

Case 16

Dr. Chee Kin Lim, DVM, BVSc(Hons), MMedVet (Diag Im), FMCVS (Vet Imaging), Dipl ECVDI



Signalment and History

- 3 year-old, female spayed, mixed breed canine
- Presented for coughing
- Was diagnosed with kennel cough by the rDVM one month ago, which improved but did not completely resolved with treatment

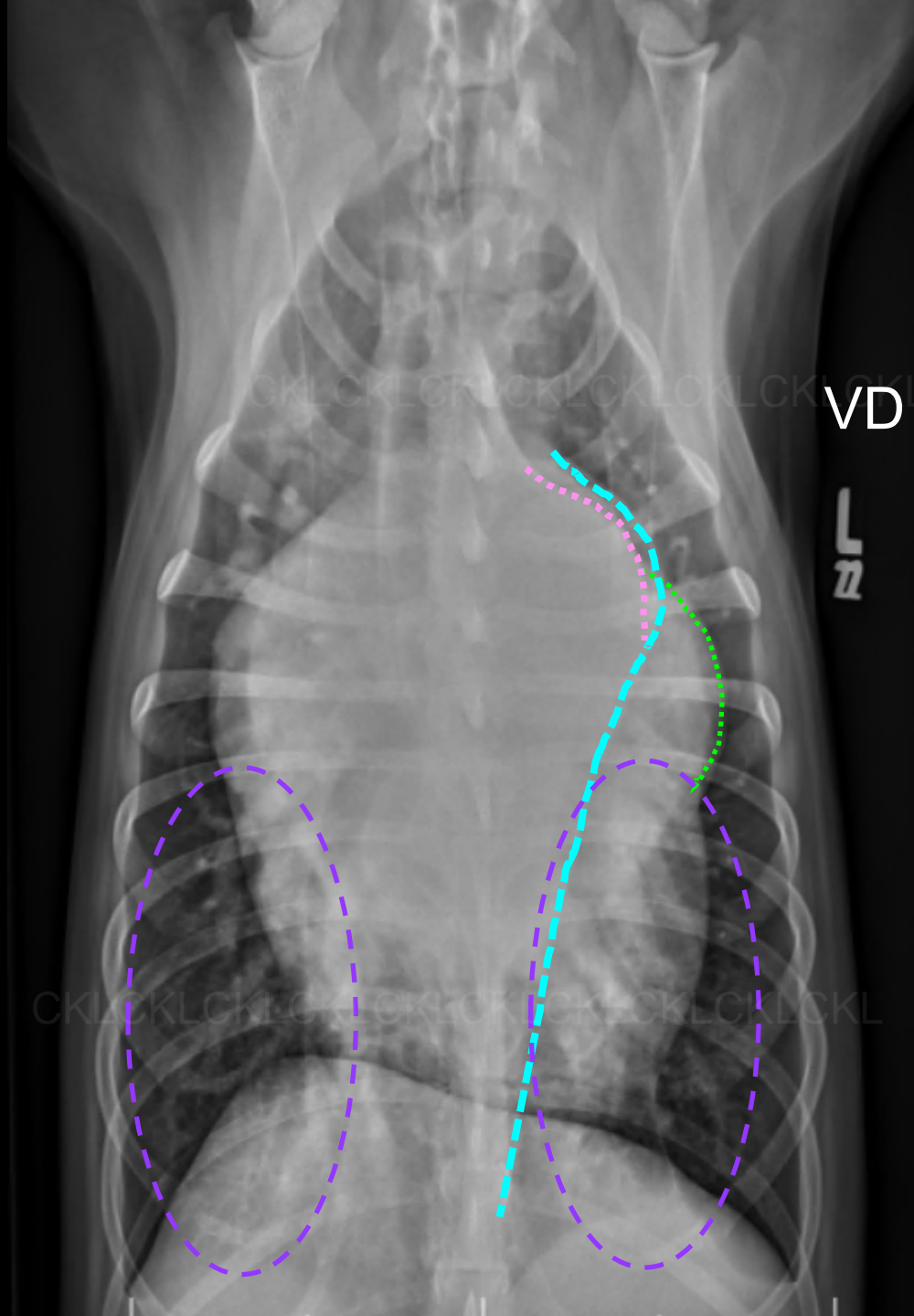
Physical Exam Findings

- Body condition: 4/9
- Temperament: BAR
- Pulse: 160
- Respiration: Panting
- Weight: 19 kgs
- Cardiovascular: abnormal with grade VI/VI continuous, basilar murmur, respiratory sinus arrhythmia to atrial fibrillation, bilaterally weak femoral pulses
- Respiratory: normal

Thoracic radiographs are available

- 1) Describe your radiological findings
- 2) List your diagnosis/differential diagnosis

