

**PATIENT**

Teddy Colmenar

**SPECIES**

Canine

**BREED**

Shih Tzu

**SEX**

Female Spayed

**AGE**

4.1.13

**WEIGHT**

15.8lbs

**INTERPRETED BY**Maggie Machen Lamy,  
DVM, DACVIM  
(Cardiology)**PRESENTING CLINICAL SIGNS**

History: 2<sup>nd</sup> degree heart block during anesthesia. Poorly responsive to atropine despite use of lower dose butorphanol and midazolam (dental cleaning with mass removal of mass left inguinal region, biopsy pending). Similar episode during anesthesia last year, worse this year.

-Pertinent abnormal PE/Chem/CBC/UA Results: cbc/chem 1/26/22 - mild increase ap (220).

-Current medications: short course of slmplicef and rimadyl tgh post mass removal

-Sedation used: Not required to complete full diagnostic ultrasound.

-Pertinent previous ultrasound results: No previous.

-STAT: Not requested

-Imaging performed by: Stephanie Warga RDCS, RVT.

**ELECTROCARDIOGRAPHIC FINDINGS**

A six lead ECG is available at both 25 and 50mm/s; 2mm/mV. The average heart rate is 120bpm. 1st degree AV block is present with a prolonged PR interval. Frequent 2<sup>nd</sup> degree AV block is noted throughout with no significant change to the PR interval, consistent with type II. The block appears to be low grade with no more than 2:1 conduction. A single VPC is identified.

ECG diagnosis: 2<sup>nd</sup> degree AV block type II, low grade. 1<sup>st</sup> degree AV block. Single isolated VPC.

**ECHOCARDIOGRAM FINDINGS**

2D, m-mode, color flow and doppler imaging is available. Mild diffuse thickening of mitral valve leaflets with no prolapse into the left atrial lumen. Trace central mitral regurgitation with no left atrial dilation. No LV dilation with mildly depressed myocardial function. The tricuspid valve appears normal with trace tricuspid regurgitation. Normal velocity. No right heart enlargement. The pulmonic and aortic valves are normal in morphology and mobility. Normal pulmonic and aortic outflow velocities with laminar flow. Trace aortic and no pulmonic insufficiency. No pericardial or pleural effusion noted. No obvious cardiac masses.

**CARDIAC CHART****HOSPITAL NAME**

Banfield Towson

**REFERRING VET**

Dr. Mike

**INVOICE**

28806

**DATE**

2/6/23

CANINE CARDIAC PARAMETERS	MR VMAX (m/s)	TR VMAX (m/s)	LA/AO (Boon method)	LA/AO (Heart Base; Swe)	FS (%)	EF (%)	EPSS (cm)
NORMAL PARAMETER	4.5-5.5	<2.7	1.3	<1.6	28-40	40-100	<0.6
PATIENT	6.2	2.5	NM	1.1	24	49	NM
CANINE CARDIAC PARAMETERS	HR (BPM)	AV VMAX (m/s)	PV MAX (m/s)	BODY WEIGHT (kg)	LA 2D short axis Base view (cm)	LVIDd Avg; 2D and m-mode short axis (cm)	LVIDs Avg; 2D and m-mode short axis (cm)
NORMAL PARAMETER	50-100	0.7-1.7	0.7-1.6	BELOW	BELOW	BELOW	BELOW
PATIENT	130	0.9	1.1	7.2	1.6	2.5	1.9
*Normal chamber parameters expressed as a mean value (SD)				3	1.27 (5.3)	2.46 (2.46)	1.36 (5.5)
<b>BODY WEIGHT DEPENDENT PARAMETERS</b>				5	1.40 (4.5)	2.74 (5.2)	1.60 (4.7)
<i>*Note: All measurements based upon multi-modal images and methods. An average value is reported.</i>				10	1.50 (3.8)	3.27 (3.5)	2.06 (3.1)
				15	1.83 (2.0)	3.71 (2.4)	2.43 (2.1)
				20	2.02 (1.9)	4.14 (2.2)	2.80 (2.0)
				25	2.18 (2.4)	4.48 (2.9)	3.10 (2.5)
				30	2.33 (3.3)	4.83 (3.9)	3.39 (3.4)
				35	2.48 (4.3)	5.17 (5.0)	3.69 (4.5)
				40	2.62 (5.2)	5.48 (6.1)	3.96 (5.4)
				50	2.88 (7.1)	6.07 (8.3)	4.46 (7.4)

Adapted from June Boon, Veterinary Echocardiography, 1998  
 Rishniw M and Hollis NE, J Vet Intern Med 2000; 14:429-435  
 Hansson et al, Vet Rad and Ultrasound 2002  
 Bonagura et al. Echocardiography: principles of interpretation, Vet Clin North Am 15:1177, 1995

## INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

The rhythm diagnosis is low grade 2<sup>nd</sup> degree AV block type II. implies that while some P waves are conducting to the ventricle, many are not. This is resulting in a relatively low ventricular rate, although sufficient to maintain and normal actively level in this case, The echocardiogram shows the overall cardiac dimensions are relatively normal with trace MR and TR, which are likely due to the arrhythmia and are hemodynamically insignificant. The LV function is mildly depressed, which is surprising and likely secondary; follow up is advised in the future. No additional issues are identified at this time.

