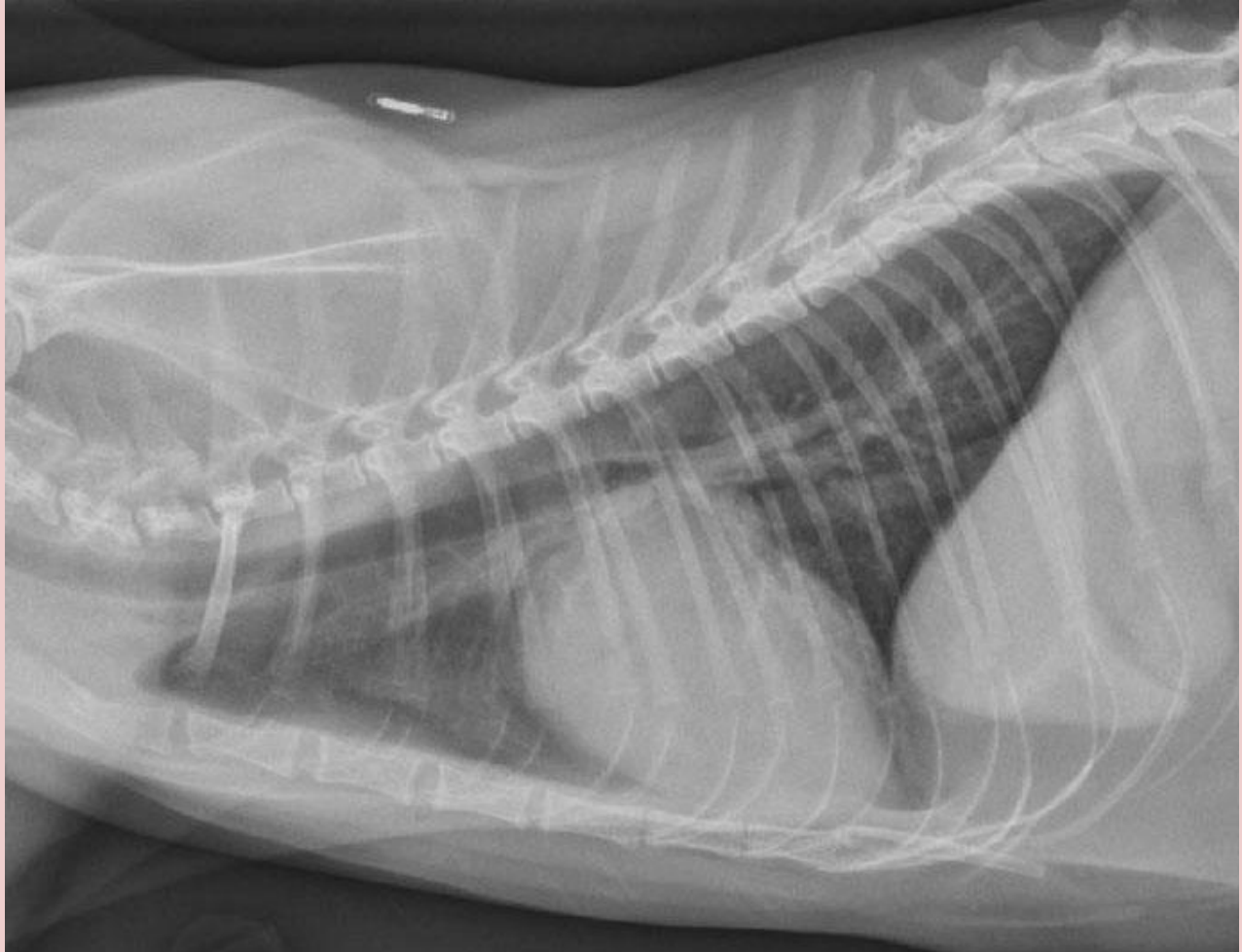


Question

A 5-year old female spayed Tonkinese cat presents to your clinic with increased respiratory effort, anorexia, and occasional open mouth breathing. The cat has a grade III/VI sternal systolic murmur. No arrhythmias are noted and pulses are synchronous. What is the most appropriate next step?



- Echocardiography and diuretic therapy
- Repeat radiographs in 1 month
- ECG and pericardiocentesis
- Cardiac angiogram and coil placement

Explanation - The next step is to determine the type of cardiomyopathy causing the clinical signs and heart failure. The increased interstitial pattern in the cranioventral lung lobes indicates that there is cardiac decompensation. Diuretics are an appropriate therapy to treat heart failure pending diagnosis.

Unlike dogs where a valvular disease is the most common form of cardiac disease, myocardial disease is the most common form of cardiac disease in cats. Causes of myocardial disease in cats are:

- Intrinsic abnormalities of myocardium
- Secondary to systemic conditions (Hypertension – Hyperthyroidism)

What to do?

- **Echo** ---- Detect HCM
- **Blood pressure / Fundic exam** ---- Hypertension
- **T4 levels** ---- Hyperthyroidism
- Treat with Diuretics (Lasix) and ACE inhibitors (Enalapril) pending diagnosis.

Question

A 7-year old male castrated cat presents for respiratory distress with open-mouth breathing. You initially place him in oxygen and obtain thoracic radiographs when he is stabilized. The films are shown here. What is your diagnosis?



