The coughing cat: feline lower airway disease

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Plan for the talk

• Mysteries and misconceptions
• What is asthma?
• What about chronic bronchitis?
• What else makes cats cough?
• The right diagnostics
• Treatment
  • Short term
  • Long term

Facts about inhaled therapy
Mysteries and misconceptions

- Lower airway conditions in cats quite poorly understood
  - Definitions arbitrary
  - Overlap between conditions
- Even in humans, asthma can be ‘brittle’ and causes deaths and healthcare costs
- Can be expensive to investigate and frustrating to treat lower airway disease in cats

**Deaths from asthma**
England and Wales, 2001 to 2018

Source: Asthma UK analysis of ONS data
Mysteries and misconceptions

- Definitions can be confusing
- Lower airway disease is common in cats
- Lack of consensus
- ‘Feline lower airway disease’
  - Asthma
  - Chronic bronchitis
  - Other pathologies (parasitic, infectious bronchitis)
- ‘Feline inflammatory non-infectious lower airway disease’
  - Asthma
  - Chronic bronchitis

- Feline asthma (FA)
  - Bronchoconstriction
  - Eosinophilic inflammation
  - Hypersensitivity

- Chronic bronchitis (CB)
  - Excessive mucous production
  - Neutrophilic inflammation
  - Mucosal hypertrophy

Why is this important?
Does it affect how I treat the patient?
Definitions...

Perspectives in veterinary medicine: Description and classification of bronchiolar disorders in cats

Carol R. Reinero¹ | Isabelle Masseau¹,² | Megan Grobman¹ | Aida Vientos-Plotts¹ | Kurt Williams³

TABLE 1: Proposed classification scheme for bronchiolar disorders in the cat

<table>
<thead>
<tr>
<th>Primary bronchiolar disorders</th>
<th>Secondary bronchiolar disorders</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Constrictive/obliterative bronchiolitis (Case 1)</td>
<td>• Extension of large airway disease</td>
</tr>
<tr>
<td>• Mineral dust airway disease (Case 2)</td>
<td>○ Asthma (Case 6, 7)</td>
</tr>
<tr>
<td>• Infectious bronchiolitis³⁴⁻⁵⁵ (Case 3)</td>
<td>○ Chronic bronchitis (Case 8, 9)</td>
</tr>
<tr>
<td>• Other primary bronchiolar variants (Case 4, 5)⁶⁶</td>
<td>○ Parasitic bronchitis (Case 10)</td>
</tr>
<tr>
<td></td>
<td>○ Bronchiectasis⁶⁷</td>
</tr>
<tr>
<td></td>
<td>• Component of interstitial lung diseases⁷</td>
</tr>
<tr>
<td></td>
<td>○ Bronchiolitis obliterans with organizing pneumonia/cryptogenic organizing pneumonia⁸¹²</td>
</tr>
<tr>
<td></td>
<td>○ Bronchiolocentric interstitial pneumonia/airway centered interstitial fibrosis (Case 11)</td>
</tr>
</tbody>
</table>

Simple??
Clear as mud?
Mysteries and misconceptions

• ‘She has furballs, they get stuck sometimes’
• ‘He has something stuck in his throat’
• Coughing cats always have ‘asthma’ like people
• ‘I offer the inhaled therapy but the clients don’t think they can do it’

Let’s challenge these!
A case: Jim

• 11 year old MN Burmese
• History of coughing intermittently for several months (maybe longer)
• Seems to be getting worse
• Otherwise bright
• Recently developed resting tachypnoea
• Course of potentiated amoxycillin made no difference
Is it coughing?

- Coughing in cats looks alarming
  - To some clients, not like coughing
- Ask clients to video an episode
  - Train reception to ask for this when booking appointment
- Save a video to show clients
- You Tube if necessary
- Demonstrate!
- Key points
  - Low posture
  - Neck outstretched
  - May have terminal retch or swallow
  - Variable duration
Non-coughing causes of ‘coughing’

• Retching
• Vomiting
• Actual hairballs....
• Dysphagia

• Remember to ask about other clinical signs/clues
  • Open mouth breathing episodes
  • Exercise intolerance (cats get it too!)
  • Resting tachypnoea
What is feline asthma (FA)?

- Definition of asthma:
  - Spontaneous bronchoconstriction
    - (initially reversible)
  - Airway eosinophilic inflammation
  - Airway hyperresponsiveness

- Only affects cats and people
- T-cell based type 1 hypersensitivity
- Changes can be progressive
  - Airway remodeling
  - Declining lung function
What is chronic bronchitis (CB)?

