Approach to the coughing horse

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Outline
- Disease classification
  - Infectious vs. inflammatory
  - Mixed
- Patient approach
  - Diagnostic options
- Management
  - Pharmaceuticals
  - Environmental strategies
- Case examples

Disease Distinction

Infectious
\[ \text{ANTIMICROBIALS} \]

Inflammatory
\[ \text{ANTIINFLAMMATORIES} \]

- EAS
  \[ \text{+EAS} \]
Patient Assessment

- Signalment
- History
- Physical examination
  - General examination
  - Vital parameters
  - Tracheal palpation
  - Cough?
- Thoracic auscultation
  - Trachea
  - Pulmonary
  - Abnormal breathing examination

- Static
- Intermittent
- Dietary impact
- Environment
  - Ventilation

- Induced with exercise
- Persistent
- Exercise intolerance
• 11 YO Percheron mare
• Presenting complaint: nasal discharge
• Vital parameters WNL
• Very bright and alert
• Thoracic auscultation WNL
  • Tracheal palpation: inducible cough
  • Tracheal auscultation: tracheal rattle
• Thoracic ultrasound WNL
  • Slight irregularity of the pleural surface

Diagnostic Plan

• Respiratory examination
• Hematology: Complete blood count + fibrinogen
• Endoscopic examination
• Bronchoalveolar lavage
  • Cytologic examination
• +/- thoracic ultrasound
• +/- thoracic radiographs
  • Poor response to therapy / management
    • Suspect multinodular pulmonary fibrosis (EMP, EHV-5)
    • Neoplasia

• 300-500 mL sterile, warmed 0.9% NaCl.
  • In initial syringe include 30 mL 2% lidocaine (label syringe).
  • Sedate (+ time to effect)
    • Xylazine 0.3 mg/kg IV or detomidine 0.01 mg/kg
    • Butorphanol 0.01 mg/kg

• Once the horse is sedate, routine restraint with twitch and appropriate handler.
  • BAL tube or 3 M scope is passed to 3-4th generation bronchi.
  • While passing, the syringe containing 2% lidocaine is gently administered to provide local analgesia of mucosa.
  • When at terminal end, wedge, inflate cuff and instill.
  • Administer 300 mL of warmed, sterile fluid, then aspirate. Expect ~ 60% yield.
Mild equine asthma (former IAD)

- Increased pulmonary inflammation
- Mast cells > 2%
- Eosinophils > 1%
- Recurrent airway obstruction
- Disease (increased effort) at rest
- Neutrophils > 5-20%

Pulmonary Inflammation: Clinical Management

- Broad spectrum antibiotics
  - Oral: Amoxicillin + clavulanic acid
  - Trimethoprim-sulfamethoxazole 20 mg/kg PO BID x 3 weeks
- Corticosteroids
  - Dexamethasone (0.02-0.05 mg/kg IV/IM)
  - Daily for 3-5 days
  - Clinical improvement = reduce dose ~ 25%
  - At approximately 10 days, administer orally for 3-5 days
  - Then every other day
  - Total treatment 14-21 days
- Prednisolone (1 mg/kg PO BID/SID)

- Bronchodilator therapy
  - Clenbuterol
    - Oral syrup: systemic administration 1 TSPF LDFN 25 mg/ml (0.3-0.2 mg/kg PO BID)
    - Albuterol
      - Aerosolized MDI
        - 5 puffs (QID-BID)
  - Not more than 21 days, limit to 2 receptors down regulation
  - Avoided if asthma challenge sensitivity
Mast cell inflammation

Anti-inflammatory therapy
+/‐ Bronchodilator therapy
Environmental Management

Housing and Health

• Ventilation
  • Stable design with indoor arena
• Outdoor temperature
• Precipitation
• Nutrition!
• Pulmonary health improved considerably
Dexamethasone
- Systemically administered
  - 20 mg IV day 1
  - 20 mg IM 3 days
  - 15 mg IM 3 days
  - 10 mg IM 3 days
  - 10 mg PO 3 days
  - 10 mg PO EOD 3 treatments
- Aerosolized
  - Aerohippus
  - Equine Haler
  - Fluticasone > beclomethasone
  - 5 puffs BID when early or to avoid problems
  - Pre-exercise 5 puffs albuterol
• Allergens and irritants initiate problems
• Improved environment
• Antiinflammatories
• Younger horse vs. older horse
  • Older horse IAD is more likely to cough
  • Increased mucus production
• Mild-mod EA vs. Severe EA
  • Mild-mod EA = inflammation, mucus, no respiratory distress at rest
  • Severe EA = allergic, inflammation, neutrophils
    • DISTRESS / INCREASED EFFORT at rest
    • Impaired innate immune defense

Mild-mod EA: Exercise intolerance (only)
• 7 YO Warmblood gelding
  • Imported into US approximately 8 months previously.
  • Intent was to be a jumper, currently used for equitation and lower level hunter classes.
  • Performed adequately, but would occasionally cough and on day 3 of competition would buck.