- Feline asthma syndrome
- Pneumonia
- Left-sided congestive heart failure
- Neoplasia

- Tracheal collapse

Explanation - The correct answer is left-sided congestive heart failure. The cardiac silhouette is tall suggestive of left ventricular enlargement and there is a diffuse unstructured interstitial pattern in the caudoventral and cranial lung fields. The pulmonary vasculature is also dilated. Remember that cats in heart failure can have edema distributed in patchy infiltrates throughout the lungs, in contrast to dogs where it is more typically in the perihilar region.

Asthma is less likely as no clear bronchial markings are seen and because of the infiltrate. **Neoplasia** is a consideration, but doesn't explain the cardiac enlargement. **Pneumonia** could also cause this pattern of infiltrate (although it is more typically cranioventral), but also does not explain the cardiomegaly. There is no evidence of **tracheal collapse**, which is an exceedingly rare condition in the cat.

Question

A grade III/VI left parasternal systolic murmur is ausculted in a 10-year old domestic short haired feline on a routine yearly examination. Moderate cardiomegaly is evident on thoracic radiography, so you refer the patient for an echocardiogram. The echocardiogram is consistent with moderate left ventricular concentric hypertrophy, and systolic anterior motion of the mitral valve (SAM). All of the following tests are indicated in the patient's workup except which of the following?

- Doppler blood pressure
- A urinalysis
- An ocular fundic examination
- Serum and plasma taurine levels
- Thyroid testing

Explanation - Left ventricular concentric hypertrophy is normally associated with systemic hypertension, hyperthyroidism, or hypertrophic cardiomyopathy (systolic anterior motion of the mitral valve can occur with any of these conditions). Thus, blood pressure measurement, examination of the fundus (for evidence of hemorrhage or retinal detachment in response to systemic hypertension), and thyroid testing can be justified. A urinalysis is also indicated to rule out isosthenuria and/or proteinuria consistent with renal disease and resultant hypertension. Serum and plasma taurine levels are not indicated in this case based on the finding of concentric hypertrophy (taurine deficiency is associated with a dilated cardiomyopathy and eccentric hypertrophy).

Question


A lethargic cat arrives with bradycardia. You decide to perform an ECG and see a lack of a P waves and a widened QRS complex. What do you suspect?

- Wenckebach
- Hyperkalemia

- Warfarin toxicity
- Mobitz Type-1 Block
- Hypercalcemia

Explanation - The correct answer is hyperkalemia. This sounds like hyperkalemia. You rock if you got it! ECG findings associated with hyperkalemia include an increased P-R interval, widened QRS complexes, lack of P waves, and tall tented T waves.

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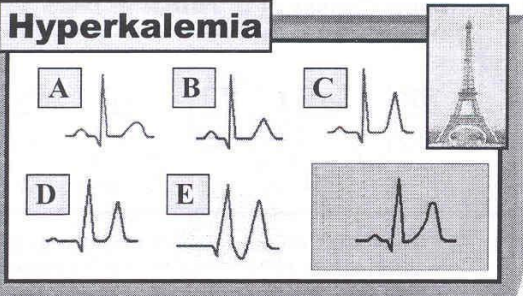


Electrolyte Disturbances

Hyperkalemia

An ECG should be obtained when electrolyte disturbance is suspected— especially for **hyperkalemia** (in which a fairly good correlation *does* exist between ECG findings and the serum potassium [K⁺] level).

Hyperkalemia



A — is normal. **B** — shows *peaking* of the T wave, which is the *earliest* change (K⁺ ≈6-7 mEq/L). **C** — The T wave becomes *taller* and more peaked (K⁺ ≈7-8 mEq/L); it almost looks like the **Eiffel Tower** (tall, peaked, with a *narrow* base) — in contrast to the T wave that is sometimes seen in healthy individuals as a **normal variant** (*shaded box*) — in which the T wave is rounded, its sides are *not* symmetric, and it has a *broad* base. **D** — P wave amplitude decreases, the PR interval lengthens, and the QRS widens (K⁺ >8 mEq/L). **E** — P waves disappear (*sinoventricular* rhythm) and the QRS becomes *sinusoid* (K⁺ >10 mEq/L). V Fib usually follows.

Question

Which of the following is true of cats with hypertrophic cardiomyopathy?

- Affected cats are usually geriatric males older than 12 years of age
- Left ventricular hypertrophy results in poor diastolic filling and left atrial dilation
- Affected cats are predisposed to thromboemboli due to stasis of blood in the left ventricle
- Hypertrophy of the cardiac muscle is usually precipitated by hypertension or aortic stenosis

Explanation - The correct answer is left ventricular hypertrophy results in poor diastolic filling and left atrial dilation. HCM is a **primary cardiomyopathy** that is not precipitated by factors such as hypertension or aortic stenosis. **Cats affected with HCM are usually diagnosed at a young to middle**

age, not when they are geriatric. Thromboembolism is a common result of HCM, but it is due to thrombus formation in the static blood of the dilated left atrium, not from the left ventricle.

Question

Which of the following is true regarding feline heartworm disease testing?

- Antibody and antigen testing are not helpful in the diagnosis of feline heartworm
- A positive antigen test is diagnostic; a negative antigen test rules out infection
- A positive antigen test is diagnostic; a negative antigen test is inconclusive
- A positive antibody test increases your index of suspicion; a negative antibody test rules out infection
- A positive antibody test is diagnostic; a negative antibody test lowers your index of suspicion

Explanation – The correct answer is a positive antigen test is diagnostic; a negative antigen test is inconclusive. An antigen test will be positive if there are female worms present. However, if there is an all-male worm infection, you can have a false-negative test result.

