Investigation of nasal disease in dogs and cats

Kate Heading BVSc FANZCVS
Melbourne Veterinary Specialist Centre
Functions of the nasal cavity

Complex motor tasks
- Sniffing
- Smelling
- Modification of breathing
- Pulmonary defence

Non-motor tasks
- Pulmonary defence
- Filtration
- Heat and moisture exchange
- Evaporative cooling.
Structure of the nasal cavity

2. Ventral nasal concha
3. Dorsal nasal concha
4. Ethmoid concha
5. Frontal sinus
6. Hard palate
7. Vomer bone
Transverse – level of the eyeball

3. Ethmoid bone
5. Ethmoid conchae
7. Choana

Transverse – level of PM2

1. Dorsal concha
2. Ventral concha
2. Nasal septum
Clinical signs: Nasal discharge

• Usually self evident (but not always)
• Volume (copious or scant)
• Frequency (continuous or intermittent)
• Location (uni or bilateral)
• Appearance (serous, purulent, mucoid, muco-purulent, sanguineous or epistaxis)
Appearance of nasal discharge

• Serous – clear and acellular. Often the first sign of upper respiratory tract disease
• Mucoid – clear and acellular with a high protein content. Occurs in response to chronic, non infectious nasal discharge
• Purulent – opaque, viscous and pale yellow to green, containing abundant neutrophils and bacteria
• Sanguineous – blood mixed with another discharge
• Epistaxis – frank haemorrhage
Clinical signs: Sneezing

- Protective reflex
- Explosive expiratory airflow that dislodges and expels foreign particles from the nasal cavities.
- Sneezing tends to decrease as the disease becomes more chronic, even if the discharge increases
- Any cause of nasal mucosal irritation or nasal discharge is a differential for sneezing
Clinical signs: Reverse sneezing

• Paroxysmal, noisy, laboured inspiratory effort +/- adoption of an orthopneic position with neck extension.

• Reverse sneezing is a mechanosensitive aspiration reflex.

• More common in dogs than cats
Other signs of nasal disease

- Pawing at the muzzle
- Facial deformity, asymmetry or ulceration
- Epiphora
- Depigmentation of the nasal planum
- Open mouth breathing
- Halitosis
- Stertor
- Seizures / neurological signs

Cohn, 2014
Differential diagnoses of nasal disease
Viral rhinitis

Dogs

• Signs of nasal disease may be seen with ‘kennel cough’
• Prominent feature of canine distemper virus (CDV)
• Herpes virus in newborn puppies causes mucopurulent nasal discharge
Viral rhinitis

Cats

- Viral rhinitis is common in cats
- FHV-1 and FCV most prevalent and virulent (80-90% URT infections in cats)
- Chlamydia psittaci (obligate anaerobe)
- Secondary bacterial infection is common
- Up to 80% of cats with acute viral URTI may become chronic carriers
‘The snuffles’

• Feline chronic rhinitis: Inflammation of the nasal cavity for > 4 weeks, either intermittently or continuously
• Wide age range (0.5-16 years)
• Role of FHV-1?
• Factors such as structural damage, secondary bacterial infection and impaired immune function may be more important than viral infection per se.
Bacterial infection

*Generally considered secondary*

May occur secondary to any compromise of the nasal defence mechanism
Mycotic infection

Dogs

• Usually caused by *Aspergillus fumigatus*
• May also be caused by penicillium species.
• Cryptococcus reported occasionally
• *A.fumigatus* is a normal inhabitant of the nasal cavity
• Usually no evidence of immunocompromise in dogs
• Most common in younger animals
Mycotic infection

Cats

- *Cryptococcus neoformans* most common
- Infection via inhalation of yeast from the environment
- Sino-nasal and sino-orbital aspergillus have been recently recognised in cats
- Alternaria spp. may infest the nasal planum

*Cryptococcus neoformans* under light microscopy (Wright’s stain)
Neoplasia

• More common in older pets
• ~ 80% of nasal masses are malignant but polyps, fungal granulomas and benign tumours can occur
• The most common neoplasms in dogs are undifferentiated carcinoma (43%), adenocarcinoma (26%) and TCC (11%) (Lobetti, J S Afr Vet Assoc 2009)
• The most common neoplasms in cats are lymphoma (70%), adenocarcinoma (13%) and carcinoma (7%) (Henderson, JFMS 2004)
• Locally invasive with low metastatic rate
Allergic rhinitis?

