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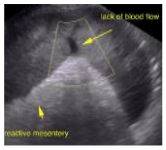
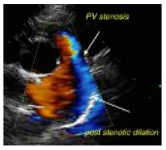
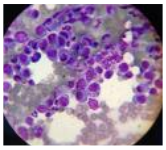
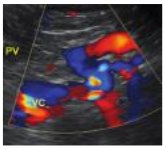





SonoPath.com
1-800-838-4268 info@sonopath.com

**PATIENT**
Anubis Whelihan

**SPECIES**
Canine

**BREED**
Yorkshire Terrier Mix

**SEX**
Male Neutered

**AGE**
5 years

**WEIGHT**
23.6lbs; 10.7kgs

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

**IMAGING PERFORMED BY**
Melissa Weisman, DVM

**HOSPITAL NAME**
Minnesota Veterinary Ultrasound

**REFERRING VET**
Dr. Weisman

**INVOICE**
28521

**DATE**
1/23/23

## PRESENTING CLINICAL SIGNS

History: Patient went to the E-clinic for an unrelated problem on year ago and was diagnosed with a grade 2/6 cardiac murmur Patient now has a grade 4/6 holosystolic murmur. Showing signs of exercise intolerance, unable to do long walks.
-Abnormal PE/Chem/CBC/UA Results: Elevated BUN.

## RADIOGRAPHIC FINDINGS *NOTE: Images submitted for supplemental cardiac information only.

Mild right-sided cardiomegaly. Bulge in the region of the great vessels.

## ECHOCARDIOGRAM FINDINGS

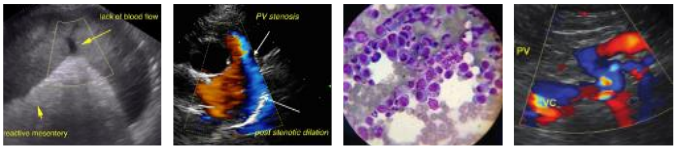
2D, m-mode, color flow and doppler imaging is available. Normal mitral valve leaflets with no obvious prolapse into the left atrial lumen. No obvious mitral regurgitation. Normal left atrial dimension. Normal LV diameter with normal myocardial function. The LV wall appears normal. The tricuspid valve appears mildly thickened with mild insufficiency seen. Elevated velocity. Mild right atrial dilation. Mild to moderate right ventricular hypertrophy. Pulmonic outflow velocities are elevated at the level of the valve. The pulmonic valve appears severely thickened, tethered and stenotic. There is mild post-stenotic dilation of the main pulmonary artery and branches. Mild pulmonic insufficiency. The aortic valve appears to have normal morphology and mobility. No obvious cardiac shunts are present. No pericardial or pleural effusion noted.

## CARDIAC CHART

| 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 | NA | 3.0 | NM | 1.1 | 41 | 73 | 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 | 100 | 0.8 | 4.5 | 10.7 | 1.8 | 2.6 | 1.5 |
| *Normal chamber parameters expressed as a mean value (SD) | | | | 3 | 1.27 (5.3) | 2.46 (2.46) | 1.36 (5.5) |
| **BODY WEIGHT DEPENDENT PARAMETERS** | | | | 5 | 1.40 (4.5) | 2.74 (5.2) | 1.60 (4.7) |
| **Note: All measurements based upon multi-modal images and methods. An average value is reported.* | | | | 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) |
| Adapted from June Boon, Veterinary Echocardiography, 1998 | | | | 25 | 2.18 (2.4) | 4.48 (2.9) | 3.10 (2.5) |
| Rishniw M and Hollis NE, J Vet Intern Med 2000; 14:429-435 | | | | 30 | 2.33 (3.3) | 4.83 (3.9) | 3.39 (3.4) |
| Hansson et al, Vet Rad and Ultrasound 2002 | | | | 35 | 2.48 (4.3) | 5.17 (5.0) | 3.69 (4.5) |
| Bonagura et al. Echocardiography: principles of interpretation, Vet Clin North Am 15:1177, 1995 | | | | 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) |

## INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

The cause of the murmur is severe valvular pulmonic stenosis. The degree of obstruction is severe based upon the velocity/pressure gradient across the pulmonic valve and the secondary hypertrophy and remodeling of the right ventricle. There is mild RA dilation and mild TR. The risk for CHF in the future is elevated and will likely limit lifespan. That being said, a diagnosis at 5

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years of age without reported CHF or syncope is certainly a good sign. No other congenital or age-related abnormalities were visualized and the mitral valve appears intact.