Radiological Findings



VD

Bulge in the proximal main pulmonary artery

Bulge in proximal descending aorta

Left auricle enlargement

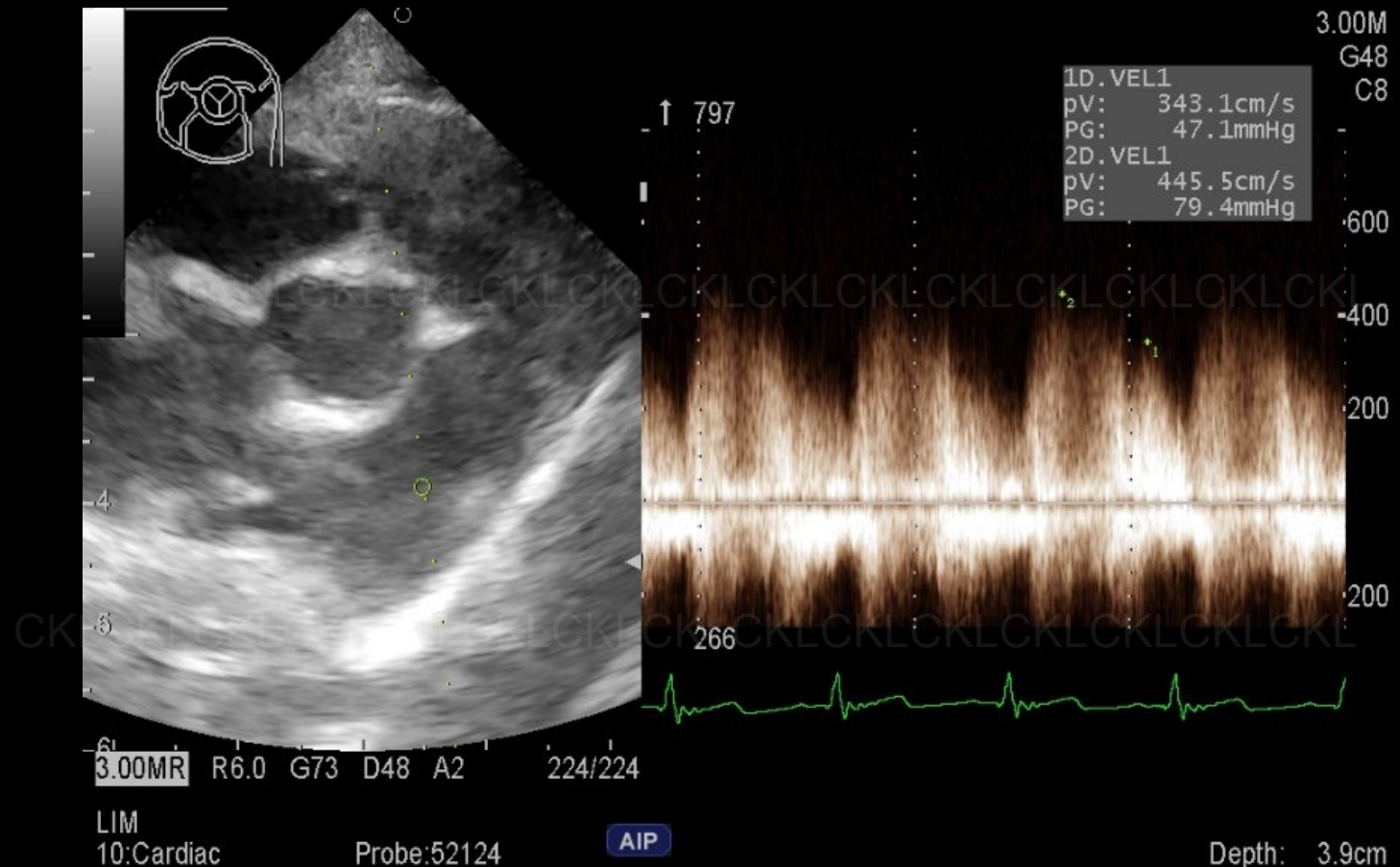
Hypervascularity of the lungs (pulmonary overcirculation)

Radiological diagnosis

- Marked left sided cardiomegaly (enlarged left auricle, left atrium and left ventricle enlargement) with pulmonary overcirculation (characterized by distended main pulmonary, aorta and pulmonary vasculature) are consistent with the diagnosis of patent ductus arteriosus (PDA)