• Presumed to occur

• Although IgE based rhinitis, as occurs in humans, yet to be demonstrated

• In a recent study of dogs with idiopathic rhinitis, 3 dogs successfully underwent desensitisation (Lobetti, J S Afr Assoc, 2014)
Idiopathic lymphoplasmacytic rhinitis

• Also known as chronic hyperplastic rhinitis
• Common but poorly understood
• Infiltration of the nasal mucosa with lymphocytes and plasma cells +/- variable numbers of eosinophils and neutrophils
• Infectious, allergic and immune mediated mechanisms implicated
• Young to middle aged dolichocephalics and mesaticephalic large breeds over represented, as well as Whippets and Daschunds
Polyps

Feline inflammatory polyps (nasopharyngeal polyp)

• Non-neoplastic pedunculated growths found in the ear canal or nasopharynx in cats
• Presumed to originate from the epithelial lining of the tympanic bulla (aural inflammatory polyps) or the auditory tube
• Those originating from the auditory tube can grow into the tympanic cavity (middle ear polyps) or the nasopharynx (nasopharyngeal polyps)
• Composed of fibrovascular tissue plus inflammatory cells
• Unknown cause – congenital, secondary to chronic middle ear and/or upper respiratory inflammation / infection
• Most common in younger cats (average 1.5 years)
Polyps: Feline inflammatory polyps (nasopharyngeal polyp)
Polyps

Feline inflammatory polyps of the nasal turbinates (hamartoma)

• Arise from the native tissue of the nasal cavities rather than the auditory tube or tympanic cavity.
• Young cats
• Rare

Canine polyps

• Rare
• Histologically resemble feline and human inflammatory polyps
Parasitic rhinitis

Australian

- *Pneumonyssoides caninum* (nasal mite of dogs) – NSW and QLD
- *Oestrus Ovis* (nasal bot fly of sheep)
- *Capillaria aerophila* (primarily lower respiratory tract)
- *Linguatula serrata* – (tongue ‘worm’) – affects dogs

Exotic

- *Capillaria boehmi* (nasal nematode)
- *Cuterebra spp.*
Oral disease

• Defects of the hard and soft palpatation (congenital vs acquired)
• Severe dental disease extending to the nasal mucosa
Foreign bodies

• Nasal discharge is initially serous but progresses to purulent with secondary infection
• Initially may see paroxysmal sneezing and pawing at the face
• Occasionally acute epistaxis or a chronic sanguineous discharge
Miscellaneous

• Defects of the ciliary clearance mechanism
• Mechanical or chemical irritation from inhaled dust or chemicals
• Nasopharyngeal stenosis
• Bronchopulmonary disease
• Megaoesophagus
• Swallowing disorders
Epistaxis

• Local disease e.g. mycotic infection, neoplasia, FB, acute trauma (including trauma secondary to sneezing)

• Systemic causes e.g. coagulopathies, systemic hypertension, thrombocytopenia, polycythaemia, multiple myeloma and vasculitis
Reverse sneezing

Reported in association with:
• Nasopharyngeal foreign bodies
• Behavioural issues?
• Airborne irritation
• Neoplasia
• Soft palpate flutter
• Entrapment of the epiglottis
• Post nasal drip
• Pneumonyssoides caninum
The diagnostic approach

- Investigate early
- Order of diagnostics tests is important
- CBC and biochemistry panels?
- Coagulation profiles?

Imaging > Rhinoscopy > Sample collection
Signalment

• Critical for guiding the direction of the investigation
• Age
• Dolichocephalic phenotype
• Breed
History

- Duration and progression of disease
- Response to prior treatment(s)
- Location and nature of nasal discharge
- Other signs of illness e.g. weight loss, lethargy, bruising, bleeding
- Onset of signs (acute vs insidious)
- Seasonal change
Clinical examination

- General examination including lymph nodes
- Ocular area: discharge, exophthalmos or enophthalmus, retinal exam
- Nasal area: symmetry or distortion, depigmentation, pain, airflow through the nostrils
- Oral cavity: oro-nasal fistulae and dental disease, palpation of the soft palate
CBC and biochemistry

- Generally low yield

**CBC**
- Neutrophilia, eosinophilia
- Thrombocytopenia
- Polycythaemia

**Biochemistry**
- Hyperglobulinaemia
- Screen for concurrent disease
Coagulation profile

- ACT
- APTT and PT
- Fibrinogen +/- FDP
- BMBT
Pre-GA diagnostics

Dogs
- Aspergillus serology
- LCAT?
- Regional lymph node cytology
- FNA of soft tissue swelling
- Systolic BP?

Cats
- Oropharyngeal and conjunctival swabbing?
- LCAT
- Nasal cytology (for Cryptococcus)
- Systolic BP?
- Regional lymph node cytology
- FNA of soft tissue swelling
Imaging

• Conventional radiographs
• Commuted tomography (CT)
• Magnetic resonance imaging (MRI)
• All require general anaesthesia to allow correct positioning

‘Although imaging cannot provide a histopathologic diagnosis, advanced imaging often provides a good degree of confidence in a probable diagnosis’ (Cohn, 2014)
## Diagnostic imaging

<table>
<thead>
<tr>
<th></th>
<th>Skull Radiographs</th>
<th>CT</th>
<th>MRI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Availability</strong></td>
<td>Readily available</td>
<td>Moderately available</td>
<td>Least available</td>
</tr>
<tr>
<td><strong>Anaesthesia requirements</strong></td>
<td>General anaesthesia</td>
<td>General anaesthesia/ sedation</td>
<td>General anaesthesia</td>
</tr>
<tr>
<td><strong>Show cribriform plate integrity</strong></td>
<td>Poor</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td><strong>Ability to discriminate between tissue and mucus</strong></td>
<td>Poor</td>
<td>Excellent (with contrast)</td>
<td>Excellent</td>
</tr>
<tr>
<td><strong>Sensitivity to detect soft tissue changes</strong></td>
<td>Poor to moderate</td>
<td>Good</td>
<td>Excellent</td>
</tr>
<tr>
<td><strong>Sensitivity to detect bony changes</strong></td>
<td>Moderate</td>
<td>Excellent</td>
<td>Good</td>
</tr>
<tr>
<td><strong>Ability to evaluate sinuses</strong></td>
<td>Moderate</td>
<td>Excellent</td>
<td>Good to excellent</td>
</tr>
</tbody>
</table>