The heartworm antibody test is prone to false-positive results because a positive test can result from a cat that has been exposed, but cleared the infection. A negative antibody test cannot absolutely rule out infection as some animals with a low worm burden may not mount a sufficient antibody response to be measured.

The antibody test and the antigen test in cats each have their pitfalls. When used together, they can be useful in many cases.

Question

Which of the following can be treated with enalapril?

- Acute renal failure
- Protein-losing nephropathy
- Hypotension
- Protein losing enteropathy

Explanation - Enalapril is an angiotensin-converting enzyme (ACE) inhibitor used as a vasodilator, antihypertensive agent, and heart failure treatment. It works by preventing the conversion of angiotensin I to angiotensin II, thus reducing aldosterone concentrations and causing diuresis. Its dilatory effects on the efferent arterioles of glomeruli help to palliate protein losing nephropathies. It is often used in conjunction with diuretics.

Question

Which of the following is incorrect concerning feline heartworm disease?

- Antibody tests can detect the exposure of the host to both male and female worms
- Cats typically have much lower adult worm burdens than dogs
- Migration of larvae to ectopic regions (outside of the heart and pulmonary arteries) is less common than in dogs
- A negative microfilaria test does not rule out heartworm disease

Explanation - Cats do typically have fewer adult worms than dogs because of increased natural resistance. Cats are often microfilaria negative despite an active infection (either from all male worm infections, or occult disease). Antibody testing can detect exposure to both male and female worms; however, **in cats, larvae are more likely to migrate to ectopic locations such as the brain, skin, and ocular tissue.**

Question

Which of these diseases is most commonly associated with aortic thromboembolism (saddle thrombus) in cats?

- Renal insufficiency
- Rodenticide toxicity
- Feline asthma
- Hypertrophic cardiomyopathy
- Hyperadrenocorticism

Explanation - The correct answer is hypertrophic cardiomyopathy. This disease tends to lead to dilation of the left atrium with blood stasis in the chamber. Thrombi form there and frequently lodge at the bifurcation of the aorta, leading to **acute paraparesis and pain.**

Question

Treatment for hypertrophic cardiomyopathy in cats (as depicted in the pathologic image) is aimed at which of the following?



- Improving systolic function by increasing heart rate
- Improving diastolic filling by increasing heart rate
- Improving systolic function by decreasing heart rate
- Improving diastolic filling by decreasing heart rate

Explanation - The correct answer is improving diastolic filling by decreasing heart rate. The primary problem with HCM is thickening of the wall of the left ventricle, impairing diastolic filling. There is usually no problem with contractility and systolic function. Slowing the heart rate provides for longer diastolic filling, allowing the left ventricle to fill more effectively. Decreasing the heart rate also decreases the severity of systolic anterior motion of the mitral valve.

For this reason, the medications used most frequently to slow the heart rate are:

- 1) **Beta-blockers** (i.e. atenolol: 6.25-12.5 mg/cat orally BID, or metoprolol: 0.5-1 mg/kg TID)
- 2) **Calcium channel blockers**: diltiazem: 1-2 mg/kg TID (PO) or 7.5 mg per cat TID

For cases with severe left atrial enlargement or cats in heart failure, also consider:

- 3) **ACE inhibitors** (i.e. enalapril or benazepril: 0.25-0.5 mg/kg once daily)
- 4) **Diuretics**: furosemide (Lasix): 1-2 mg/kg BID-TID
- 5) **Blood thinners** to prevent thromboembolic disease with aspirin or clopidogrel (Plavix).

Also, always keep in mind that you want to identify and treat **possible underlying hypertension or hyperthyroidism** that could be contributing to the disease.