Referral for balloon valvuloplasty should be considered as the gold standard therapeutic option for this condition, and may improve long term outcome and delay onset of clinical signs (including exertional syncope and right-sided congestive heart failure). That being said, given that the patient is 5 years old with only exercise intolerance reported, simple monitoring would be reasonable as an alternative. Regardless, medical management with atenolol is recommended to decrease heart rate and lessen the obstruction as below. Monitor for development of associated clinical signs (collapse, abdominal distention, cough, labored breathing). Mild exercise restriction is advised.

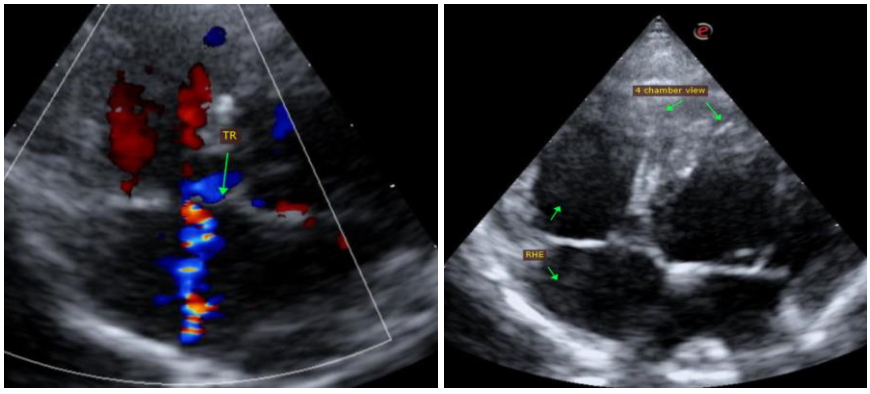
Exercise intolerance may be benefited by atenolol therapy, as blocking heart rate increases will hopefully help avoid acute hypoxia and syncope. Mild lifelong activity restriction is advised. This case could become quite challenging as the patient ages, as development of respiratory disease and/or pulmonary hypertension may exacerbate right-sided disease. Serial monitoring is advised and referral to a local Cardiologist in the future may be warranted should further symptoms arise.

Anesthetic risk is mild to moderate at this time. Avoid heart rate stimulating drugs such as atropine or glycopyrrolate unless absolutely necessary. Avoid vasodilators such as acepromazine. Mild IV fluid restriction is advised. Cardiac protective drug choices (opioid/benzodiazepine premedication, propofol or alfaxalone induction, isoflurane gas) are recommended. Pre-oxygenate for 5-10 minutes prior to induction and recover in O2 if possible. Monitor for arrhythmias, hypotension, and hypoxia both intra and post-operatively and intervene as necessary.

Plan: Institute atenolol to effect: 25mg tabs, ¼ tab PO BID to start (up-titrate to desired effect). Goal is to suppress heart rate <120-140bpm even with stress/activity. Baseline chest radiographs and ECG are recommended. Referral for balloon valvuloplasty consultation if desired.

If surgery is declined, recommend recheck echocardiogram in 12 months to assess for progression, response to medication, and/or development of age-related disease.

## IMAGES



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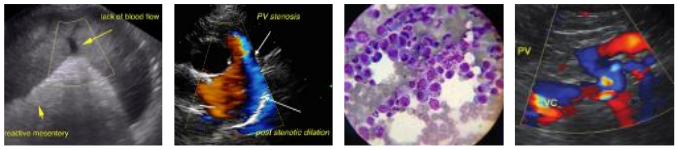

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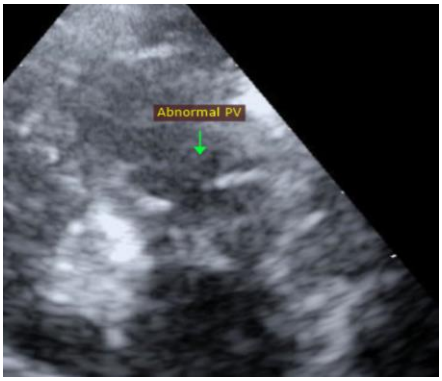


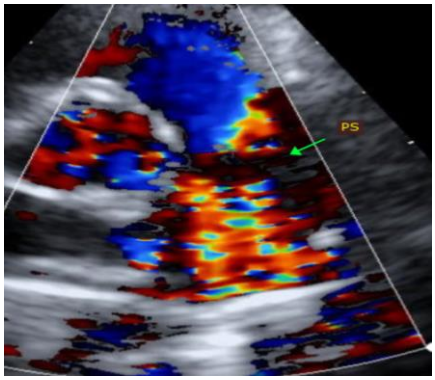


**The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.**

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.

**Maggie Machen Lamy, DVM**
**Diplomate of the American College of Veterinary Internal Medicine (Cardiology)**
info@sonopath.com