• Common cause of coughing
• Secondary to airway insult?
• No bronchoconstriction but airway narrowing due to mucous and remodeling
• Neutrophilic BAL (>7%)
• No increased eosinophils
• Mucosal oedema and excessive mucous production
• More chronic history – less frequent emergent presentation BUT can be dyspnoeic
Species differences: cats are not small dogs

- Small airways
  - Small changes in diameter = massive airflow limitation
- Suffer bronchoconstriction (sensitive airway smooth muscle)
- Hypoxaemia occurs
  - Bronchiole blends into the alveolus
  - Obstructions of the bronchioles cause significant hypoxia

- Relatively large airways
- Lack of airway hyperresponsiveness
- Lack of bronchoconstriction (airway smooth muscle less sensitive)
- Hypoxaemia with chronic bronchitis rare
  - Airflow redistribution with obstructed airways
  - Distinction between bronchiole and alveolus
Triggers for lower airway disease

• In humans, triggers include environmental substances, allergens, emotional stress

• Cats likely to have allergenic triggers for FA
  • House dust mites
  • Grasses

• CB may have origins in airway irritation

• Makes sense to avoid toxins and allergens as much as possible
Feline lower airway disease – not just asthma

Chronic cough +/- episodes of tachypnoea

- Inflammation with mixed cells or neutrophils

- Chronic bronchitis

- Other causes of lower airway disease

- Spectrum of lower airway disease

- Asthma

- Inflammation with eosinophils in BAL

- Response to bronchodilators

- Episodes of dyspnoea

Other causes of lower airway disease
Feline asthma vs chronic bronchitis

Cough was most frequent presenting sign (also dyspnoea, abnormal auscultation)

No significant difference in radiographs

Significantly more cats with FA had eosinophilia (39.6%)

Erythrocytosis in 37% CB and 29.3% CB

Differentiation of FA and CB was not possible with clinical signs, signalment, radiographs.
Other causes of coughing

• Not just asthma and chronic bronchitis!
• Can be asthma and chronic bronchitis PLUS infection
• Cats can have lower respiratory tract disease AND cardiac disease
• Cats with cardiac disease CAN cough (but perhaps they also have some lower airway disease)

• Lungworm: *Aelurostrongylus*
• Heartworm-associated respiratory disease
• Bacterial infection?
Mycoplasma: primary or secondary invader?

• Mycoplasma can be normal flora of the upper airway
• In humans *M pneumoniae* associated with asthma
• Studies complicated by contamination from upper airway of BAL samples
• Found in lungs from cats without CB and FA

• Utility of quantitative PCR?
• Does it worsen FA or CB?
• I would usually treat, but be aware (and inform owners) it is not likely to be the whole story
Radiography

- Thoracic radiography is insensitive for the diagnosis of lower airway disease
- Highly variable appearance
  - Normal (23% cases)
  - Bronchial/bronchointerstitial
  - Right middle lung lobe collapse
  - Hyperinflation in FA
    - Lucent lung fields
    - Caudal displacement of the diaphragm
Radiography

- Will not give you a diagnosis
- Excludes neoplasia (almost)
- Plan it
- Take 3 views
- Ideally inflated
- Consider further tests at the time
- Commonly ‘mild bronchointerstitial pattern...’
Advanced imaging: CT

• Much more useful
• Normally can’t see bronchioles
  • Bronchial wall thickening
  • Patchy alveolar pattern
  • ‘Tree in bud’ mucous plugging
  • Subtle changes differentiate from other causes of coughing
Can we CT conscious cats?

- Mousetrap device
- Allows us to CT dyspnoeic cats
- Often slight movement blur
- Can’t usually give contrast
  - Could with mild sedation
- POCUS for dyspnoeic cats is optimal until stable
Back to Jim
Bronchoscopy
Bronchoscopy
Bronchoscopy and BAL: scary right?

• Not without risk
• Bronchospasm in asthmatic cats can be life-threatening
  • Haemorrhage
  • Pneumothorax
• Anaesthesia monitoring vital
• Capnograph and pulse oximeter
• Pre-treat with terbutaline (0.015mg/kg)
  • Will cause tachycardia
• Preparation is important
  • Equipment list
• Ensure sample handling is appropriate
  • Communicate with lab
  • Create a smear (in-house examination)

• Plan well
• Pre-oxygenate
• Monitor during and post-GA
• Capnography useful
• Provide oxygen at all times
• Can use a urinary catheter down side of scope
What about a blind BAL?