Question

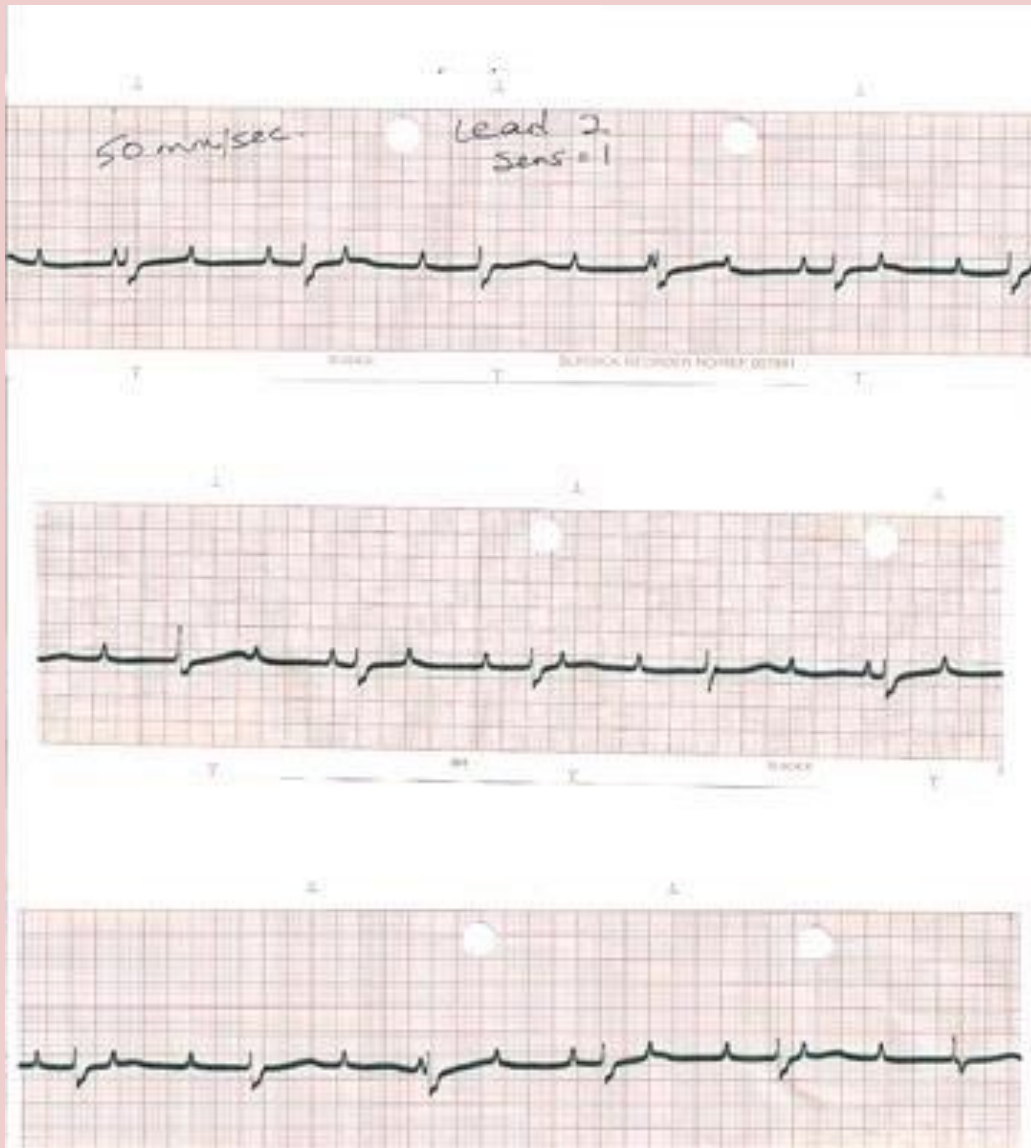
A feline patient has only been eating canned dog food for the past 8 years. Which of the following are you concerned about?

- Hypertrophic cardiomyopathy
- Atherosclerosis
- Arrhythmia from a vitamin deficiency
- Dilated cardiomyopathy

Explanation - Dog foods do not contain the amount of taurine that cats need to maintain vital organ function. A taurine deficiency can lead to **dilated cardiomyopathy** in cats. Hypertrophic cardiomyopathy is seen in cats with a genetic predisposition for the condition. Atherosclerosis is not typically seen in dogs and cats and is more of a human disease.

Question

What rhythm best describes this electrocardiogram recorded from a 15-year old domestic short hair ausculted with a resting heart rate of 80-110 bpm?



- Atrial fibrillation
- Third degree atrioventricular block
- First degree atrioventricular block
- Second degree atrioventricular block

Explanation - Atrioventricular (AV) block describes abnormal conduction between the heart's pacemaker and the remainder of the heart muscle tissue. Third degree AV block is the most malignant rhythm of the three classes of AV block because it represents complete dissociation between the pacemaker firing and ventricular contraction. Thus, on the rhythm strip, there is no association between the pacing (p waves) and the heart producing a beat (the ventricular contraction as represented by the QRS complex). As a result of stimulation from the sinoatrial node, P waves appear at a regular rhythm while the AV node fires at its own rhythm resulting in dissociated QRS complexes at 80-110 bpm (the resting pacemaker of the ventricle is 80-110 bpm in cats).

On the rhythm strip above, you can see P waves in varying locations next to the QRS complexes. Some P waves are even on top of the QRS complex.

First degree AV block is when there is increased distance between the P waves and the QRS complexes. Second degree AV block is when there are intermittent/occasional P waves without a corresponding QRS complex.

Atrial fibrillation is a rhythm showing a bumpy baseline, and irregularly irregular QRS complexes firing at a fast speed.

Question

A 10-year old FS DSH presents for losing her balance. The owner said she seems to be unsure of her distance in the last day when jumping up onto the counter and has bumped into the couch a couple of times.

Her fundic examination shows engorged retinal vessels of the right eye, and the left retina appears hazy and is difficult to see any detail of the optic nerve or vessels. Both pupils are markedly dilated, and there is no menace of the left eye. The right eye is still visual. You suspect the left eye has a detached retina.

You check her blood pressure, and she is calm while you take several readings using a Doppler. Her average systolic blood pressure is 260 mmHg. You are confident the reading is accurate. Which of the following medications would be the best choice for this cat?

- Furosemide
- Pimobendan
- Amlodipine
- Enalapril
- Atenolol

Explanation - This cat is extremely hypertensive and should be treated immediately with medication to reduce blood pressure. Normal systolic blood pressure for a cat is around 160 mmHg or less. Sometimes it may be slightly increased when the cat is stressed. Hypertension can lead to many complications including hypertensive retinopathy (retinal detachment), hypertensive heart disease, neurologic complications, and progression of renal disease.

If the blood pressure can be stabilized quickly, there is a good chance the retina will re-attach with time. Underlying causes of hypertension in the cat include hyperthyroidism and renal disease. This cat should be further evaluated for these conditions.

Amlodipine is the treatment of choice for hypertension in cats. It is a **calcium channel blocker** and works by preventing calcium influx into vascular smooth muscle cells, thereby causing vasodilation. This relaxes the vessels and allows for reduced blood pressure.

