Frequently Asked Cardiology Questions

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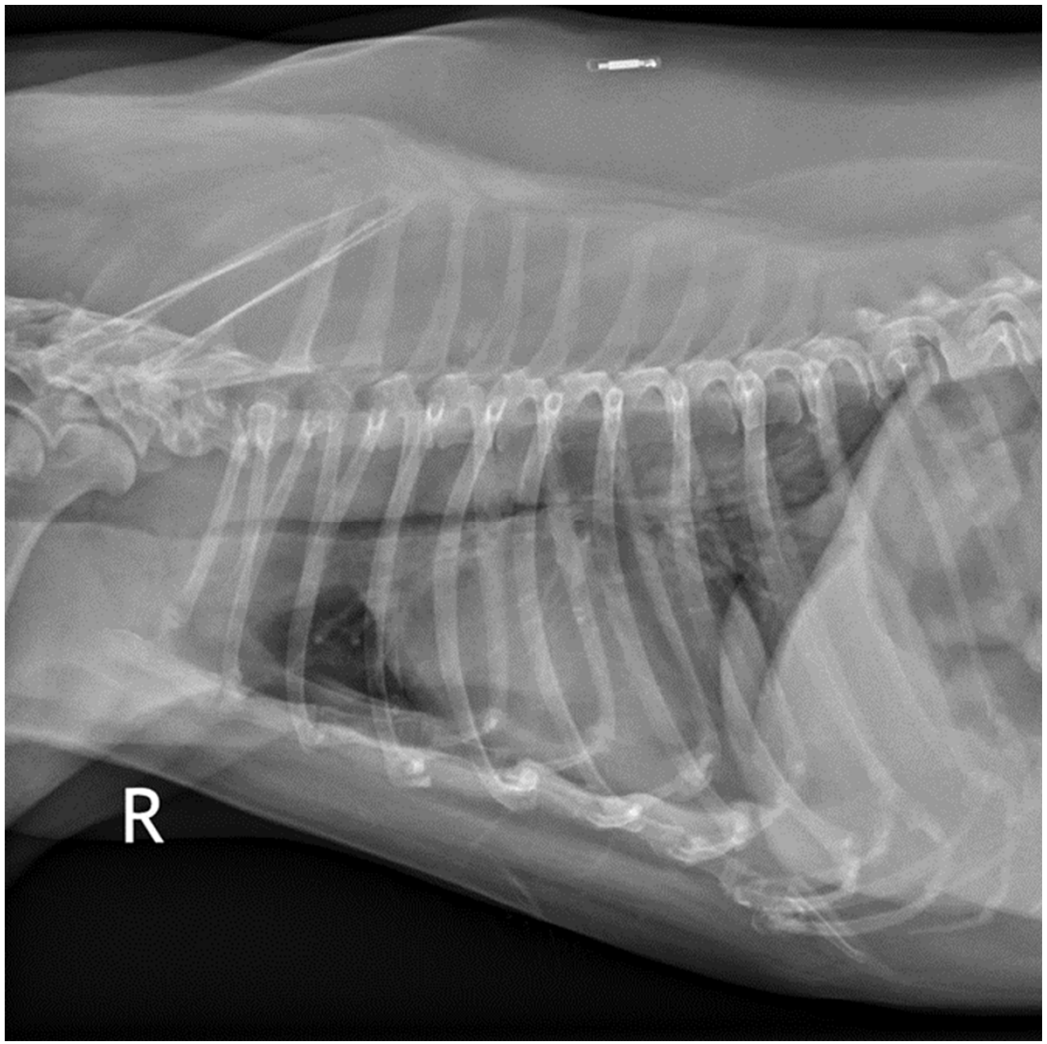
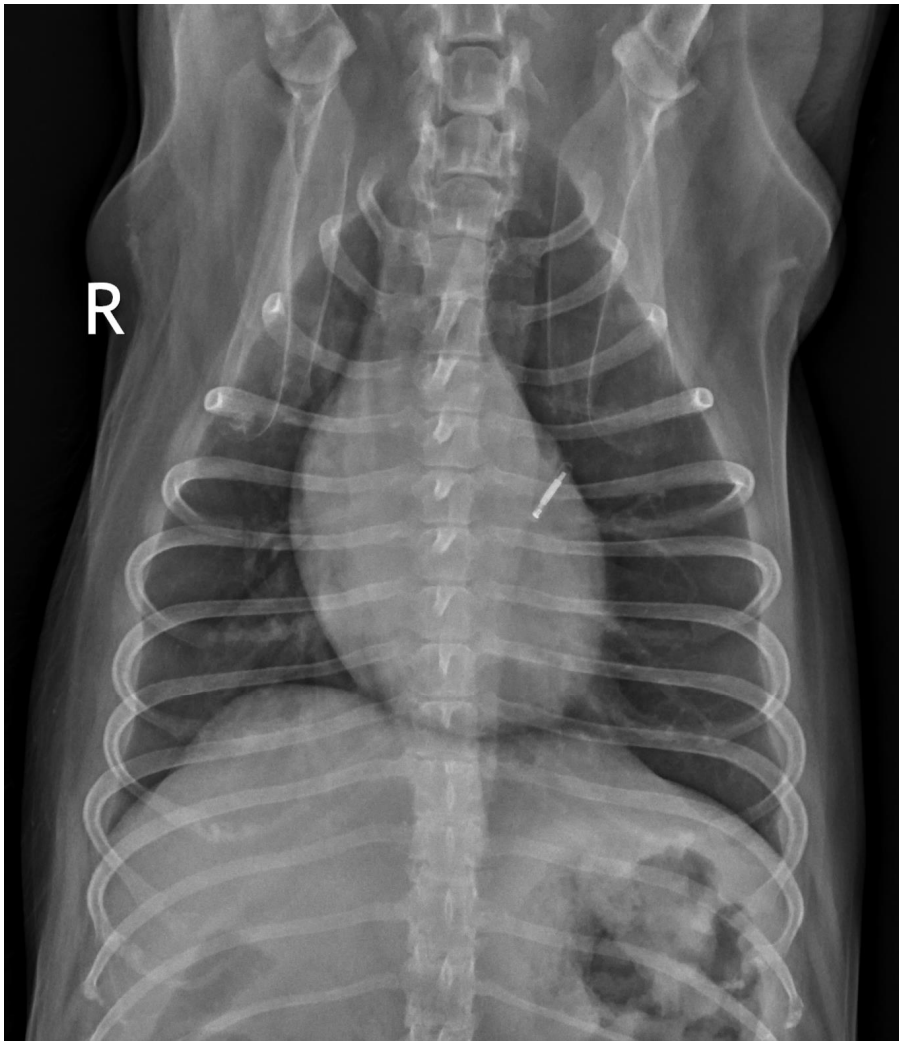
Leading Specialty Healthcare for Pets

Scenario #1 Chronic cough

- Wheezing and coughing for about 6 months
- Grade III/VI left apical systolic murmur
- Regularly irregular rhythm; HR 100 bpm
- Normal respiratory effort; RR 30