AV block is typically idiopathic in origin, with progressive deterioration of the electrical system resulting in persistent bradycardia, significant lethargy and collapse. An atropine challenge can be performed to ensure the diagnosis, with little to no response expected. These cases typically are unable to be managed medically; however, the atropine challenge will be telling. Baseline full lab work should also be performed, to rule out any electrolyte abnormalities that may be contributing.

Barring any treatable systemic issues, the recommended treatment in this case is referral for discussion of pacemaker implantation even without reported clinical signs. No symptoms are mentioned in the history other than anesthetic complications, which are not surprising given the arrhythmia. Reasonable to utilize Pimobendan until the HR is addressed, given the totality of the findings. If referral is declined, heart rate stimulation can be attempted as discussed; however, this is of often little benefit.

Going forward, there is potential that the arrhythmia may remain subclinical for some time. If not corrected however, this patient will succumb to either continued cardiac dilation over time resulting in CHF (which will be difficult to manage in the absence of a normal heart rate), or to worsening bradycardia/syncope/sudden death. The goal would be to stabilize the situation through heart rate management and use medical support to hopefully support the structural disease.

Going forward, unfortunately if the HR is not corrected the patient will always be at risk for progression to CHF, syncope and/or sudden death in the future. If patient develops syncope or QOL suffers, euthanasia or pacemaker implantation will become the only options, and this should be expressed to the owner.

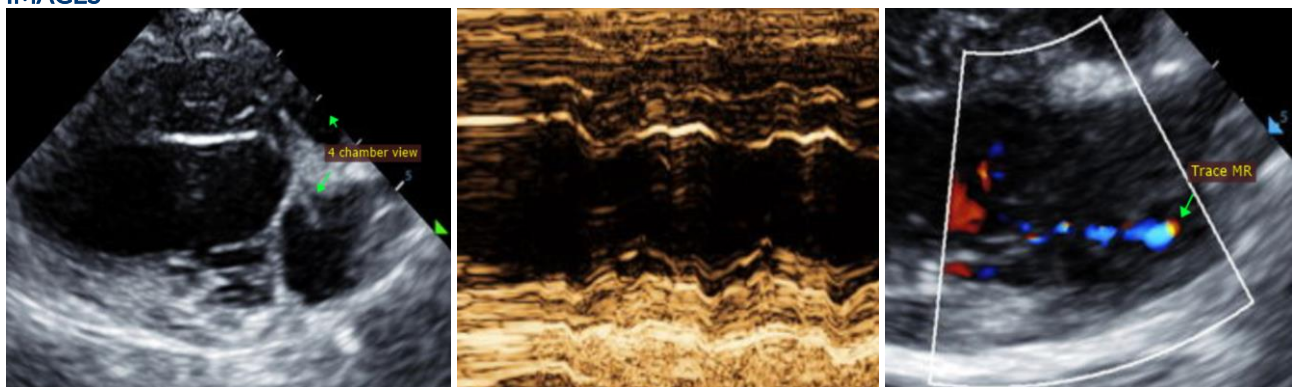
**Anesthesia is contraindicated due to high risk for complication.**

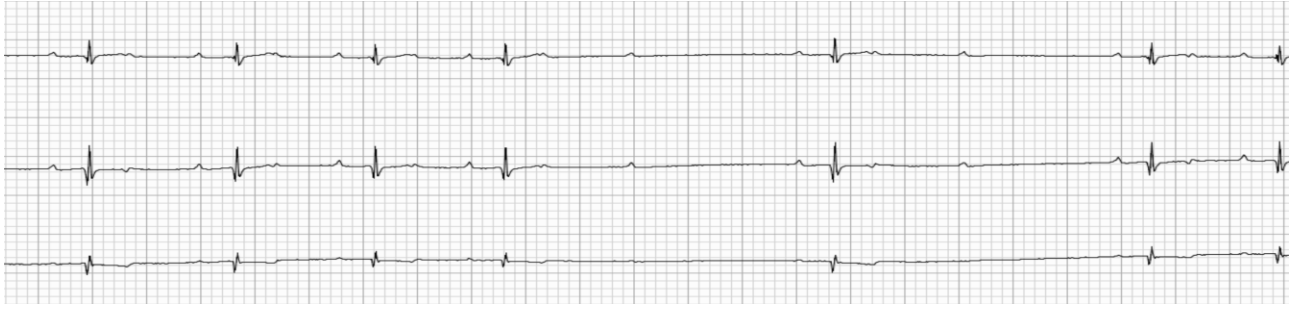
## PLAN

Consider referral to a tertiary facility for further evaluation and discussion of surgical intervention. Systemic work up and atropine challenge should be considered as discussed: administer 0.04mg/kg atropine IV or IM and assess response. Institute Pimobendan 0.3mg/kg PO q12h.

If referral is declined, reassess in 6 months, sooner if syncope or respiratory signs arise.

## IMAGES





**The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.**

Thank you for this referral. This report was generated using transcription software, and minor dictation errors may be present. If the clinical or image interpretation does not parallel your findings or if I can be of any further assistance, please contact me.

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