Atenolol is a beta blocker and is often used in tachycardic patients with hyperthyroidism. It does not adequately control systemic hypertension in most cases.

Furosemide is a diuretic used in treating congestive heart failure. **Enalapril** is an ACE-inhibitor and does help to decrease blood pressure in some cases by causing vasodilation. However, in a cat with severe hypertension, enalapril alone would not likely provide adequate control. **Pimobendan** is a calcium sensitizer that increases cardiac contractility. It is sometimes used in cats with dilated cardiomyopathy. It is most often used in dogs as an adjunctive treatment for pulmonary hypertension or congestive heart failure.

Question

Which of the following is not a common sequela of hypertrophic cardiomyopathy in cats?

- Right heart failure
- Thromboembolism
- Left heart failure
- Systolic anterior motion of the mitral valve

Explanation - The correct answer is right heart failure. HCM in cats usually only affects the left heart. Thromboemboli occur due to stasis of blood in the dilated left atrium. Left heart failure occurs as the left ventricle becomes stiffer, and blood backs up into the pulmonary vasculature. Systolic anterior motion of the mitral valve occurs when the anterior leaflet of the mitral valve blocks the left ventricular outflow tract during systole due to thickening of the ventricle wall and displacement of the valve leaflet.

Question

Which of the following drug choices is indicated for the treatment of hypertrophic cardiomyopathy in a cat?

- Prednisone
- Digoxin
- Atenolol
- Atropine

Explanation - The correct answer is atenolol. Atenolol is a beta blocker and will decrease heart rate thus allowing for better chamber filling before contraction. Other treatments include ACE inhibitors, calcium channel blockers, and diuretics. Beta blockers may improve blood flow and reduce arrhythmias. They may also decrease dynamic obstruction of the left ventricular outflow tract.

Question

A 6-month old domestic short hair cat presents for its first physical exam. Cardiac auscultation reveals a grade IV/VI holosystolic murmur on the right thorax. Thoracic radiographs were

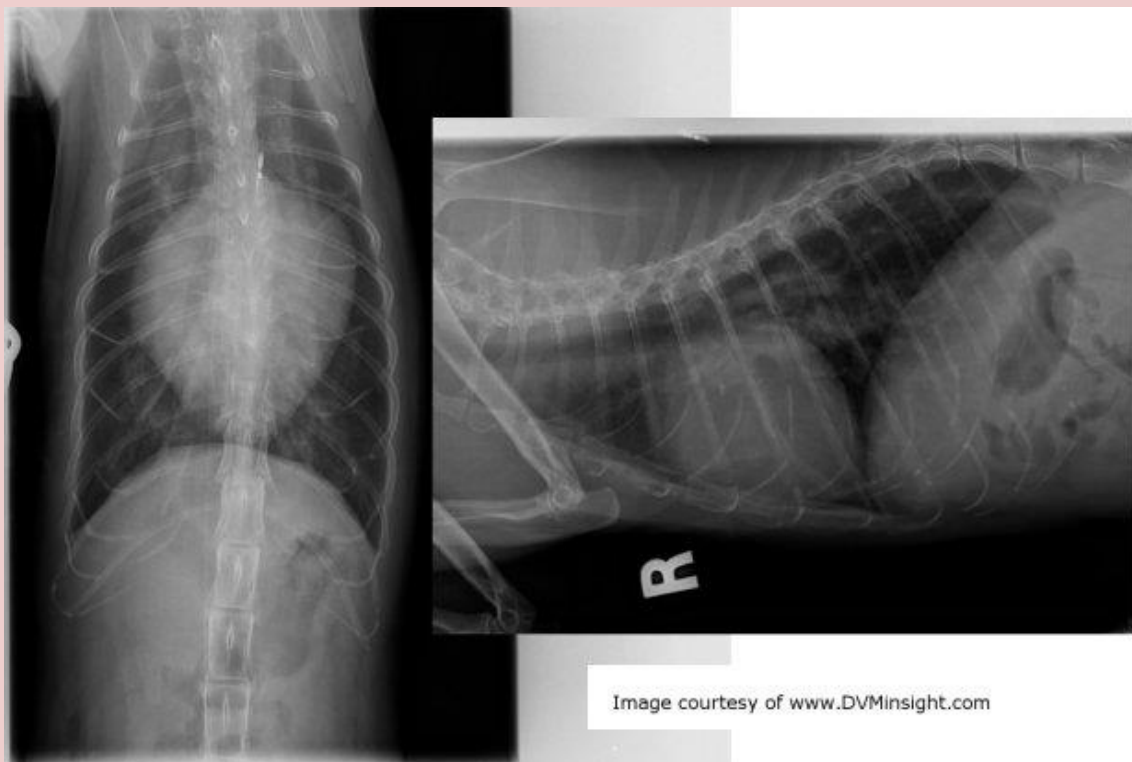
unremarkable and echocardiography showed a small turbulent jet flowing through the ventricular septum from the left ventricle to the right ventricle. Which of the following do you tell the owner?

- Surgical correction is required because the defect will become bigger as the cat grows.
- The prognosis is very good with small ventricular septal defects and no treatment is needed.
- The cat should be started on prophylactic medical therapy for heart failure since surgical correction is not feasible.
- The prognosis is guarded to poor in the long run because the cat will likely develop heart failure early in life.