Scenario #1 Chronic cough



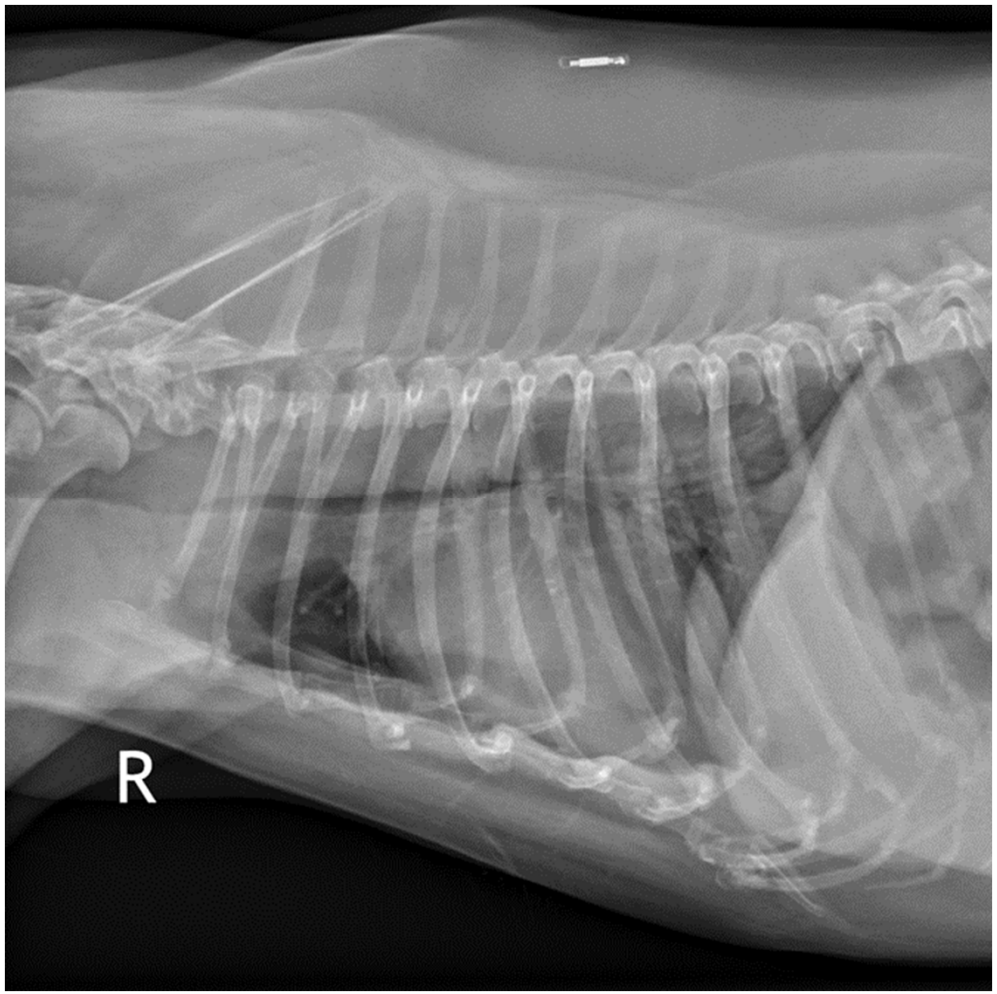


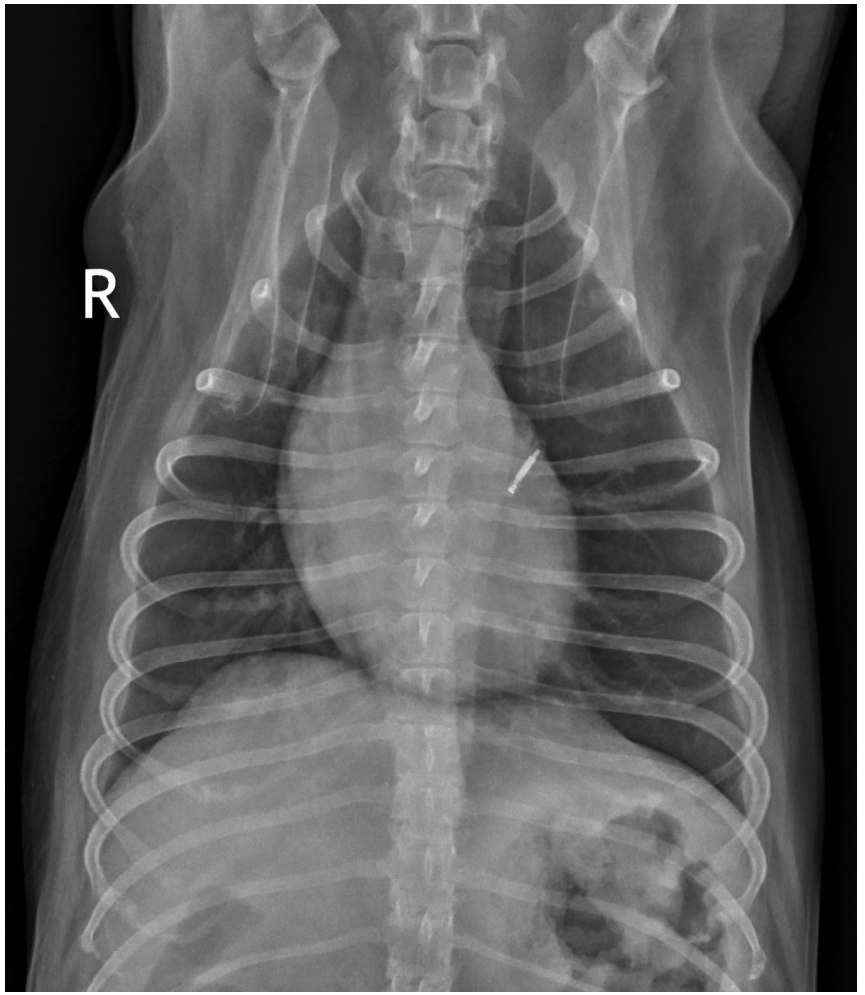
Scenario #1: How would you treat?

He has pulmonary edema: start furosemide

He has bronchomalacia: try cough suppressant

Scenario #1 Chronic cough Discussion





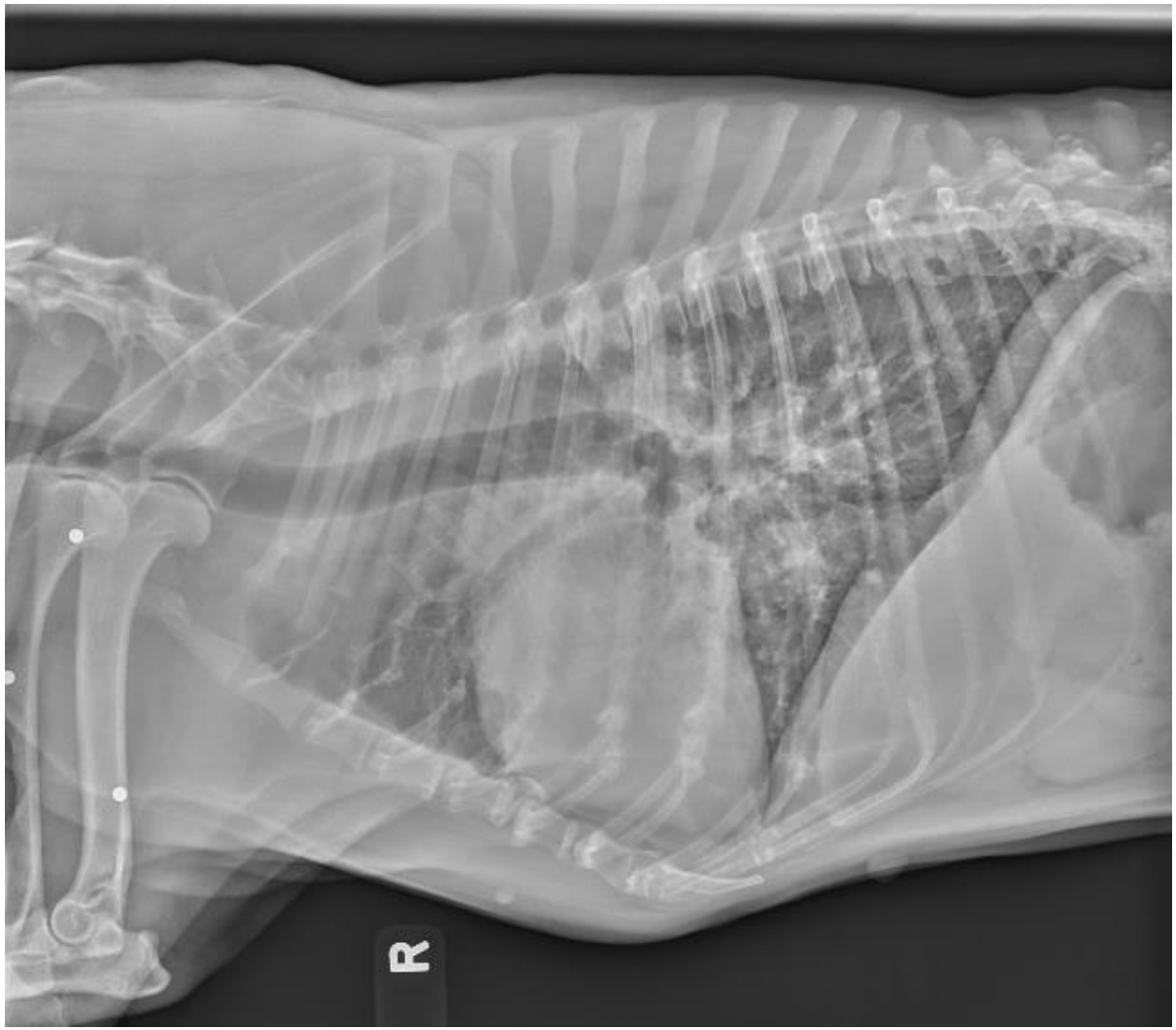
Scenario #1 Chronic cough Discussion

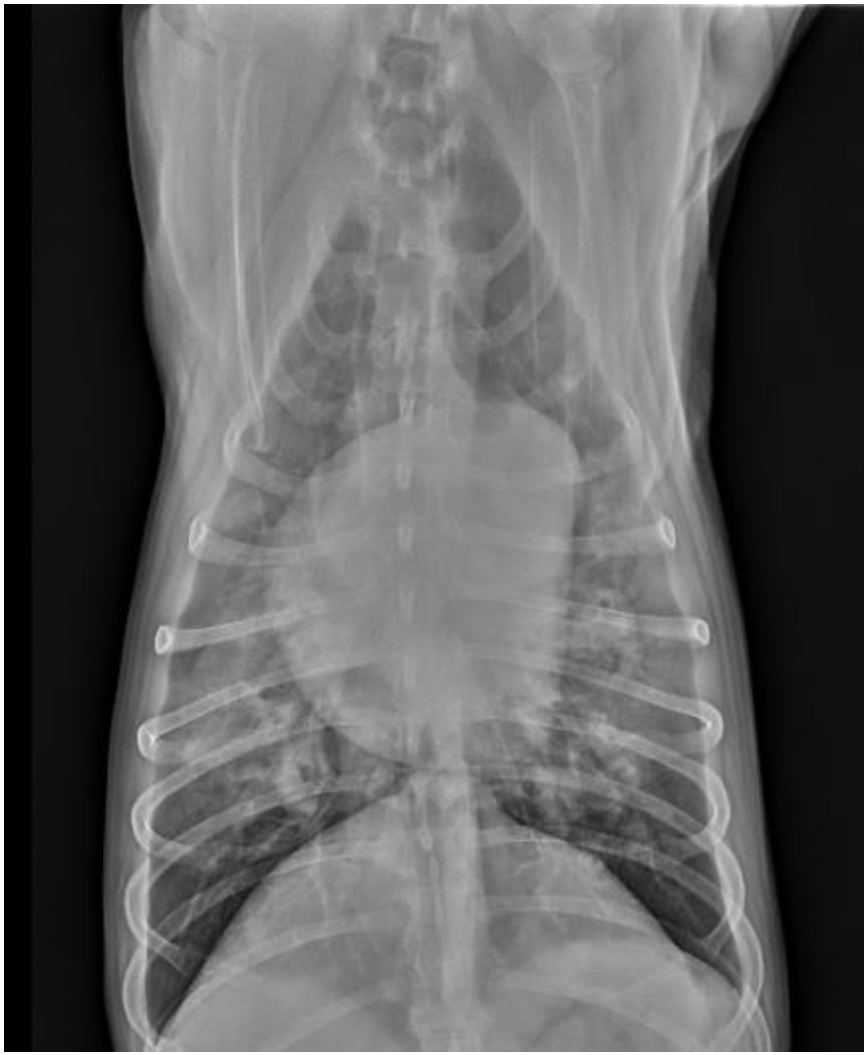
- The presence of cough alone in a dog with DVD may not indicate CHF
  - Often DVD and tracheobronchial disease occur concurrently
  - Coughing as the primary clinical sign is likely not due to CHF
  - Respiratory rate
    - Owners should always monitor the resting respiratory rate
      - Resting respiratory rate <40 bpm (Unlikely that pulmonary edema is present)
  - A normal lung auscultation does not rule out pulmonary edema
- Sinus arrhythmia
  - Clinical signs less likely to be due to CHF
- Presence of crackles with no increase in respiratory rate
  - Suspect primary lung disease over pulmonary edema

