



**MARISA AMES, DVM, DACVIM (CARDIOLOGY)**

ASSOCIATE PROFESSOR,  
Colorado State University,  
College Of Veterinary Medicine

## What's the Protocol? Managing Dogs with Severe Heartworm Disease

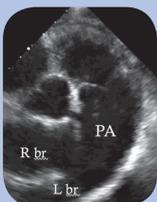
Fortunately, most infected dogs have no clinical signs or only mild signs of heartworm disease (HWD) and tend to undergo adulticide therapy with few major complications. The likelihood of complications associated with HWD increases with the chronicity of infection. Prognosis is dependent on stabilization, the ability to administer subsequent adulticide therapy and the ability of the family to commit to treatment of chronic conditions.

Following is a brief overview of these complications, including clinical signs, diagnosis and treatment. For information on drug dosages, please visit [www.heartwormsociety.com/treating-severe-HWDisease](http://www.heartwormsociety.com/treating-severe-HWDisease).

### PULMONARY HYPERTENSION (PH)

**What it is:** Increased pulmonary vascular resistance and obstruction  
**Cause:** Chronic, untreated HWD leads to pulmonary vascular endothelial injury, remodeling, and dysfunction; physical obstruction by worms also contributes  
**Common clinical signs:** Lethargy, shortness of breath, cyanosis and/or syncope  
**How to diagnose:** Echocardiographic evidence of right-heart remodeling ± estimation of pulmonary pressures if tricuspid or pulmonary valve insufficiencies present

**Treatment:** Sildenafil, rest and oxygen as needed; anticoagulant therapy when there is high suspicion of heartworm-pulmonary thromboembolism (HW-PTE) and no contraindications



### PNEUMONITIS

**What it is:** Inflammation in the pulmonary parenchyma due to HWD  
**Cause:** Death of microfilaria and/or the presence of adult worms  
**Common clinical signs:** Cough, tachypnea  
**How to diagnose:** Radiographs typically show unstructured interstitial infiltrate  
**Treatment:** Steroid therapy, rest and oxygen as needed



### HW-PTE

**What it is:** Thrombus formation from dead and dying worms; thrombi and worm fragments may stay in place or embolize  
**Cause:** Worm death, which may occur 3-21 days after adulticide administration or spontaneously  
**Common clinical signs:** Lethargy, shortness of breath, cyanosis and/or syncope  
**How to diagnose:** Echocardiographic assessment for PH, which is usually present (see above); rarely may see thrombus in pulmonary trunk or branches  
**Treatment:** Sildenafil, rest, corticosteroids and oxygen if needed; anticoagulant therapy when there is high suspicion of HW-PTE (e.g. cyanosis and collapse 3-21 days after adulticide or visualization of thrombus) and no contraindications



### RIGHT-SIDED HEART FAILURE (R-HF)

**What it is:** PH puts chronic pressure load on the right heart, leading to right ventricular failure  
**Common clinical signs:** Lethargy, abdominal distension, shortness of breath, jugular venous distension and/or pulsation, syncope  
**How to diagnose:** Echocardiography shows right-sided heart remodeling; presence of transudate or modified transudate cavitory effusions  
**Treatment:** Mechanical removal of effusions, diuretic, pimobendan, and sildenafil (to treat underlying PH); also consider spironolactone and/or angiotensin-converting-enzyme inhibitor



### CAVAL SYNDROME

**What it is:** PH and decreased right ventricular function allow worms to relocate to the right heart and caavae  
**Cause:** Worms cause disruption of the tricuspid valve and/or caavae, decreasing venous return to the right heart, reducing stroke volume and cardiac output; worm mass can also lead to microangiopathic anemia and pigmenturia  
**Common clinical signs:** Lethargy, right-sided systolic murmur, syncope, collapse, pallor and pigmenturia  
**How to diagnose:** Clinical signs of above in dogs known to be heartworm+  
**Treatment:** Stabilization (IV fluids, vasopressors, blood products), worm extraction, and management of specific related issues (e.g. pneumonitis, PH or R-HF)