Explanation - The correct answer is the prognosis is very good with small ventricular septal defects and no treatment is needed. The prognosis of small VSDs is very good. Some will close by themselves within the first year of life. It is unlikely that a small VSD will cause any significant problems such as heart failure, though follow-up evaluation is warranted to monitor cardiac size and function. Large VSDs carry a guarded prognosis and require cardiac bypass for surgical correction or novel device closure via transcatheter techniques; neither of which are commonly employed in animals. Small VSDs cause a relatively more turbulent jet of blood through the small defect, causing a louder murmur than a large VSD.

Question

An 8-year old cat presents to your clinic for an exam. On physical exam, vital parameters are HR- 220, RR-20, T-101.3 F. You auscult a 3/6 systolic murmur. A chemistry panel shows BUN- 42 mg/dl, creatinine- 2.0 mg/dl, albumin- 3.6 g/dl, and globulin 3.1 g/dl. You take thoracic radiographs which are shown (see image). Based on these findings and the likely diagnosis, which of the treatment plans would be most appropriate?



- Digoxin and clopidogrel (Plavix)
- Ivermectin
- Balloon valvuloplasty
- Prednisone and methimazole
- Diltiazem and aspirin

Explanation - This cat has classic findings for hypertrophic cardiomyopathy. The radiograph is a great example of the "**Valentine shaped heart**" that can be seen with this disease. You should note that many cats with even moderate to severe HCM can have relatively mild changes on radiographs.

Treatment is aimed at improving diastolic function and preventing thromboembolism. The medications used most frequently are:

1. **Beta- blockers** (i.e. atenolol: 6.25-12.5 mg/cat orally SID-BID, or metoprolol: 0.5-1 mg/kg TID)
2. **ACE inhibitors** (i.e. enalapril or benazepril: 0.25-0.5 mg/kg once daily)
3. **Calcium channel blockers**: diltiazem: 1-2 mg/kg TID (PO) or 7.5 mg per cat TID
4. **Diuretics** (for cats in failure): furosemide (Lasix): 1-2 mg/kg BID-TID
5. Preventing thromboembolic disease (options include aspirin and clopidogrel).

Balloon valvuloplasty is used for pulmonic and sometimes aortic stenosis. Digoxin is not used for HCM and prednisone would be contraindicated.

Question

A 6-year old domestic medium hair cat presents for dragging his hind legs when walking and loud vocalizing. The cat is an indoor/outdoor cat, current on his vaccinations. He was acting normally this morning, and the owner found him like this when they got home this afternoon. On physical exam heart rate is 260, respiratory rate is 50, and temperature is 102.8. A II/VI heart murmur is heard parasternally. The cat tries to move frequently and vocalizes loudly. Palpation of the hind legs is very painful, with stiff muscles and no femoral pulses appreciated. What is the most likely cause and prognosis?



- Megacolon. Prognosis great to fair, discuss long term management with owner and potential sequelae.
- Disseminated Intravascular Coagulopathy. Prognosis typically poor, discuss euthanasia with owner.
- Urinary obstruction. Poor to good prognosis based on underlying etiology. Discuss long term management and possible surgery with owner.
- Intervertebral disk disease. Prognosis good, discuss surgical intervention if cat does not improve in 24 hours or deep pain sensation to hind legs is lost.
- Unknown trauma leading to pelvic fracture. Medical or surgical management if animal is able to urinate on own and pain medications. Prognosis fair to great depending upon neurological status.
- Heart disease with emboli lodging in aortic bifurcation. Prognosis grave, discuss euthanasia with owner.

Explanation - The most likely cause of aortic saddle thrombi in cats is cardiac disease; with the most common being hypertrophic cardiomyopathy, restrictive cardiomyopathy, and dilated cardiomyopathy. The left atrium becomes dilated, and turbulent blood flow through left atrium activates platelet aggregation. Thrombi form in the left atrium and eventually dislodge into systemic circulation. Emboli can lodge in the brain, kidneys, GI vessels, and aortic bifurcation. Even if treatment is successful, recurrence is common.

Question

A 3-year old, indoor-only, male castrated Maine Coon cat is presented to you for acute-onset of hindlimb pain and paresis. Physical examination reveals a grade III left parasternal heart murmur and minimal movement in the hind legs. Femoral pulses are bilaterally absent, and the hindlimb toes are cold to the touch. The cat is tachypenic, but lung sounds are normal. What is the most likely diagnosis?

- T3-L3 intervertebral disc disease
- Thrombus at the aortic bifurcation (saddle thrombus)
- Lymphoma of the spinal cord
- Tetanus
- Chlorpyrifos toxicity

Explanation - Maine Coon cats are predisposed to development of hypertrophic cardiomyopathy at a young age. Consequently, left atrial enlargement predisposes to atrial thrombus formation, and these clots frequently lodge in the arterial supply to the hindlimbs. The trifurcation is where the aorta divides into the two external iliac arteries and the common origin of the internal iliac arteries. Classic findings due to a clot at the aortic trifurcation include posterior paresis/paralysis, hindlimb

pain, cyanotic nailbeds, absent femoral pulses, and a firm leg musculature. Other signs of cardiac disease/failure (murmur or pulmonary edema) are often but not always evident at presentation.

Neither cord lesions, tetanus, nor toxicities should cause the vascular compromise evident on this cat's physical exam.

Question

An 11-year old FS DSH cat presents to you for a physical exam. The owner reports that the cat typically sleeps a lot, and she has not noticed any abnormalities at home. A grade III/VI left parasternal systolic murmur is ausculted; the heart rate is 180 beats per minute.