Scenario #2 Heartworm Disease

- Presented for evaluation of cough and increased RR
  - Diffuse crackles noted
  - No murmur
  - Increased RR
  - Coughing
  - Heartworm positive

Scenario #2 Heartworm Disease





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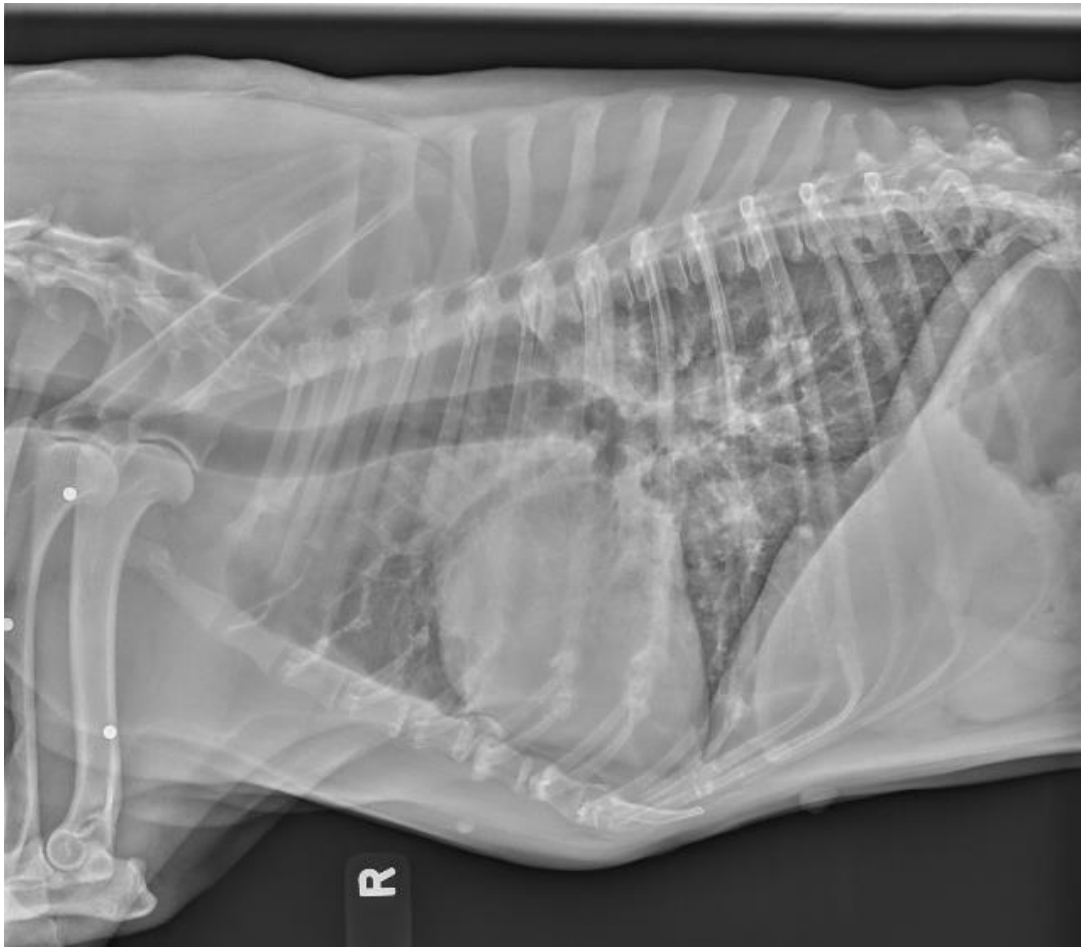
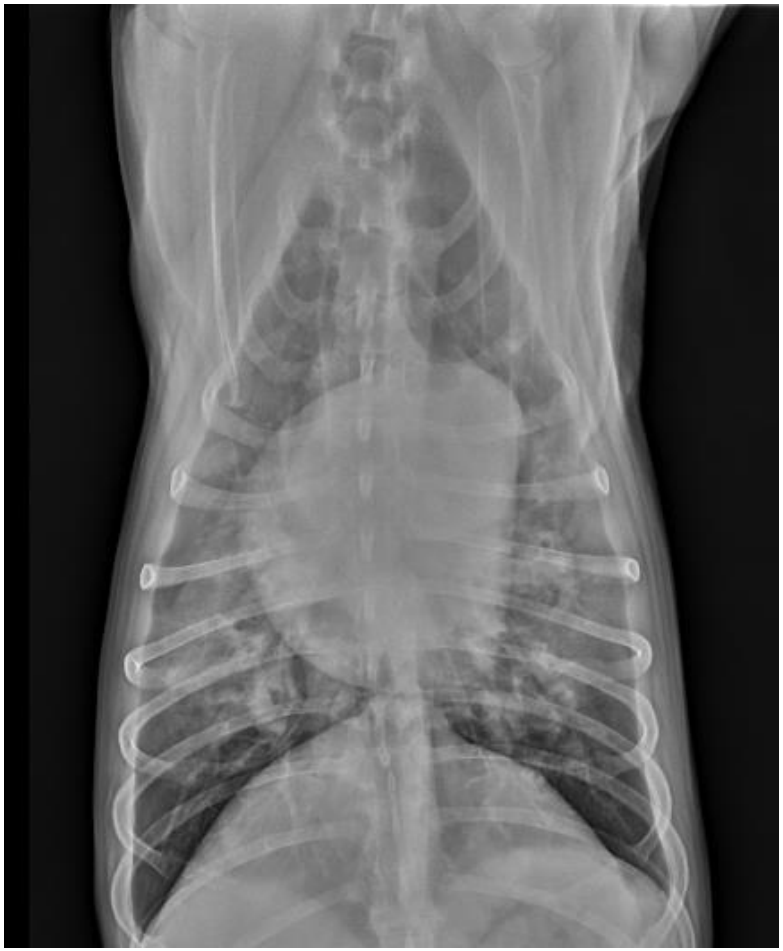
Scenario #2: How would you treat?

Bilateral interstitial pulmonary infiltrates: This is CHF, start furosemide

Bilateral interstitial pulmonary infiltrates: This is pneumonitis, start steroids

Scenario #2 Heartworm Disease discussion





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Scenario #2 Heartworm Disease discussion

- Pulmonary edema does not occur secondary to heartworm disease
  - Pneumonitis is common

- Pneumonitis Treatment
  - Doxycycline
    - Reduces *Wolbachia* in all stages of heartworms
    - Lethal to third- and fourth-stage heartworm larvae
    - Microfilariae ingested by mosquitoes developed into third-stage larvae but are not able to develop into adult worms.
    - *Wolbachia* surface protein (WSP)
      - Contributes to inflammation
    - 10 mg/kg Q12 for 4 weeks
      - May cause vomiting
        - If noted decrease to 5mg/kg Q12
  - Prednisone
    - 0.5 mg/kg Q12 for 1 week, then 0.5 mg/kg Q24 for 1 week, then 0.5 mg/kg Q48 for 1-2 weeks
      - Use lowest effective dose. Some patients may need it long term.

Do I need to carry Cardalis in my practice?