• Intermittent urticarial.
• Intermittent bilateral nasal discharge.
• Mucous production with exercise is not uncommon.
• BAR
• Vital parameters WNL
• Mild urticarial right shoulder
• Small amount left sided mucoid nasal discharge
• BCS 5/9, 1416 pounds

• Baseline auscultation: mild tracheal rattle
• Rebreathing: increased BV, bilaterally, tracheal rattle until swallow. Rate increased
• Worsened signs following lunging
• Thoracic ultrasound
• Endoscopy
• Bronchoalveolar lavage:
  • Mild elevation in eosinophils (2%; N<1%)
  • Mast cells (2%; N<2%)
  • Non-degenerate neutrophils (7%; N<5% BAL),
  • Finding suggest mild/mod EA, inflammatory airway disease/mild eosinophilic pneumonitis.
  • Some macrophages were multinucleated indicate activated in response to inflammation.
  • No bacterial or fungal organisms or intracellular viral inclusions were present.
  • Fungal culture and EHV-5 testing (quantitative PCR) performed and negative.
Clinical management: eosinophilic EA

- Environment
  - Outdoors, ventilation, rest from exercise
- Inhaled corticosteroids
  - Flexineb, budesonide (1 mg twice daily)
- Omega-3 FA
  - Aleira, Arenus, Inc.
  - 1.5 scoops daily
• **Budesonide**: Continue nebulizing 1 mg budesonide (1:1 solution with sterile saline) via the Flexineb device twice per day as before.

• **Prednisolone (20 mg tablets)**: 2 mg/kg PO q 24 hours 5 days, then 1 mg/kg daily 7 days, then 0.5 mg/kg PO daily 7 days, then 0.5 mg/kg PO EOD for 3 doses.

• **Omeprazole 4 mg/kg PO daily** on empty stomach while on systemic prednisone.
• Environment, maintain ventilation
• Continue budesonide nebulization
• Reintroduce exercise
• Reduce nebulization to once daily for 30 days
• Continue with Aeira
• Omeprazole as needed at high risk times

13 YO DWB
• Successful competition through winter in FL.
• Transported back to NE in late March.
• Developed fever and acute respiratory distress, referred.
• T = 104 F.
• Labored respiratory effort

• T = 99.7 F
• HR = 70-80 bpm
• RR = 42 brpm, labored
  • Wheezes diffusely present
  • Mucous membranes appeared gray
• PO2 = 52 mmHg (100 mmHg)
• Lactate = 3 mmol/L (<1 mmol/L)
• O2 sat = 87% (100%)
• Serum amyloid A = 1130 mg/dL (<20 mg/dL)
• Equine respiratory panel nasal swab at presentation: negative for all known pathogens (influenza, Equine herpes virus 1 and 4, equine arteritis virus and Strangles). Positive for equine adenovirus.

• Equine respiratory panel nasal swab (4/3) PCR: negative for all known pathogens (see above) and equine adenovirus. Positive for equine herpes virus 2 and 5. Significance unknown, as many horses are positive.

• Broncho-alveolar lavage cytology: majority (80%) non-degenerate neutrophils, 20% mixed inflammatory cells, and foamy macrophages. This is most consistent with heaves (recurrent airway obstruction) but viral and EHV-5 were mentioned as possible causes (and viral ruled out on 2-viral PCR swabs).

• Antibiotics:
  • Penicillin, gentamicin then TMS-SMZ
  • Oxygen
  • First 3 days, tapering, until PaO2 improved (>70 mmHg)
  • GCS
  • Bronchodilators
    • Clenbuterol
    • Albuterol
  • Aerosolized GCS
  • Beclomethasone
  • Environment
• Represented in 30 days
• IV oxytetracycline
• Prednisolone
• Nebulized
• Omega-3 FA
• Environment

Severe equine asthma
• Life long condition, environment and medical management.
• Higher risk of secondary infectious disease.
• Other risk factors could contribute to deterioration of condition.
  • Long distance transport
  • Indoor housing
  • Poor quality hay

7 month old Arabian filly
• History of mild cough for several weeks.
• Approximately 2 months of serous to mucoid nasal discharge.
• Eating and drinking adequately.
• Lives in a barn at night, out during the day in a dry lot.
General Assessment

- 163.5 kg, BCS 5/9
- Hair coat, general appearance considered good.
- PE:
  - T = 101.0
  - P = 68 bpm
  - R = 44 bpm
- Thoracic auscultation:
  - Increased BV sounds
  - Wheezes present
- Abdominal auscultation:
  - Normal borborygmi

Other history?

- Fed a commercial pelleted diet
- Free choice brome hay
- No halter
- No vaccines
- No deworming
- No hoof trim

Leukogram

- HCT 35%
- Total protein 7.0 g/dL
- Leukocyte count 9.2 K/μL
- PMN 5.1 K/μL
- Band 0.0 K/μL
- Lymph 3.6 K/μL
- Eos 0.2 K/μL
- Monocyte 0.3 K/μL
- Fibrinogen 0.6 mg/dL
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<th>Value</th>
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<tr>
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<tr>
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<tr>
<td>GGT</td>
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Streptococcus zooepidemicus
Streptococcus (alpha hemolytic)
Gram positive (small rod)
Treatment Plan

- Antimicrobials?
  - Doxycycline
- Anthelminthic?
  - Fenbendazole
    - 2.5 mg/kg PO
    - 5 mg/kg PO
    - 10 mg/kg PO x 5 days
    - Sweeper in 2 weeks
- Other?
  - Clenbuterol
    - Eosinophils → bronchoconstriction (wheezes on auscultation)

Parascaris equorum

- Never dewormed
- Raised foals
- Eggs persist in environment
- Young are susceptible
- Prepatent pd. 10-12 weeks
- Hepatotracheal migration
- L4 in lung, L5 in gut that can reproduce.
Summary

• With history and examination can determine likely disease considerations.
• Complete examination will include blood work and imaging.
• Additional information may be obtained from BALF cytology.
• Parasitic disease may cause primary cough.