The owner is immediately concerned about the heart murmur so you perform a complete blood count, chemistry panel, T4 levels, and urinalysis to start. The CBC shows a hematocrit of 32%, WBC of 8,430/ul and platelet count of 218,000/ul. Chemistry panel shows a BUN=24 mg/dl, creatinine=1.2 mg/dl, ALT=32 IU/l, albumin of 3.1 g/l, and globulin of 2.9 g/l. Urinalysis is within normal limits with USG=1.029. The T4 is 1.8 ug/dl.

You refer her to your local cardiologist for an echocardiogram. He reports finding a normal left atrial size, moderate left ventricular concentric hypertrophy, and systolic anterior motion of the mitral valve (SAM) with normal fractional shortening. No electrical disturbances were seen on an ECG he performed. The cat's systolic blood pressure was 130 mmHg in his clinic.

Which of the following should be considered for the treatment of this cat?

- Oxygen
- Nitroglycerin paste
- Spironolactone
- Atenolol
- Furosemide

Explanation - This case describes typical findings for a cat with hypertrophic cardiomyopathy (HCM). Nitroglycerin, oxygen, spironolactone, and furosemide are indicated for cats with heart FAILURE from HCM, which this cat does not have.

Use of a beta-blocker such as atenolol is advocated by some cardiologists, particularly when left ventricular outflow obstruction exists. Atenolol alleviates the obstruction by reducing heart rate, LV contractility, and also reduces myocardial oxygen demands. Diltiazem and antithrombotics may also be considered.

Question

A cat presents with dyspnea and coughing. On a routine blood smear you find a *Dirofilaria immitis* microfilaria. How would you treat this cat?

- Corticosteroids
- Ivermectin
- Melarsomine
- Surgical removal
- Thiacetarsamide

Explanation - The correct answer is corticosteroids. Treating with any agent that is an adulticide may potentially result in embolization, release of antigen, and acute death, making this a controversial choice. Corticosteroids work well in reducing inflammation associated with infection and will help alleviate clinical signs. Cats are different than dogs in that heartworms cannot survive as long and the cats are sometimes able to eliminate the worm. Surgical removal has been attempted but is not a common practice and may also result in acute death.

Question

A 3-year old male domestic shorthair cat presents for a two day history of lethargy, vomiting and vocalizing progressing to recumbency. On initial evaluation, heart rate is 100 bpm, pulse quality is poor, mentation is obtunded, and there is a large firm bladder on abdominal palpation. An intravenous catheter is placed. Which of the following is the most immediately life-saving intervention?

- IV administration of calcium gluconate
- IV administration of a balanced electrolyte solution
- IV administration of sodium bicarbonate
- Placing a urinary catheter to relieve urethral obstruction
- IV administration of dextrose
- IV administration of regular insulin

Explanation - **Calcium gluconate** will serve to immediately counter the effects of hyperkalemia-induced bradycardia and cardiovascular collapse in this cat with a most-likely diagnosis of urethral obstruction. The other interventions will help to reduce the level of potassium and could be a part of therapy but may not take effect rapidly enough to address the most life-threatening component of the cat's illness.

Question

You just began working in the intensive care unit and you notice a Cornish Rex exhibiting fever, restlessness, vomiting, urticaria, and hemoglobinuria. What do you think is happening?

- Blood transfusion reaction
- Disseminated intravascular coagulation
- Cyclosporine reaction
- Diabetic ketoacidosis

Explanation - The correct answer is blood transfusion reaction. This is the perfect random question. The fun fact to remember is that **Cornish rex, British short hair, and Devon rex** cats are predisposed to having **Type B blood type**. Type B cats have anti A antibodies and tend to have acute transfusion reactions as compared with type A cats. Also, realize that the clinical signs being exhibited are those of anaphylaxis and that will help you narrow down the choices.

Question

A 5-year old domestic medium haired female cat presents to you for **poor appetite** and **vomiting** over several days. On physical exam, you note pale, **icteric mucous membranes**, mild generalized **lymphadenopathy**, and **hepatosplenomegaly**. HR-230 bpm, RR-44 bpm, T-103.8F. Bloodwork reveals:

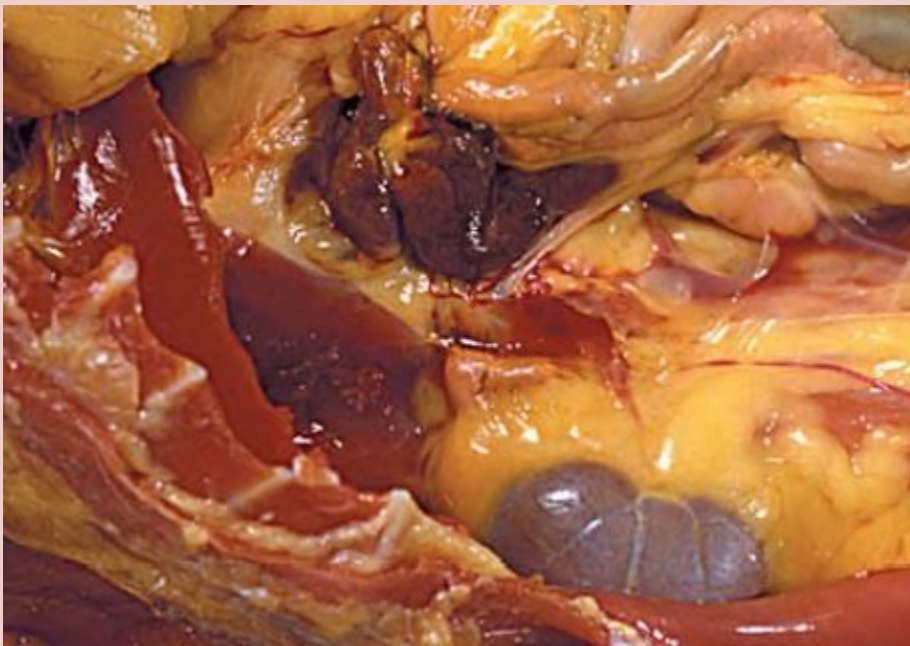
HCT-11% (25-47)

