected vessels of humans and dogs? Humans: lipid is primarily located in the intima. Dogs: lipid is primarily located in the tunica media and adventitia.

Typical gross findings: The most frequently affected arteries are the coronary arteries, but other organs can be affected, including brain and kidneys. These arteries are prominent and enlarged, with a thick, irregular wall. Areas of infarct can be seen in the myocardium and occasionally in other affected organs.

Typical microscopic findings: The wall of affected arteries is thickened by deposition of lipids, observed as cholesterol clefts, free droplets in the interstitial space and numerous lipid-laden foam cells throughout the wall. In dogs, the lipid accumulation occurs mainly in the tunica media and adventitia and is frequently accompanied by mineralization and fibrosis. In some cases, one or more thrombi can be seen adhered to the endothelial surface of affected arteries. Other occasional findings include coagulative necrosis of affected organs, caused by thrombosis (ischemia).

Discussion: Atherosclerosis is a vascular disease characterized by formation of atheromas in the arterial wall. An atheroma (or fibrofatty plaque) is a focally raised plaque composed by lipids covered by an external fibrous capsule. This condition is common in humans, but has little practical importance in domestic animals. Dogs, cats, bovine and goats are considered resistant to the condition, while rabbits, swine and chickens are susceptible. These animals can develop the arterial lesions in response to a high-dose cholesterol diet. In dogs, the condition occurs most frequently associated with hypothyroidism and diabetes mellitus, due to the hypercholesterolemia observed in these conditions. Miniature Schnauzers seem to be predisposed to the condition, probably due to an idiopathic hyperlipoproteinemia. It is currently accepted that atherosclerosis results from a chronic response to endothelial injury, and that the hypercholesterolemia is one of the causes of primary endothelial damage. Clinical consequences of atherosclerosis are uncommon in dogs, but can occur occasionally, mainly due to rupture of the injured areas, followed by thrombosis or fat embolism.

References and Recommended literature:

1. Kapourchali FR, Surendiran G, Chen L, Uitz E, Bahadori B, Moghadasian M: Animal models of atherosclerosis. *World J Clin Cases* **2(5)**:126-132, 2014.

2. Hess RS, Kass PH, Van Winkle TJ: Association between diabetes mellitus, hypothyroidism or hyperadrenocorticism, and atherosclerosis in dogs. J Vet Intern Med 17:489-94, 2003.
3. AFIP 2009. Armed Forces Institute of Pathology Wednesday Slide Conference, 4:2. Available in: http://www.askjpc.org/wsco/wsc_showcase.php?id=226, Access in July 7th 2015.
4. Robinson WF & Robinson NA: Cardiovascular system. In: Jubb, Kennedy, and Palmer's Pathology of Domestic Animals, ed. Maxie MG, 6th ed., vol. 3, pp. 57-59. Elsevier Saunders, St Louis, Missouri, 2015.

Please send your comments/questions to the whole LCPG list by hitting "reply to all".

A final document containing this material with answers and a brief discussion will be posted on the C. L. Davis website by the end of the current month (http://www.cldavis.org/lcpg_english.html).