- Combination of spironolactone and benazepril
  - Given once a day
  - Chewable tablet

- 2019 ACVIM Consensus Statement
  - Stage A (No heart disease but considered at risk)
  - Stage B (DVD disease without current or historical CHF)
    - B1 (No cardiomegaly or not enlarged enough to initiate treatment)
    - B2 (Cardiomegaly significant enough to initiate treatment)
  - Stage C (DVD and Congestive heart failure)
  - Stage D (DVD and CHF refractory to “standard therapy”)

Stage C

- Degenerative valve disease and previous or current CHF (chronic therapy)

- Recommendations
  - Furosemide PO (1-2 mg/kg Q 12 hrs up to 4-6 mg/kg Q 8 hrs)
  - Pimobendan (0.25 – 0.3 mg/kg PO Q 12 hrs)
    - QUEST study (Haggstrom et al. JVIM 2008;22:1124-1135)
      - Pimobendan (267 days) vs Benazepril (140 days)
  - ACE inhibitor (Enalapril or benazepril 0.5 mg/kg PO Q 12 hrs)
  - Spironolactone (2.0 mg/kg PO q12 - 24 h)
    - Aldosterone antagonism
    - Minimal diuretic effects

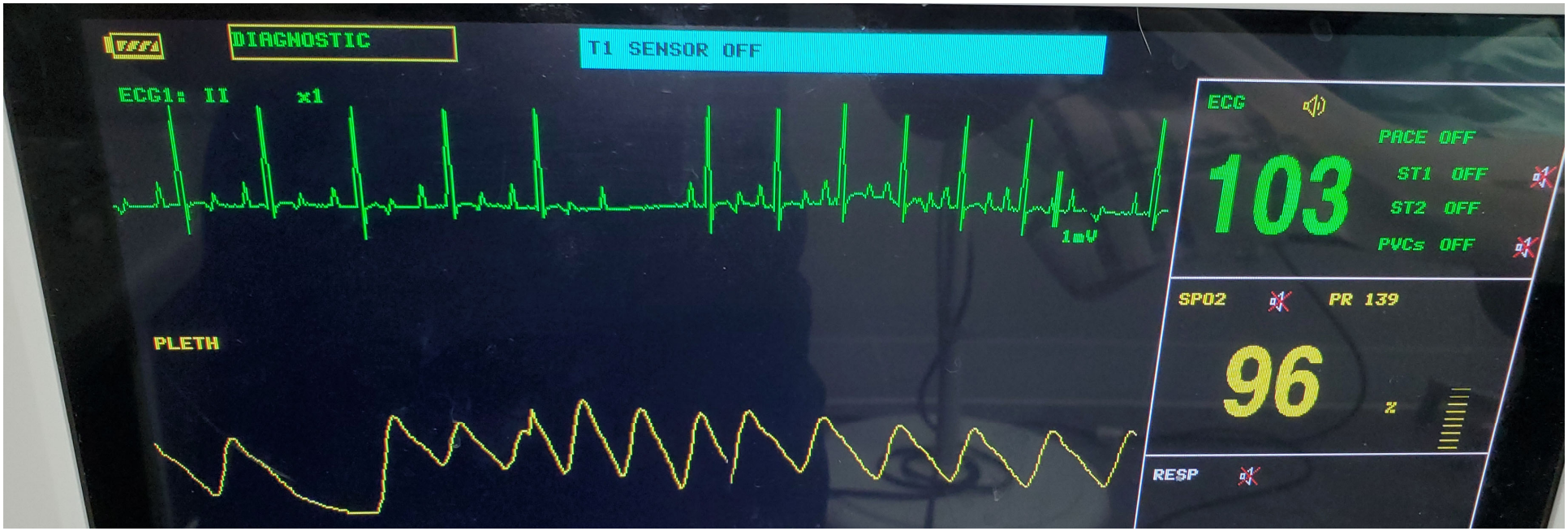
What treatment should I start in a cat with HCM?

	Diuretic	Ace inhibitor	Antiplatelet	Beta blocker
HCM- No LAE				
HCM- LAE			Y	
HOCM				Y
HCM-CHF	Y	Y	Y	

What about Pimobendan?

What should I do? Case # 1

- 2 yr old Cocker Spaniel undergoing OHE
  - Midazolam and Simbadol; propofol induction
  - Bradycardia noted during the procedure



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Case #1: What would you do?

This is ventricular tachycardia: Give it lidocaine

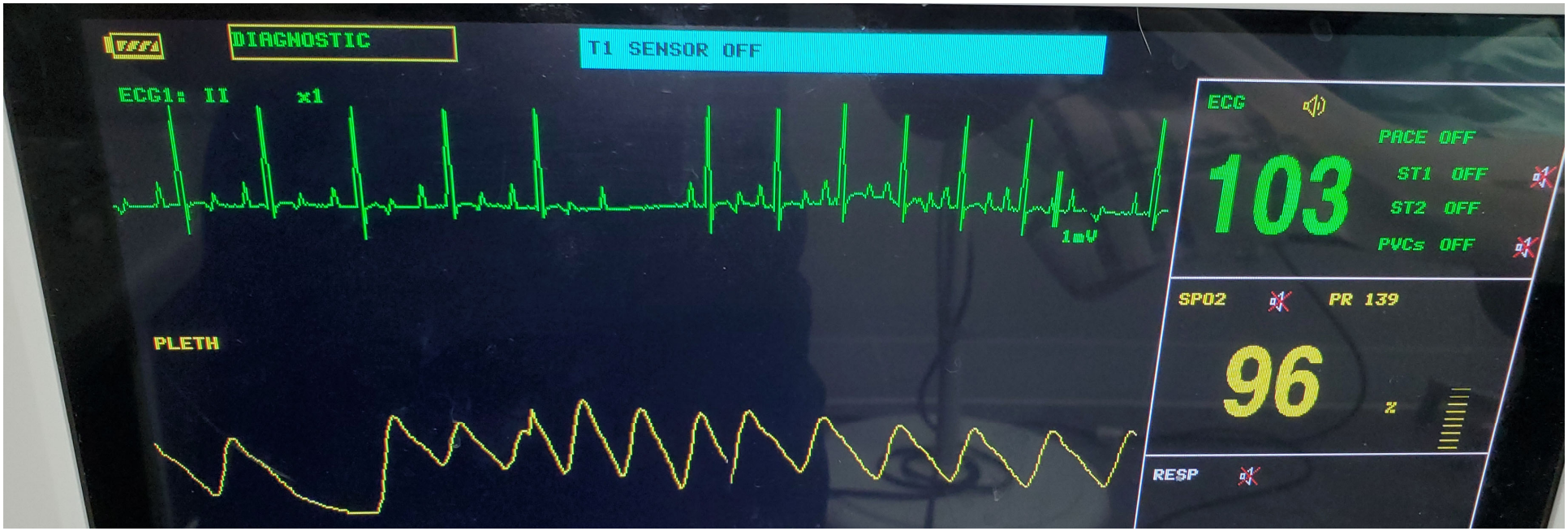
This is supraventricular: Treat for SVT

This is atrioventricular block: Give it atropine

This is a normal sinus rhythm

What should I do? Case # 1 Discussion

- 2 yr old Cocker Spaniel undergoing OHE
  - Midazolam and Simbadol; propofol induction



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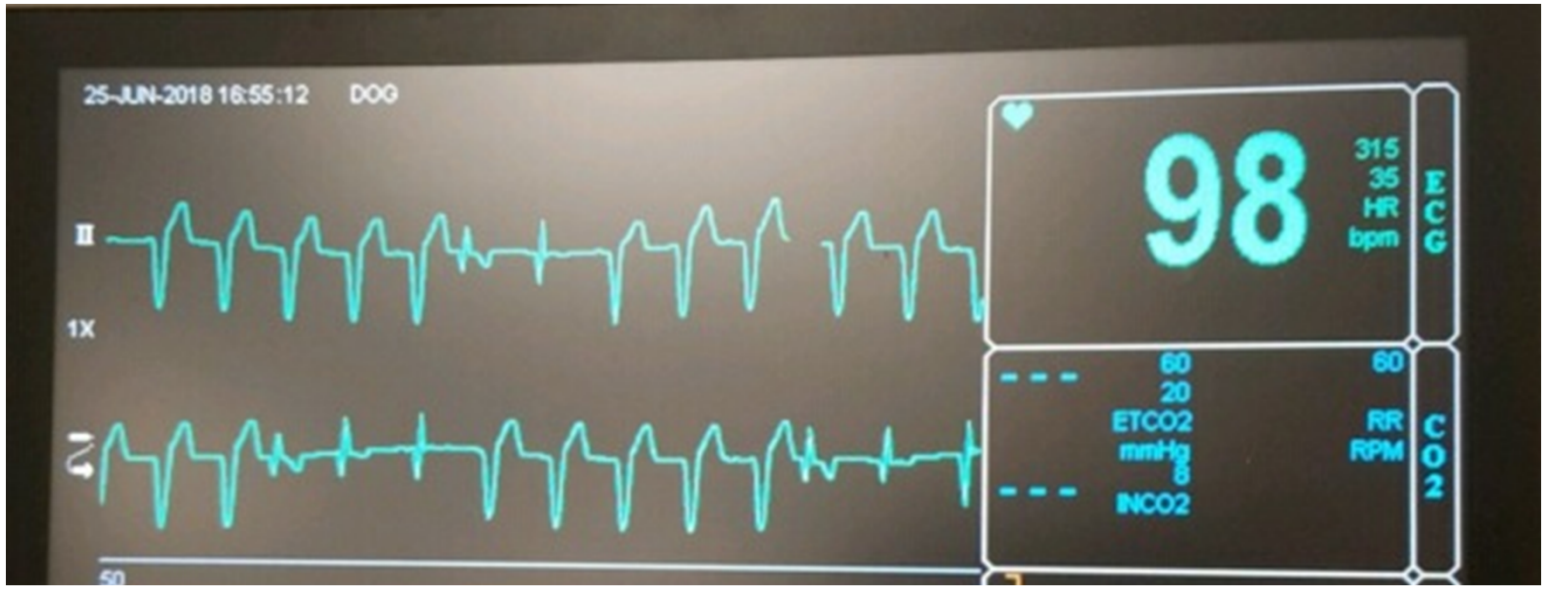
2nd Degree AV Block

- Mobitz type I (Wenckebach) block
  - Progressive prolongation of the PR interval
  - Followed by non conducted P wave
  - More likely to be secondary to increased vagal tone
- Mobitz type II block
  - AV block without prolongation of the PR interval
  - More likely to be associated with AV node disease
- Block is described by the ratio of P waves to QRS complexes
  - 2:1 AV block
    - Refers to the presence of two P waves for every QRS complex.
  - Advanced or high-grade AV block
    - More than two consecutive blocked P waves

What should I do? Case #2

- 11.5 yr old English setter mix undergoing MRI for suspected Cerebellar stroke
- Anesthesia: Hydrocodone and Midazolam; Propofol; Isoflurane



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Case #2: What would you do?