Retic- 340,000/ul (10,500-51,000)

WBC-19,000/ul (5,500-14,540)

Platelets-120,000/ul (220,000-539,000)

A chemistry panel is pending but you order a blood transfusion right away. Unfortunately, the cat's condition rapidly declines and the cat dies. Post-mortem exam reveals generalized icterus and splenomegaly (see image). Which of the following was the cat most likely suffering from?



- Toxic hepatocellular necrosis
- Pancreatitis
- Immune-mediated hemolytic anemia
- Biliary obstruction

Explanation - The only answer choice that readily explains the acute presentation and severe regenerative anemia is immune-mediated hemolytic anemia (IMHA). The icterus could be caused by any of the choices but in this case, is apparently prehepatic due to hemolysis. Keep in mind that in cats, IMHA usually occurs secondary to an underlying infectious or inflammatory disease, although primary idiopathic IMHA does occur as well.

Question

The card shown below is used for determining feline blood types. On the card, the circle on the left has heat inactivated antibodies against the type B feline antigen. The circle on the right has heat

inactivated antibodies against the type A feline antigen. 50 ul of anticoagulated blood from a cat has been mixed with 50 ul of saline and added to each circle on the card 2 minutes ago. What is the cat's blood type?



- Mik
- A
- AB
- B

Explanation - The card shown is one of several widely used in-practice test kits for feline blood typing. The presence of agglutination as seen in the circle on the right occurs because the anti-A antibodies on the card bind the type A antigen present of the cat's red blood cells. Agglutination in both wells would indicate an AB cat, which is rare. Mik is a recently identified feline blood group antigen; a proportion of type A cats lack expression of Mik and have a serum alloantibody for Mik. This can be a cause of acute hemolytic transfusion reactions in cats, even if they are matched for their blood type. This card (and most blood typing kits) does not test for Mik.

Question

Most cats have type A blood. This makes transfusion of cats with type B blood potentially problematic. Which feline breeds are most likely to have type B blood?

- Siamese, domestic long hair
- Oriental Shorthair, Siamese
- Tonkinese, Oriental Shorthair
- British Shorthair, Devon Rex

Explanation - Besides the domestic short and long haired breeds, Tonkinese, Oriental Shorthairs and Siamese are typically blood type A.

Common B blood type breeds include **British Shorthairs**, **Devon and Cornish Rex**, Ragdolls, Scottish Fold, **Persians**, and **Himalayans**.

Question

It is a busy day in the clinic and you are down to your last appointment. You are excited to leave for the day and can't wait to finish this general examination of a 1-year old female cat that was just adopted from the local rescue. The owners would like a general health screen along with

information on spaying the cat. On physical exam, you detect a continuous machinery murmur, which is audible on both sides of the chest. Otherwise, the examination was unremarkable, pulses were strong and symmetrical, normal temperature, heart rate, and respiratory rate. The cat was purring making it difficult to hear the murmur but you are certain it is present. You discuss with the owners the likelihood of a patent ductus arteriosus and recommend an echocardiogram to confirm the diagnosis. You also explain to the owners that this condition, although seen in cats, is much more commonly seen in dogs. Assuming the owners will go on to have surgery performed, what muscular landmark allows the surgeon to determine he/she is at the 5th rib space?

- Latissimus dorsi muscle
- Superficial pectoral muscle
- Serratus ventralis muscle
- Scalenus muscle
- Cutaneous trunci muscle

Explanation - The correct answer is **scalenus m**. This applies to both dogs and cats. The 5th rib marks the end of the muscular portion of the scalenus and the beginning of the external abdominal oblique. It is almost impossible to remember all the origins and insertions of muscles; a good tip is to try and at least remember those that provide important surgical landmarks.

The scalenus lies ventral to the origin of the cervical and thoracic parts of the serratus ventralis. It attaches to the first few ribs and the transverse processes of the cervical vertebrae and inserts on the 5th rib.

The serratus ventralis is fan-shaped and originates on the transverse processes of the last five cervical vertebrae and the first seven or eight ribs. It inserts on the scapula.

The superficial pectoral muscle originates on first two sternbrae and usually part of the third. It goes on to insert on the whole crest of the greater tubercle of the humerus.

The latissimus dorsi covers most of the dorsal and some of the lateral thoracic wall. Its origin is at the spinous processes of the lumbar and last 7 or 8 thoracic vertebrae. It inserts on the teres major tuberosity of the humerus and teres major tendon.

The cutaneous trunci muscle is a thin sheet of muscle that covers most of the dorsal, lateral, and ventral walls of the thorax and abdomen. This muscle is responsible for twitching the skin and is innervated by the lateral thoracic nerve.
