**Feline hypertrophic cardiomyopathy (HCM)**

**Classic case:** 2 y/o male Maine Coon cat - tachypnea, open mouth breathing, cyanosis, wt. loss

**Presentation:**

**The most common feline cardiac disease**

**History and signalment**

- Juvenile (5 months) up to geriatric
- **Maine Coon, Ragdoll** – autosomal dominant
  - Cardiac myosin binding protein-C gene (MyBPC) mutation
  - Test avail. for MyBPC gene mutation
- **American shorthair**, British shorthair, Persian, Scottish fold, Sphinx, Rex
- **Males** more SEVERE than females
- **RARE in DOGS**

**Clinical sign/presentation types**

1) **Compensated HCM**
   - Murmur ausculted on annual physical exam
   - No overt signs

2) **Congestive heart failure due to HCM**
   - Tachypnea > 40 breaths/minute, dyspnea, open mouth breathing
   - Cyanosis, syncope, lethargy, weakness
   - Anorexia, weight loss
   - +/- vomiting or jugular pulse

3) **Aortic thromboembolism (TBE) due to HCM**
   - Pelvic limb paralysis
   - Cyanotic nail beds
   - Crying, painful
   - Absent femoral pulses
   - Contracted gastrocnemius muscles

**DDX:**

- 2ndary HCM due to systemic hypertension, hyperthyroidism, subaortic stenosis, acromegaly,
- Cardiac infiltration by inflammation, neoplasia, or edema
Test(s) of choice:

**Thoracic auscultation**
- Tachycardia
- Murmur
  - Mitral regurgitation
  - LV outflow obstruction
- Gallop sound due to blood entering stiff LV
- Premature beats (atrial or ventricular)
- Irregular rhythm
- Abnormal lung sounds
  - Dull ventral lung sounds (pleural effusion)
- Increased bronchovesicular sounds “crackles” (= pulmonary edema)

**Cardiac troponin I**: Increased in moderate to severe HCM

**Plasma brain natriuretic peptide (BNP)**: Increased NT-proBNP in severe HCM or CHF

**ECG**
- Sinus tachycardia, supraventricular or ventricular premature contractions
- Severe left atrial dilation
  - Atrial fibrillation (uncommon)
  - P-mitrale (wide P)
- Left atrial hypertrophy
  - Left axis deviation (mean electrical axis 0 to −90
  - Increased QRS amplitude > 1mV

**Thoracic radiographs**
- If left atrium not enlarged MAY appear normal
- Cardiomegaly
  - **Valentine** heart (L atrial enlargement) DV view
  - Left atrial bulge at 1-3 o’clock (DV)
  - Elongated heart (DV)
  - Elevated trachea, round heart silhouette (lateral)
- Pulmonary venous enlargement
- Pulmonary edema
  - Anywhere in cats
  - +/- pleural effusion
Feline hypertrophic cardiomyopathy (HCM)

Test(s) of choice: (continued)

**Echocardiogram**
- Concentric left ventricular hypertrophy
- $\geq 6$ mm **septum +/- L ventricular free wall** end diastolic thickness
- Papillary hypertrophy
- **Systolic anterior motion** of mitral valve (COMMON, not all HCM)
- Left atrial enlargement (moderate to severe disease)

**Tissue doppler imaging (TDI) echocardiography:**
To identify diastolic dysfunction
- Pulsed-wave or color Doppler
- Monitor therapeutic effects
- Monitor disease progression

**Cardiac myosin binding protein-C gene (MyBPC) mutation**
- Test available for MyBPC gene mutation

**Sleeping respiratory rate:** Have client assess and call if > 40

**Rx(s) of choice:**

**ACUTE treatment of CHF** due to feline HCM:
- **Avoid stress** Cage rest, Gentle handling
- **IV fluids contraindicated**
- **Supplemental oxygen**
- **Diuretics**
  - **Furosemide (Lasix)**
    - Loop diuretic
    - Inhibits Na$^+$ and H$_2$O reabsorption in Loop of Henle
    - Activates Renin-Angiotensin-Aldosterone-System (RAAS)
  - **Hydrochlorothiazide**
    - Thiazide diuretic
    - Works in distal tubule
    - Use if CHF refractory to furosemide
  - **Spironolactone**
    - K$^+$ sparing diuretic
    - Antagonizes aldosterone
    - Use if CHF refractory to furosemide
- **2\% Nitroglycerin (topical)** - Venodilator – reduces preload
  Therapeutic thoracocentesis and paracentesis **as necessary**
**Feline hypertrophic cardiomyopathy (HCM)**

**Rx(s) of choice:** (ACUTE CHF continued)

- **Thromboembolism therapy**
  - Palliative
    - 50% treated symptomatically regain limb function in 1-6 weeks
    - Natural thrombolysis/reperfusion occurs slowly
      - No complications from reperfusion injury
  - Pain management – buprenorphine
  - Nursing care – warmth, padding, turning q4h, cleaning
  - (Fibrinolytic agents)
    - Streptokinase
    - t-PA
    - Reperfusion injury, hyperkalemia, acidosis, hemorrhage, high re-thrombosis rate, high cost of drugs

**CHRONIC treatment of HCM:** 3Ds and rest

- **Diuretics** as listed above to reduce pulmonary edema
- **Diet** – Low sodium, palatable
- **Dilator**
  - Afterload and preload reducers
    - ACE inhibitors (enalapril, 2% nitroglycerine)
  - Beta adrenergic blockers
    - Propanolol, atenolol
  - Ca++ channel blockers
    - Diltiazem, ampulidine
  - Improve myocardial relaxation
  - Improve ventricular filling
- **Anti-thrombogenic therapy**
  - Aspirin q 3 days
- **REST**
- Periodic therapeutic thoracocentesis and paracentesis as needed

**Prognosis:** Varies w/ individual, medical management, client compliance

- **Good to Fair:** mild, non-progressive, compensated; median survival > 5 yrs
- **Poor:** Severe HCM, CHF, TBE; survive 2 months to 4 yrs

**Prevention:**
- Genetic screening for MyBPC mutations (autosomal dominant) and educate client
Feline hypertrophic cardiomypathy (HCM)

**Pearls:**
- Left ventricular **concentric hypertrophy of HCM** = Stiffness, impaired relaxation
- HCM is a primary sarcomeric defect

**Refs:** Cote, Clin Vet Advisor, Dog and Cat. 2nd ed. pp. 565-567, Merck Manual, 10th ed (online), Heart failure (overview of signs) and Cardiomyopathy, (scroll down) Images courtesy of Dr. Terri Defrancesco

**My Notes:**