This is ventricular tachycardia: Give it lidocaine

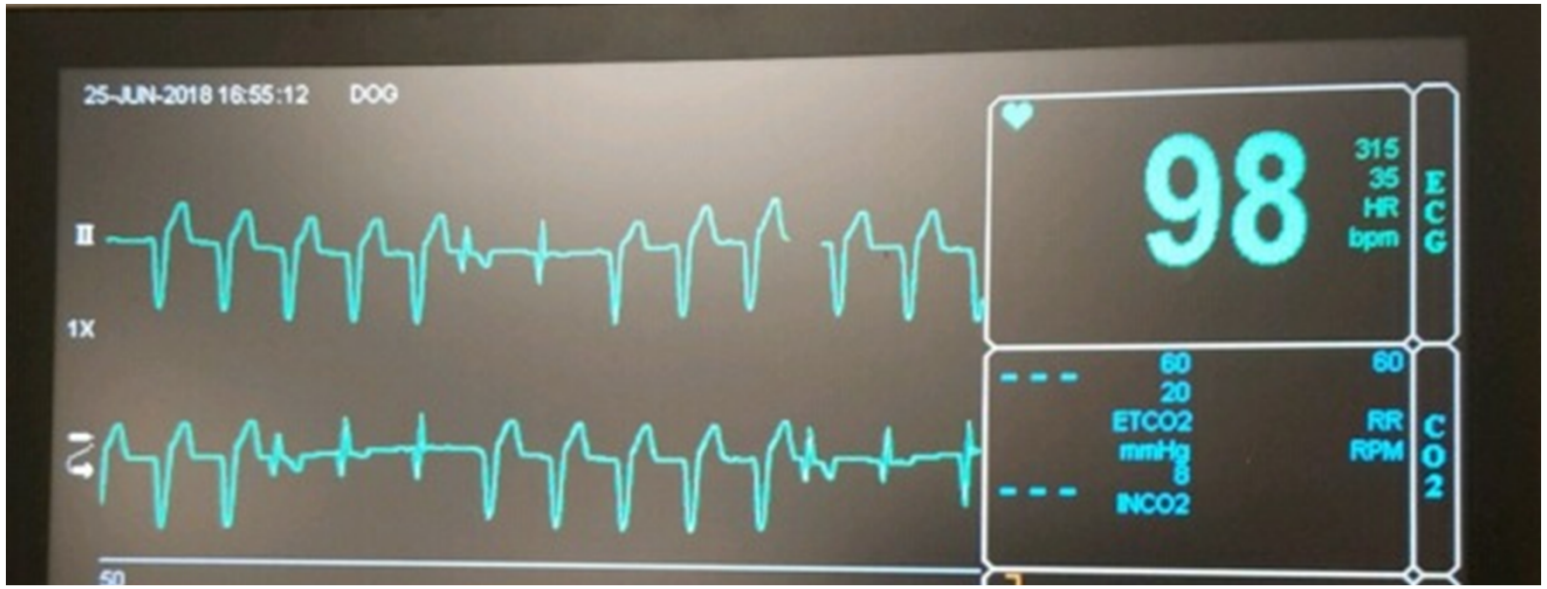
This is supraventricular: Treat for SVT

This is a sinus rhythm: No treatment

This is an idioventricular rhythm: No treatment

What should I do? Case #2 Discussion

- Idioventricular rhythm



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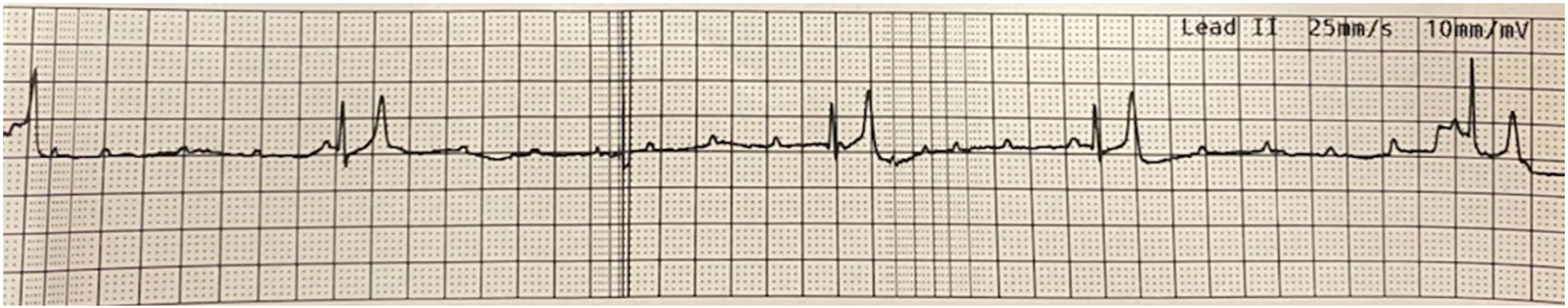
What should I do? Case #3

- 10 yr old mixed breed dog presented for weakness episodes



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Case #3: What would you do?

This is ventricular tachycardia: Give it lidocaine

This is supraventricular: Treat for SVT

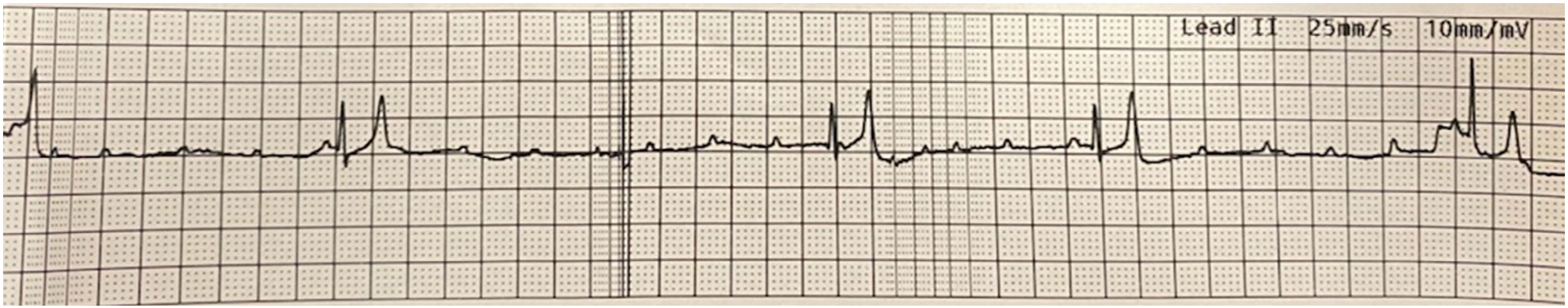
These are escape beats due to 3rd degree AV block: Pacemaker

This is a normal sinus rhythm

What should I do? Case #3 Discussion

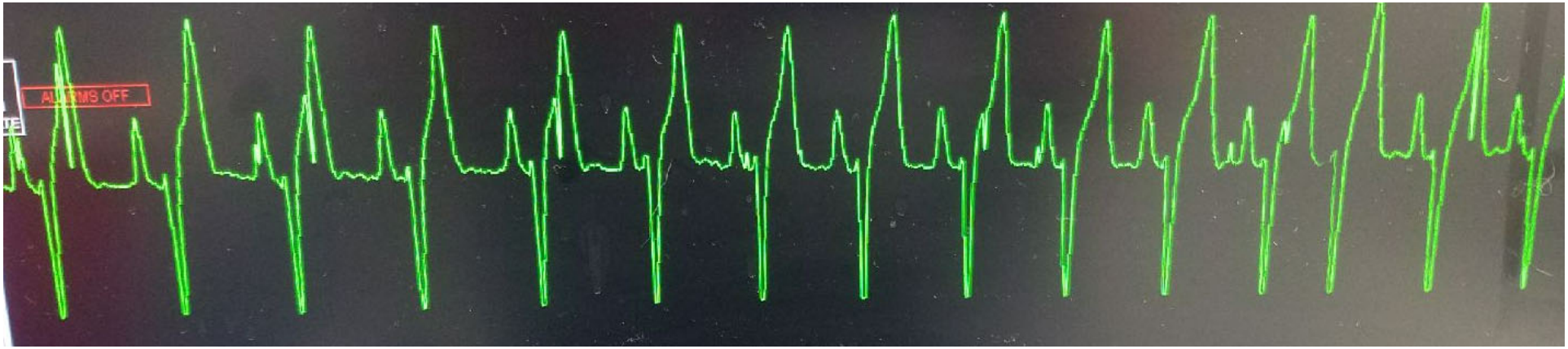
- 10 yr old mixed breed dog presented for weakness episodes

- 3rd degree AV block with escape beats
  - Escape beat 40 bpm (likely ventricular escape beats)



What should I do? Case #4

- 8 yr old Dachshund presented on ER for abnormal episodes
  - History of neurological disease
  - Arrhythmia noted on auscultation
    - Received 1 dose of lidocaine



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Case #4: What would you do?

