Zuku Review FlashNotes™

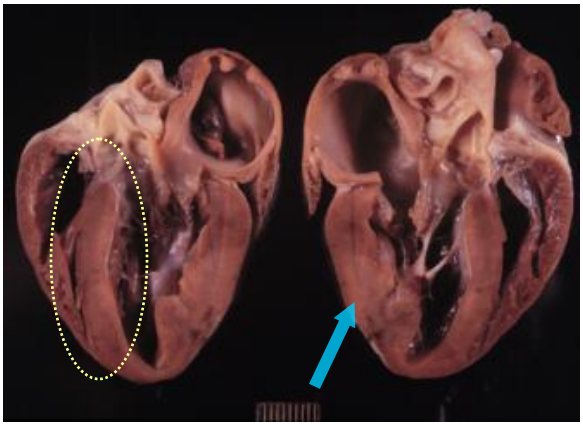
Feline hypertrophic cardiomyopathy (HCM)

Extended Version

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

Presentation:

The most common feline cardiac disease



Feline hypertrophic cardiomyopathy

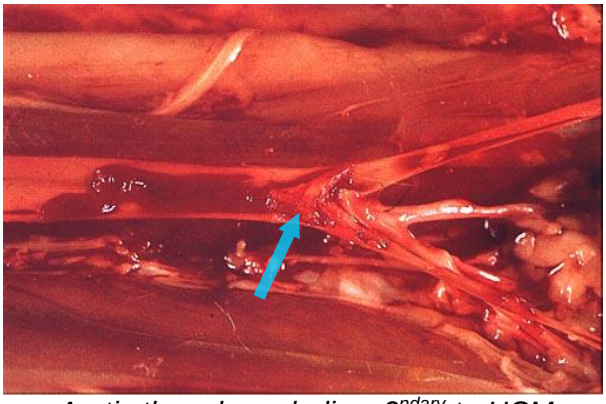
Note hypertrophy of interventricular septum and left ventricular free wall

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



Aortic thromboembolism 2^{ndary} to HCM

DDX:

- 2^{ndary} HCM due to systemic hypertension, hyperthyroidism, subaortic stenosis, acromegaly,
- Cardiac infiltration by inflammation, neoplasia, or edema

Zuku Review FlashNotes™

Feline hypertrophic cardiomyopathy (HCM)

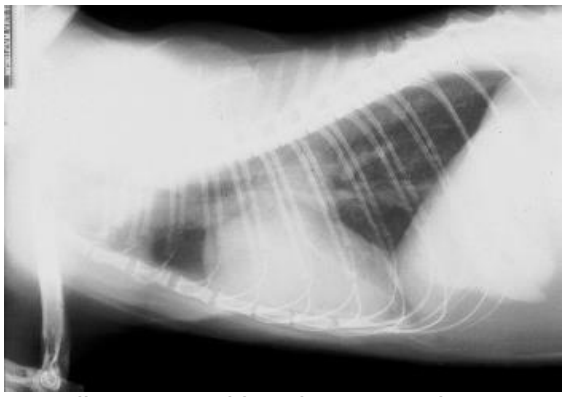
Extended Version

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)



Feline HCM with pulmonary edema
Note increased sternal contact of heart

- 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

"Valentine-shaped" heart of feline HCM, DV view

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

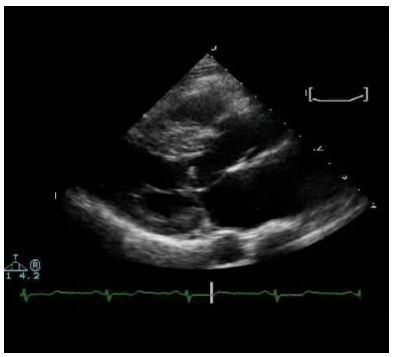
- Pulmonary edema
  - Anywhere in cats
- +/- pleural effusion

Zuku Review FlashNotes™

Feline hypertrophic cardiomyopathy (HCM)

Extended Version

Test(s) of choice: (continued)



*Echocardiogram displaying **systolic anterior motion** of the mitral valve due to HCM*
Echo courtesy, Dr. Ksheka and Wikimedia Commons

Echocardiogram

- **Concentric left ventricular hypertrophy**
- **≥ 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_2O reabsorption in Loop of Henle
    - Activates Renin-Angiotensin-Aldosterone-System (RAAS)
  - Hydrochlorthiazide
    - 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**

Zuku Review FlashNotes™

Feline hypertrophic cardiomyopathy (HCM)

Extended Version

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, amplodipine
    - 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

Zuku Review FlashNotes™

Feline hypertrophic cardiomyopathy (HCM)

Extended Version

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: