Equine Cardiovascular Disease

SCAAEP EJC
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Daria DiGiovanni
Equine Cardiovascular Disease

- 3rd most common cause of poor performance in athletic horses (after musculoskeletal and respiratory)
- Cardiac abnormalities are rare
- Clinical Signs: Poor performance/exercise intolerance, distended veins, swelling of the limbs, weakness or collapse
Anatomy/Physiology

- Breed dependent
- Anterior
- Covered externally by the forelimbs
- 100% blood volume passes through the heart each minute
Normal!

25 mm/sec $\rightarrow$ 5 boxes=1 sec
Count # beats/15 big boxes
# beats x 20 = BPM
Common CV Conditions

Arrhythmias:
- 2\textsuperscript{nd} Degree AV Block
- Atrial Fibrillation

Valvular insufficiencies ("leaky valves")
Arrhythmias: 2nd Degree AV Block

- Most common arrhythmia
- Dropped beat, “regularly irregular”, resolves with increased HR
- Pathology: Delayed and blocked impulse at AV node ➔ conducted and non-conducted P waves ➔ P waves +/- QRS complex
Arrhythmias: 2nd Degree AV Block

- **Mobitz I (Wenkebach):** P-R gradually lengthens (variable) until QRS dropped

- **COMMON FINDING IN NORMAL HORSE—abnormal in cattle**

- Can result from digitalis treatment/electrolyte imbalance

- **Mobitz II:** P-R interval is constant before and after dropped beat
Etiology: high vagal tone, electrolyte imbalance, (hyperkalemia), pharmacologic effects or A-V nodal disease

Treatment: None (if only occasional non-conducted complexes); +/- pacemaker (high frequency or long duration)
Arrhythmias: Atrial Fibrillation

- **Signalment**: Athletic, fit horses

- Most common arrhythmia associated with poor performance

- **Clinical Signs**:
  - Common: poor athletic performance, incidental finding
  - Uncommon: ataxia, epistaxis, collapse, wt loss
Arrhythmias: Atrial Fibrillation

Pathology:
- Sudden decrease in performance → heart otherwise normal
- Malfunctioning of the SA node (pacemaker)
  - Instead of a single signal stimulating contraction of the ventricles, several signals generated in the atria → irregularly irregular HR and decreased CO
Arrhythmias: Atrial Fibrillation

Pathophysiology:
- Associated in most species with atrial enlargement
  - Condition requires area of atrial tissue large enough that chances of circus movements of wavefronts developing cause the activation pathways in increase in length
  - >15 hands have large enough atria that AF can persist
- High Vagal tone
  - Release of Ach shortens the refractory period to differing degrees in different cells in the atria, resulting in increase inhomogeneity of refractoriness.
Arrhythmias: Atrial Fibrillation

C.V. Effects:

- Limited ventricular filling during exercise, reducing SV → reducing CO → affecting performance
- Results in a higher HR (240-260 vs. 220-240)
Arrhythmias: Atrial Fibrillation

Diagnosis:

- **Cardiac auscultation:** irregularly irregular rhythm, absence of atrial contraction sound, pulse quality variable, HR normal or raised

- **ECG:** No P waves, base line undulation, irregular R-R interval, QRS normal
Arrhythmias: Atrial Fibrillation

DCM in a poodle.
Arrhythmias: Atrial Fibrillation

Treatment:

1. Must be sure to rule out underlying heart disease, as they will be less successful with treatment (R/O w/Echo)

   Grave prognosis w/ CHF and AF (can be managed with digoxin and diuretics)

2. Measure plasma K+ values and do
F Ex Na+
Arrhythmias: Atrial Fibrillation

Treatment:
- Treatment of cases W/OUT evidence of underlying diseases often results in permanent return to sinus rhythm and subsequent return to athletic performance.
- Can be treated repeatedly and can perform well.

Quinidine sulphate:
- Na channel blocker
- Prolongs the Q-T interval (slowed depolarization AND repolarization)
- Elimination by liver (P450)
Arrhythmias: Atrial Fibrillation

- If treated soon after onset, they can be restored with Quinidine therapy
  - Via stomach tube
  - Test dose for anaphylactic reactions
  - Peak concentration 2 hrs post administration → dose every 2 hrs until conversion to sinus rhythm
  - Most result in conversion with 30-60 g total
Arrhythmias: Atrial Fibrillation

- Doses above 5 mg/I likely to results in side effects and NOT increase the chances of conversion to sinus rhythm (can do assay to measure this!). Can convert when plasma levels drop down.

- SE: Mild depression, colic→ weakness, nasal edema, tachycardia, ataxia, hypotension, collapse

- Fluid therapy and constant ECG monitoring (QRS greater than 25%)

- Also: thrombocytopenia, granulomatous hepatitis, myethenia gravis, hearing loss (tinnitus=ear ringing)
References

http://www.provet.co.uk/equinecardiology/5a679c2.htm

http://cal.vet.upenn.edu/projects/anestecg/index.htm

http://www.thehorse.com/