This is ventricular tachycardia: Give it another lidocaine dose

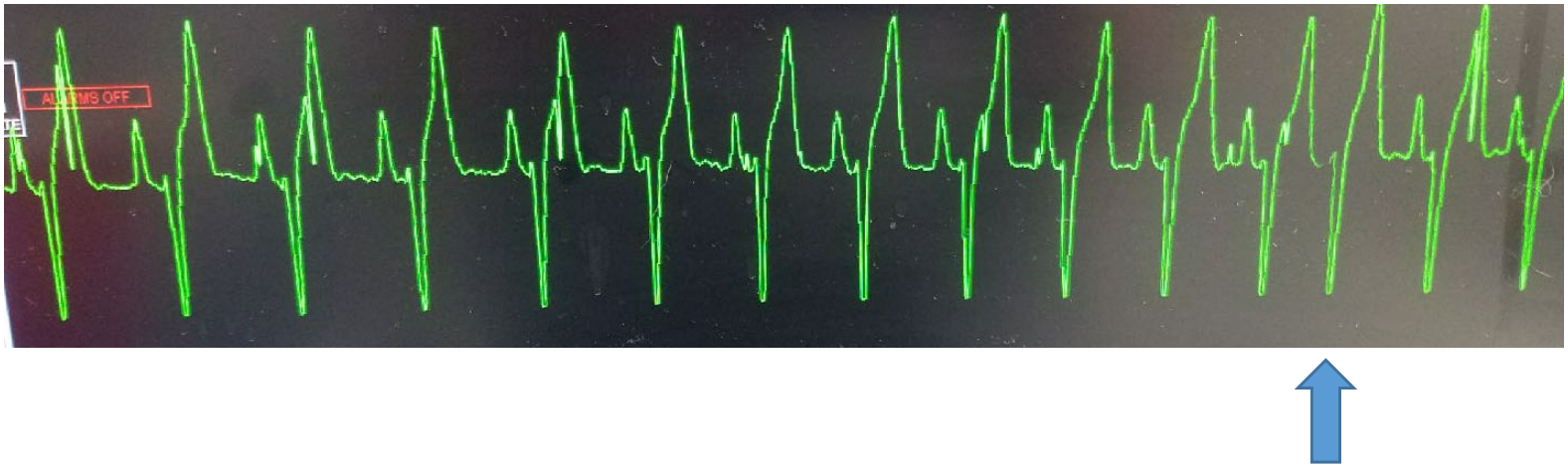
This is supraventricular: Treat for SVT

This is a sinus rhythm: No treatment

This is an idioventricular rhythm: No treatment

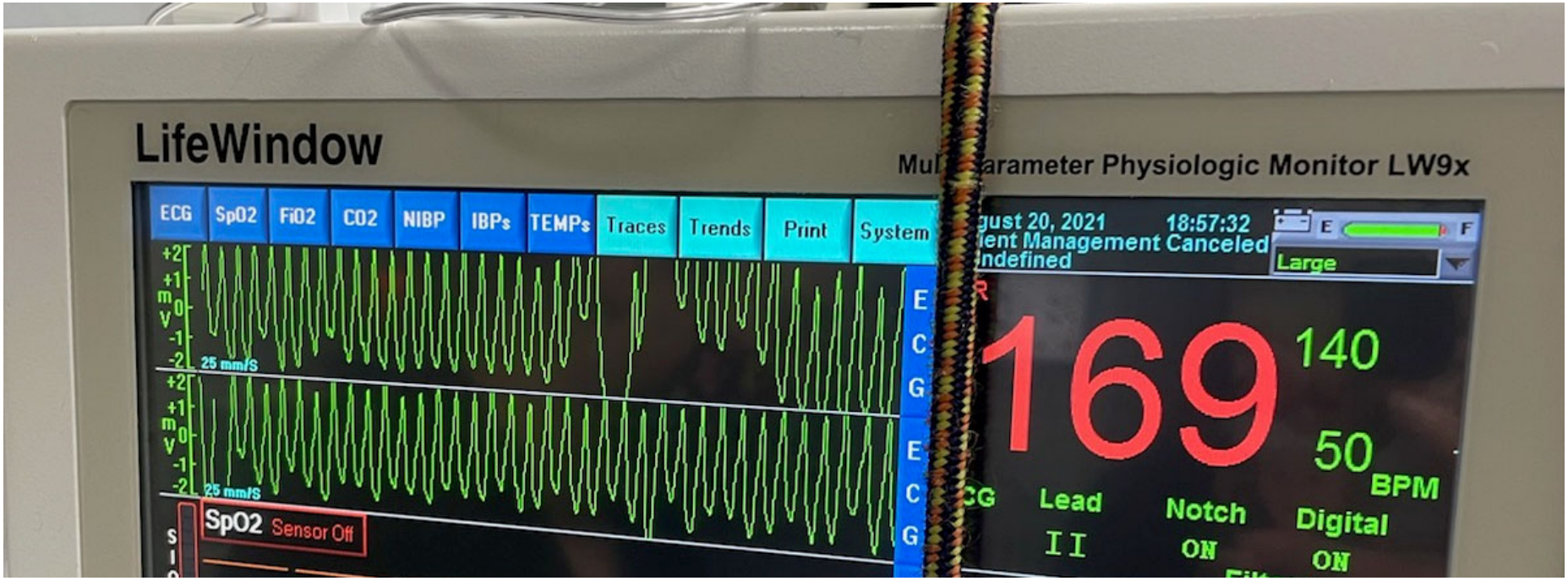
What should I do? Case #4 Discussion

- Sinus rhythm with a bundle branch block
  - Suspect RBBB (need more leads to determine)
- Atrial premature complexes



What should I do? Case #5

- 12 yr old Golden mix history of collapse episodes



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Case #5: What would you do?

This is tachycardia: Give it lidocaine

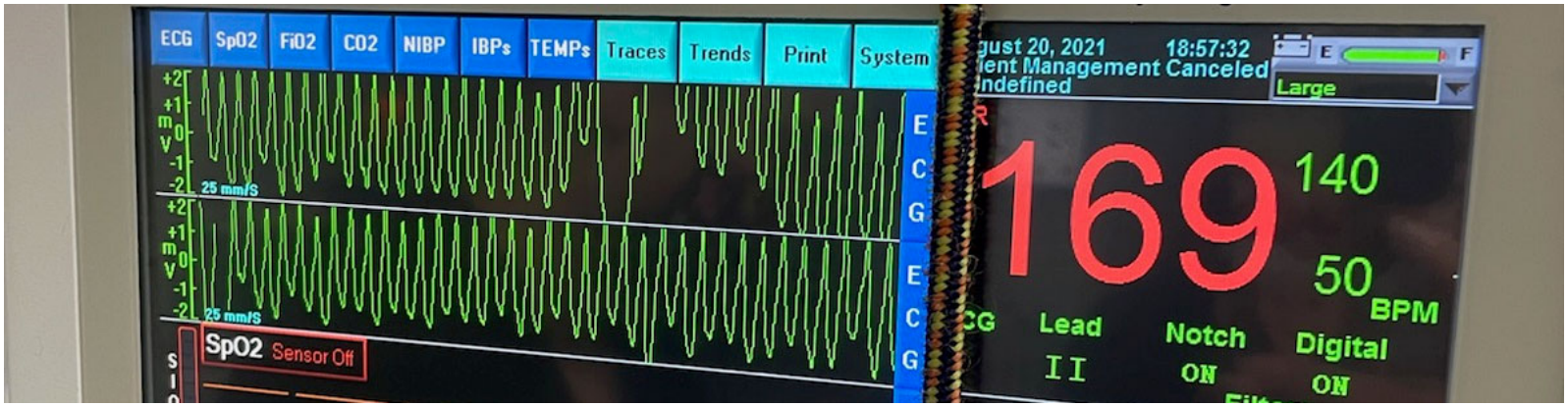
This is supraventricular: Treat for SVT

This is a sinus rhythm: No treatment

This is an idioventricular rhythm. The monitor says HR is 169: No treatment

What should I do? Case #5 Discussion

- 12 yr old Golden mix history of collapse episodes
  - Ventricular tachycardia
  - Splenic mass was noted on abdominal U/S
- HR is too fast for ECG monitor



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Antiarrhythmics - Ventricular Arrhythmias

- Lidocaine (IV)
  - Na channel blocker (Class 1B)
  - 1st choice for acute VT treatment
  - 2 mg/kg (up to 3 times)
  - 40-100 ug/kg/min CRI
- Procainamide (IV)
  - Na channel blocker (Class 1A)
  - 2nd choice for acute VT treatment
  - GI side effects with oral
  - 5-15 mg/kg (max 15 mg/kg)
  - 10-50 ug/kg/min CRI
- Sotalol (oral)
  - K channel blocker and beta-blocker
  - 1st choice for chronic VT treatment
  - 1-2 mg/kg PO Q12
- Mexiletine (oral)
  - Na channel blocker (Class 1B)
  - ventricular arrhythmias
  - GI side effects
  - 4-7 mg/kg PO Q8
- Amiodarone (IV and oral)
  - K channel blocker (properties of all 4 classes of antiarrhythmic)
  - Hypersensitivity reaction (not seen with new IV formulation)
  - Oral (hepatic toxicity, Pulm. Fib, Thyroid dysfunction, GI side effects)