- Not all clinics have an endoscope
- Useful for diagnosis
- Pre-treat with terbutaline
- Sterile ET tube
- Feeding tube (8F) passed into lower airways
- Aspirate with 20ml syringe

Comparison of bronchoscopic and nonbronchoscopic bronchoalveolar lavage in healthy cats

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Andrea L. Sanchez DVM, DVS:
Stephanie G. Nykamp DVM, MS:
J. Scott Weese DVM, DVS:
Anthony C. G. Abrams-Ogg DVM, DVS:
Dorothee Bienzle DVM, PhD

OBJECTIVE
To compare bronchoscopic lavage (BAL) accomplished by use of a bronchoscopic (B-BAL) and a nonbronchoscopic (NB-BAL) technique in healthy cats.

ANIMALS
12 healthy cats.

PROCEDURES
Two BALs were performed in a randomized order 2 weeks apart in each cat. Cats were anesthetized, and a 2.9-mm fiberoptic bronchoscope (B-BAL) or 8F red rubber catheter (NB-BAL) was wedged in a bronchus. Two 5-mL aliquots of saline (0.9% NaCl) solution were infused into the left and right caudal lung fields and aspirated manually with a 20-mL syringe.
Back to Jim: BAL

- Bronchoscopy showed small amounts of thick mucous in large airways
- Some airway inflammation
- Initial BAL seemed to be thick mucous
- Repeated to get a good sample
  - Warm saline in 5ml aliquots
  - Check sample is ‘foamy’
  - Don’t need to coupage
BAL cytology

• Distinguish between asthma and chronic bronchitis
  • Eosinophilic predominance in asthma
  • Neutrophilic in chronic bronchitis
• Allows culture
• Allows infectious disease PCRs
• Identification of lungworm

BUT: Eosinophils can be within normal limits in cats with FA
Normal cats can have an eosinophilic BAL
Interpret with imaging and clinical signs
BAL results

Eosinophilic inflammation
Mycoplasma (low level)

PCR useful to exclude lungworm
Treatment of inflammatory FA and CB

Avoidance of allergens
- Plug in air fresheners
- Cigarette smoke
- Perfumes

Injectable corticosteroids

Treatments of FA and CB

Oral corticosteroids

Bronchodilators (for FA)

Inhaled corticosteroids

?reduce stress?

Be aware the conditions (particularly FA) can wax and wane making it hard to judge the effect of therapy*
Allergen avoidance: does it help?

- Not well studied in veterinary medicine
- Likely ‘polysensitization’
- Avoidance of obvious triggers
  - Plug in air fresheners
  - Perfumes
  - Cigarette smoke (including on clothes)
- House dust mites
  - HEPA filter in vacuum
  - Impermeable pillow and mattress covers (or shut cats out of the bedroom!)
- Dust from litter trays and perfumed cat litter
- Compliance issues....
Glucocorticoids: pred or dead?

- Evidence that treatment with glucocorticoids is effective experimentally and clinically for FA and CB
- Glucocorticoids can be given orally or as inhaled therapy
- Some evidence that both oral and inhaled glucocorticoids will reduce airway eosinophilia in asthmatic cats
Oral glucocorticoids: the nitty gritty

• Majority of clinicians will start with oral therapy at 1-2mg/kg prednisolone SID
• Emergency treatment of dyspnoea with dexamethasone 0.1-0.2mg/kg IV or SC
• Transition to inhaled therapy (takes 7-10 days to have an effect) but training may take longer
• Remember compliance!

Results from Taylor et al 2021 – Owners’ experiences of medicating cats – oral medication
Inhaled therapies

• Inhaled therapies have been used in cats for some years now
• Following from the treatment of children
• Using an MDI and chamber with a valve and mask
Inhaled vs systemic glucocorticoids

- Systemic glucocorticoids may cause adverse effects
  - Diabetes mellitus
  - Immunosuppression
- May be contraindicated in some conditions
  - Pre-existing DM
  - Cardiomyopathy

- Some systemic absorption but minimal suppression of the HPAA axis
- Effective at reducing airway inflammation.
Inhaled glucocorticoids

- Dose of inhaled fluticasone not fully established by research
- One study suggested equal response to 44, 110 and 220ug twice daily
  - Efficacy may plateau
- General recommendation 125ug: one puff twice a day (titrated up or down)
Bronchodilators

- Reverse smooth muscle contraction
- Not suitable for monotherapy
- Short acting beta agonists
  - Terbutaline
    - Appropriate to use via injection in acute airway constriction
    - *preferred in acute bronchoconstriction in clinic
  - Albuterol/salbutamol
    - Via MDI in acute bronchoconstriction
    - May be pro-inflammatory with long term chronic use
    - Can be used at home
- Long acting beta agonists
  - Salmeterol combined with fluticasone
Inhaled therapies: long term