Additional diagnostics

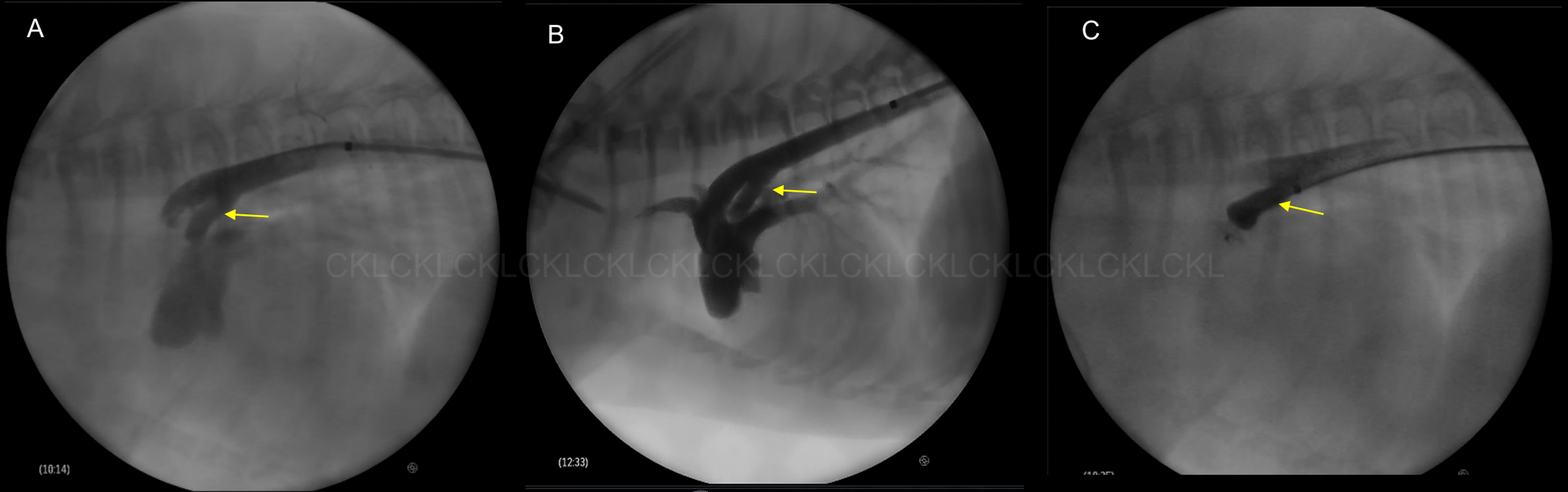
- ECG: Atrial fibrillation
- Echocardiogram:
 - Severe LA and LV dilation
 - Severely decreased systolic function: might be due to tachyarrhythmia
 - MPA severely dilated with large PDA
 - Diastolic pulmonary artery flow (positive or negative) with normal systolic flow



Final diagnosis

- Left to right shunting PDA
 - Atrial fibrillation: dilation of left heart → turbulent blood flow → arrhythmia

Outcome : Successful placement of Amplatz Canine Ductal Occluder in the PDA



Images courtesy of Dr. Melissa Tropf, DVM, MS, DACVIM (Cardio)

Figures A & B: Yellow arrow indicating presence of positive contrast within the PDA (via selective angiography) and subsequently retrograde flow into the main pulmonary artery and perfusing the rest of the pulmonary vasculature

Figure C: Successful placement of the Amplatz Canine Ductal Occluder within the PDA, with absence of retrograde flow into the main pulmonary artery

Remarks

PDA

- Due to failure of closure of the ductus arteriosus
 - Genetic defect of ductal wall: elastic fibers instead of smooth muscle fibers
- Shunting of blood from aorta to main pulmonary artery
- Overcirculates the lungs and left heart
- Results in left sided cardiac volume-overload
 - left atrial and left ventricular enlargement
 - ± pulmonary vascular enlargement
 - ± ductus bump (Ao and/or MPA)

Remarks

PDA

- Most PDA shunting are left to right (aortic pressure > pulmonary artery pressure)
- Confirmation of diagnosis of PDA will require additional imaging such as echocardiography and selective angiography
- Most PDA shunting are left to right (aortic pressure > pulmonary artery pressure)

Remarks

PDA

- In a small subset of cases (15% of dogs with PDA), persistent pulmonary overcirculation induces increased vascular resistance, and subsequently cause pulmonary hypertension
- When the pulmonary artery pressure exceeds the aortic pressure (severe pulmonary hypertension), the shunt direction will be changed to a right to left flow (also referred as a reversed PDA)
- There are various types of morphology of PDA that can be characterized by selective angiography (Miller et al. J Vet Cardiol. 2006;8:109-114)
 - Type III ductal PDA and reversed PDA (all intervention contraindicated)

References

Saunders AB et al. Long-term outcome in dogs with patent ductus arteriosus: 520 cases (1994-2009). J Vet Intern Med. 2014 Mar-Apr;28(2):401-10

Miller MW, Gordon SG, Saunders AB, Arsenault WG, Meurs KM, Lehmkuhl LB, Bonagura JD, Fox PR. Angiographic classification of patent ductus arteriosus morphology in the dog. J Vet Cardiol. 2006 Nov;8(2):109-14

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Ettinger, Stephen, et al. "Congenital Heart Disease." Textbook of Veterinary Internal Medicine: Diseases of the Dog and the Cat, 6th ed., Elsevier, 2006.