Wide QRS Complex

Lead I

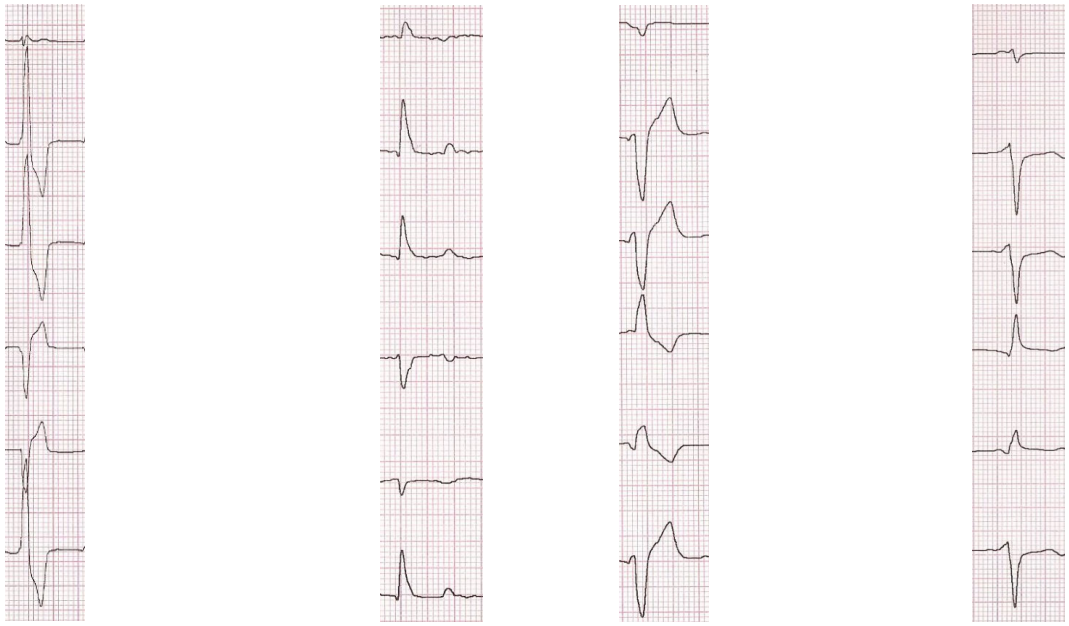
Lead II

Lead III

Lead aVR

Lead aVL

Lead aVF



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Wide QRS Complex

Premature Ventricular Complex

Bundle branch block

Ventricular escape

Lead I

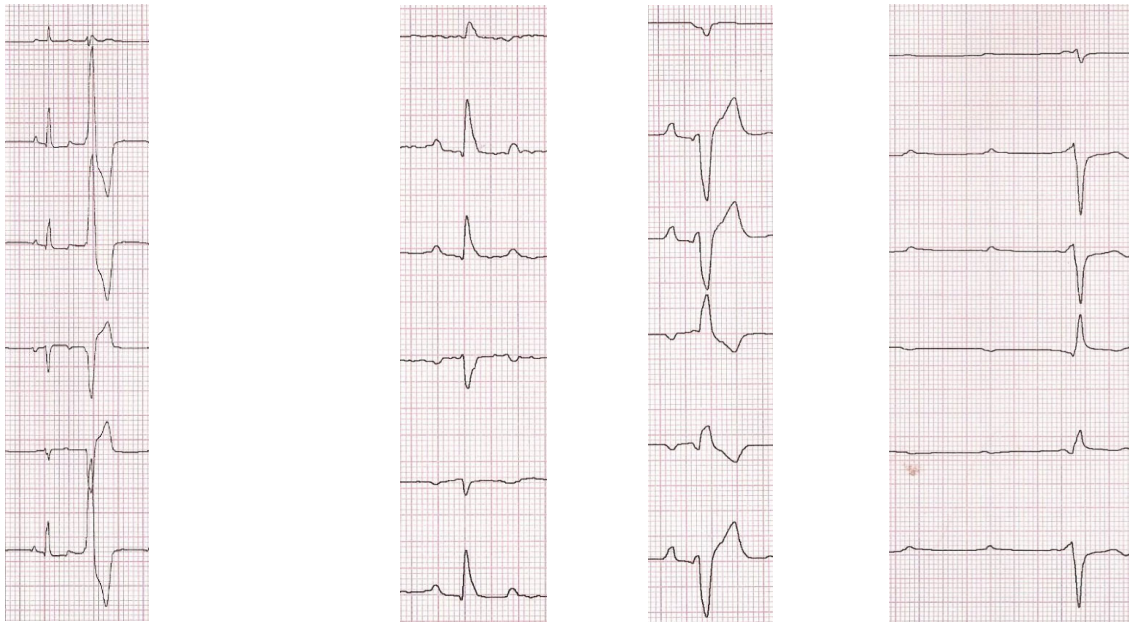
Lead II

Lead III

Lead aVR

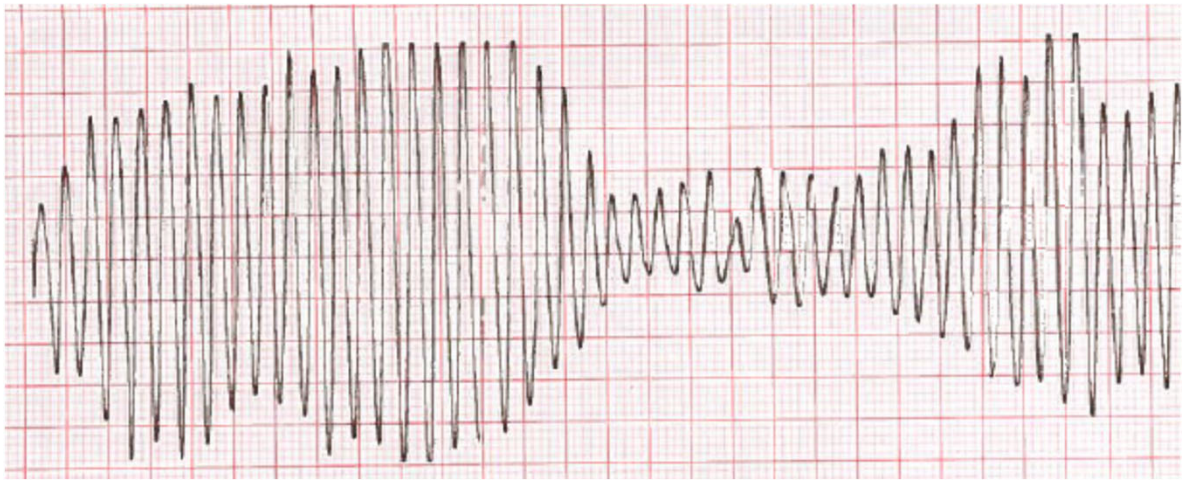
Lead aVL

Lead aVF



What should I do? Case # 6

- Unresponsive patient

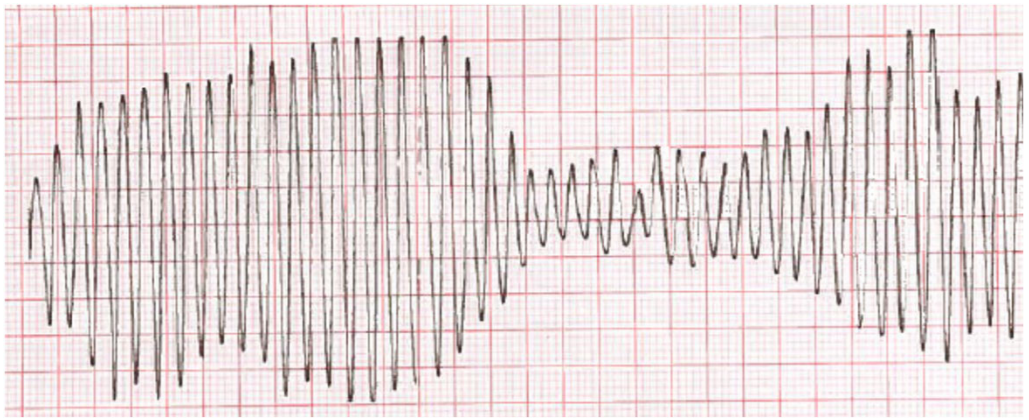


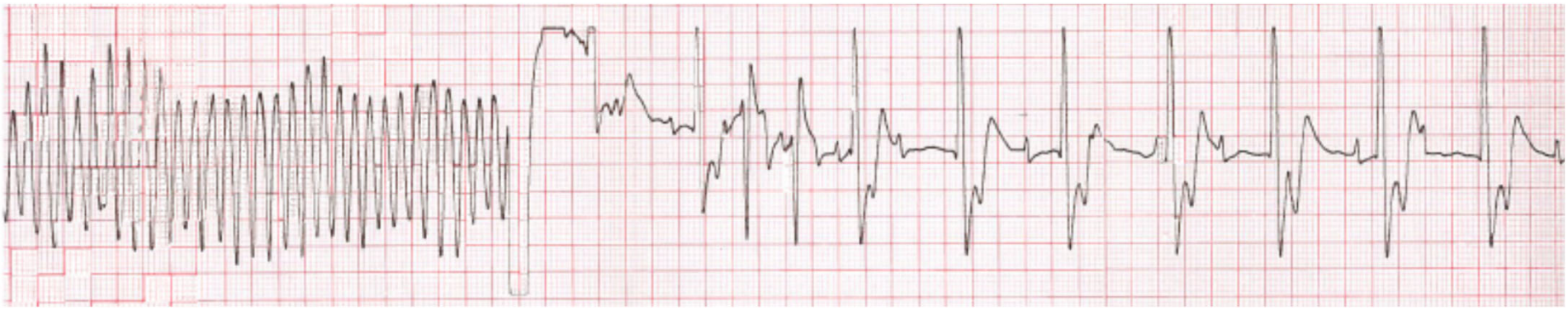
Case #6: What would you do?