• Prevention is better than severe relapse
• Look after the inhaler
  • Clean it!
• Look for any long-term adverse effects
  • Corneal ulcers
  • Hair loss
  • Coughing when administering
  • Demodecosis (facial)
• Complacency from owner can risk relapse
### FELINE ASTHMA AND CANINE BRONCHITIS

**TREATMENT PATH & DOSING GUIDELINES**

#### 1 Treat Exacerbation!

**Ensure animal can breathe**
- Immediate dilation of airways to provide respiratory relief
- Provide injectable steroid and either intraln or injectable bronchodilator
- Injections administered in clinic/hospital
- Inhaled bronchodilator may be administered in clinic or at home by owner

**Clear the airways**
- Reduce airway inflammation and regain control of airways
- Provide short term course of systemic steroids
- 10-day therapy course

**Introduce Inhaled Therapy**
- Taper systemic steroids while introducing inhaled steroids
- Overlap therapy for 2 weeks
- Inhaled steroids effectively target the airways for disease control without the side effects of systemic steroids

**Maintain disease control**
- Maintenance therapy to keep inflammation controlled and prevent exacerbations
- Daily therapy for symptom management
- Cat owners can administer inhaled bronchodilator during flare ups from exposure to triggers

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#### MEDICATIONS

<table>
<thead>
<tr>
<th>Dexamethasone</th>
<th>Prednisone / Prednisolone</th>
<th>Fluticasone 1 puff</th>
<th>Fluticasone + salmeterol</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR Salbutamol</td>
<td>AND Terbutaline</td>
<td>125 µg / 25 µg</td>
<td>250 µg / 25 µg</td>
</tr>
<tr>
<td>OR</td>
<td>OR Salbutamol</td>
<td>250 µg / 25 µg</td>
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</tr>
<tr>
<td>Notes</td>
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<td>Notes</td>
<td>Notes</td>
</tr>
<tr>
<td>Owners unable to regain control at home should be referred to veterinary care</td>
<td>Owners unable to regain control at home should bring animal to veterinary care</td>
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#### Dosing Guideline

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<tbody>
<tr>
<td>0.1–0.5 mg/kg IM or IV</td>
<td>0.5–1.0 mg/kg every 24 hours</td>
<td>1 puff</td>
</tr>
</tbody>
</table>

#### Notes

- Review environmental modifications
- Ensure pet owners understand systemic steroids are only temporary
- Owners already using inhaleds with exacerbation with albuterol can continue with inhaled steroid

**Useful dosage guidelines**

- Salbutamol is a rescue medication and should not be used as monotherapy
- Canines not shown to bronchoconstrict. Little evidence salbutamol is effective for canine bronchitis

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• Initial treatment with doxycycline 10mg/kg SID for 2 weeks (remember the water/food)
• With prednisolone 1.2mg/kg SID PO
• Start inhaler training
• Direct owner to sources of training materials: https://www.trudellanimalhealth.com/cats

Responded well! Coughing stopped
Reduced long term dose to once a day
Will do anything for a Dreamie!

Responded well, minimal coughing, maintained on one puff once a day (125ug)
Alternative therapies

• Allergen specific immunotherapy
  • Further research needed
  • Some evidence of effect
  • Need to choose correct allergens
  • Can take time to have an effect (inhaled therapy still needed)

• Omega 3 fatty acids
• Tyrosine kinase inhibitors
  • Adverse effects
• Cyclosporin
  • Some reports of use in diabetic cats for example
• Stem cell therapy
Relapse can occur and be severe.....Coco

- 2 year old FN Ragdoll
- Diagnosed and treated for asthma 3 months before
- Weaned off oral prednisolone after initial response
- Hit and miss compliance to inhaled medication
- Taken for vaccination (stress)
- Next day severe dyspnoea and coughing

Refractory to treatment..... PTS
Follow up and check in

- To avoid relapse, as with any chronic condition, check how the cat is doing
- Check the owner is using the device correctly (nurse clinics)
- Explain importance of maintenance therapy
- Consider as any other chronic inflammatory condition on medication – adjustments and check ups are needed
- Use a validated device (Aerokat)
The take home messages

• A lot still to learn about lower airway diseases in cats!
• Coughing is the most common presenting sign of inflammatory lower airway disease
• Treatable – inhaled therapies effective
• Long-term treatment needed to avoid relapse
Do not miss the next webinar on training!

All very well me telling you to use inhaled therapies but did anyone tell the cats?

Successful inhaler training VITAL to long term successful management.
Relax! And support your clients to use an inhaler!