- Give it lidocaine
- Give it diltiazem
- Nothing, it's a normal rhythm
- Shock it: 1, 2, 3...Clear!

What should I do? Case # 6 Discussion

- Unresponsive patient





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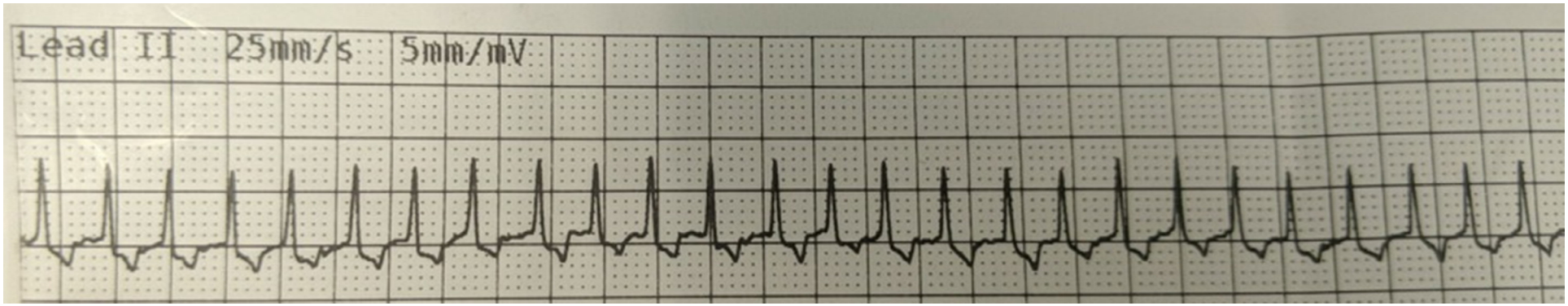
What should I do? Case # 7

- Presented for an episode of collapse earlier in the day
- PE: Grade III-IV/VI LAS murmur, tachycardia



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Case #7: What would you do?

This is ventricular tachycardia: Give it lidocaine

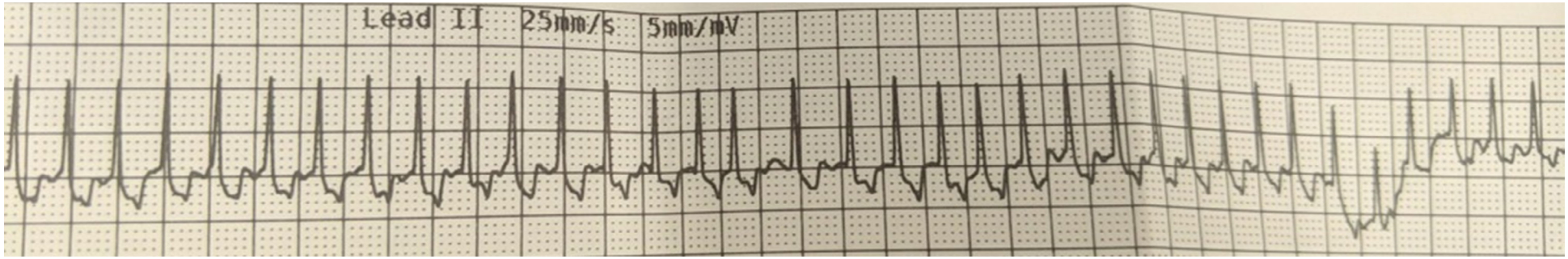
This is supraventricular: Treat for SVT

This is a sinus rhythm: No treatment

I don't know what is going on: help!!

What should I do? Case #7 continues

- ECG after Lidocaine bolus 2mg/kg IV



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Case #7: What would you do....now?

This is still ventricular tachycardia: Give it more lidocaine

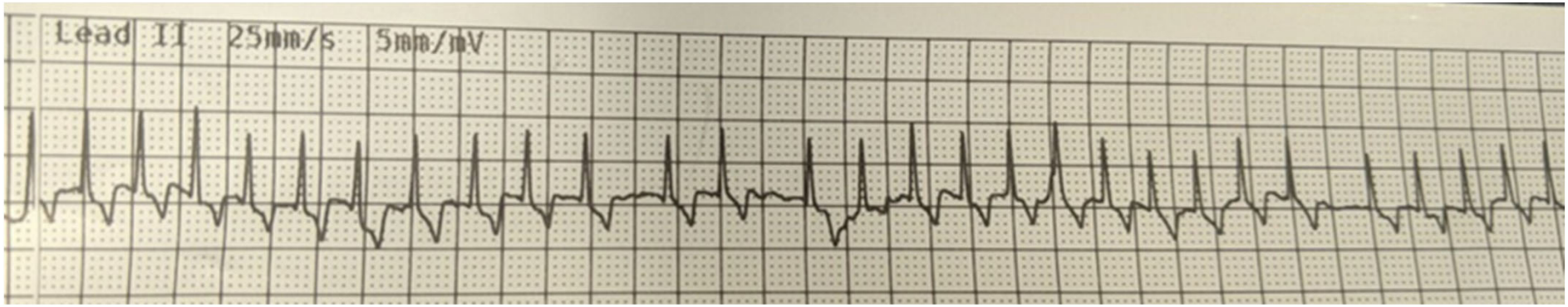
This is supraventricular: Treat for SVT

This is a sinus rhythm: No treatment

I still don't know what is going on: help!!

What should I do? Case # 7 continues

- After a diltiazem bolus



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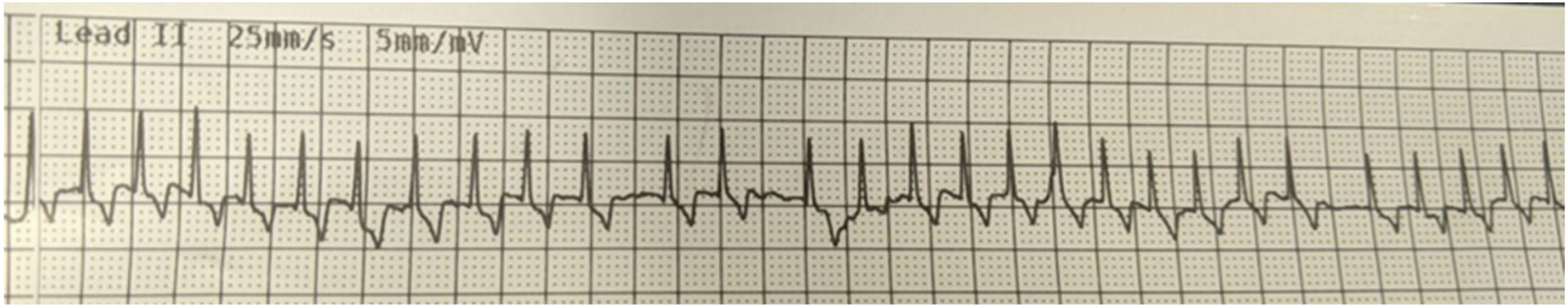
Case #7 (part 3): What would you do...now?

This is still ventricular tachycardia: Give it even more lidocaine	**A**
This is supraventricular: Treat for SVT	**B**
This is a sinus rhythm: No treatment	**C**
I still don't know what is going on: PLEASE HELP!!	**D**

What should I do? Case # 7 Discussion

- After a diltiazem bolus



  - ATRIAL FIBRILLATION

Atrial fibrillation: Treatment strategy

- Rhythm versus Rate control
  - Rhythm control reserved for patients with no structural disease
  - Rate control (most common approach)
    - HR < 160 bpm
- Digoxin
  - 0.0025-0.003 mg/kg Q12
  - Increases parasympathetic tone
  - Side effects: GI, ventricular arrhythmias
- Diltiazem
  - 2-3 mg/kg Q12 Dilacor XR/ Diltiazem ER
  - Ca channel blocker
  - Reduces ability of AV node to conduct
  - Decreases systolic function
- Beta Blocker (Atenolol)
  - Reduces sympathetic tone

Thanks to your referrals, canine patients of the future may live healthier lives.

https://www.dogheartstudy.com

Your referrals are vital to this important clinical study.

We are currently enrolling dogs diagnosed with **ACVIM Stage B2 MMVD** to evaluate an investigational medication to determine whether it may delay the onset of CHF.

This is an FDA-regulated study with benefits for you, your patient, and your client.

Inclusion criteria

- A moderate to high intensity systolic heart murmur with maximal intensity over the mitral area (≥ grade 3/6).
- Echocardiographic evidence of MMVD defined as characteristic valvular lesions of the mitral valve apparatus (leaflet thickening, valve prolapse, ruptured chordae tendinae).
- Presence of mitral regurgitation on the color Doppler echocardiogram.
- Echocardiographic evidence of left atrial dilatation, i.e. 2D left atrial/aortic (LA/Ao) ratio ≥ 1.8 by the Swedish method.
- Radiographic evidence of cardiomegaly (vertebral heart size [VHS] score > 10.5).
- Dogs must be at least 6 years of age.
- Dogs must have a body weight between 4.1 kg and 15 kg (9 lb and 33.1 lb).

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Questions?

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