Modified from Cohn, 2014
Rhinoscopy

• 1\textsuperscript{st}: Nasopharyngoscopy
  – Used to evaluate the nasopharynx above the soft palate

2\textsuperscript{nd}: Rhinoscopy
- Used to evaluate the nasal passages
Endoscopy

2\textsuperscript{nd}: Rhinoscopy
- Used to evaluate the nasal passages
Biopsy

• Direct visualisation using endoscopy
• Blind biopsy technique e.g. Rigid polyethylene tube or endoscopic biopsy forceps
• DON’T PENETRATE THE CRIBRIFORM PLATE
• Submit samples for histopathology +/- cytology +/- culture (fungal)

Cohn, 2014
Culture

• Bacterial infection is nearly always secondary
• Fungal culture should ideally be carried out on samples collected by direct visualisation from fungal colonies
• Normal dogs as well as dogs with neoplasia and foreign bodies can have a positive fungal culture.
Rhinotomy / sinusotomty / frontal sinus trephination ............ Last resort

https://www.studyblue.com/notes/note/n/section-viii-respiratory-system/deck/5370832

Sharman, 2012
To summarise……..

- CBC and biochemistry
- Coagulation times
- FNA local LN / swellings
- MRI
- Endoscopy
- Biopsy
- LCAT
- Nasal cytology (crypto)
- Conjunctival and pharyngeal swabs
Things that aren’t generally helpful

• Bacterial culture – don’t culture snot
• Multiple courses of antibiotics (with the exception of idiopathic rhinitis or a systemic problem with a nasal manifestation)
• Fungal culture in the absence of other diagnostics
• CBC and biochemistry panel – in the absence of epistaxis
Case studies - Roxy

- 11 year old FS Beagle
- 1 month history of reverse sneezing which progressed to sneezing and nasal discharge (serous then purulent +/- spots of blood)
- Normal physical examination bar firm left mandibular lymph node
Case studies - Roxy
Case studies - Roxy
Case studies - Jack

• 8 year old MN Goldden Retriever

• 2 month history of right sided muco-purulent nasal discharge (+/- epistaxis)

• Clinical exam: Mild depigmentation of the nasal planum and aversion to nasal palpation
Case studies - Jack
Case studies - Douglas

- 4 year old male Bull Terrier
- One month history of intermittent right sided epistaxis
- Skull radiographs obtained before referral reported to be normal
- Systolic blood pressure 150 mmHg
- CBC - marked neutrophilia, normal platelets
- Biochemistry panel - unremarkable
- Coagulation times - normal
Case studies - Douglas
Case studies - Douglas

• Diagnosis: Nasal adenocarcinoma
• Treatment:
  - Radiation therapy in Brisbane
  - 18 fractions of 2.67 Gy
Case studies - Ziggy

• 18 month old male entire Cocker Spaniel
• 3 month history of sneezing and bilateral mucoid nasal discharge (+/- flecks of blood) progressing to include exophthalmos of the left globe
• Clinical exam: Exophthalmos and scleral inflammation (left side)
Case studies - Ziggy
Case studies - Ziggy

- Diagnosis: Sino-nasal cryptococcosis
- Treatment: Fluconazole and amphotericin B


Cryptococcosis in dogs: a retrospective study of 20 consecutive cases.

Abstract

The clinical and mycological findings in 20 consecutive cases of cryptococcosis evaluated between 1981 and 1995 were analysed retrospectively. Typically, young adult dogs (median age 2 years) of either sex were affected. Dobermann Pinschers and Great Danes were significantly over-represented in relation to other breeds and crossbred dogs, and there was no trend for cryptococcosis to be acquired at a particular time of year. Cryptococcus neoformans was cultured from 18 dogs, with 16 isolates further characterized. Of these, C. neoformans var. neoformans was isolated from 12 cases, while the remaining four strains were C. neoformans var. gattii. Dogs with C. neoformans var. gattii infections resided in rural (two cases) or suburban (two cases) environments. Ten dogs were presented as a result of infection of structures inside, adjacent to, or contiguous with the nasal cavity. Seven dogs were presented primarily for signs of central nervous system disease, of which at least three also had cryptococcal rhinosinusitis. One dog had cryptococcal pneumonia and also possible mycotic rhinitis, another had disseminated disease with lymph node and skin involvement, while the last dog was presented for vomiting referable to cryptococcal mesenteric lymphadenitis. Treatment consisting of surgery and/or antifungal drug therapy was successful in the majority of animals in which it was attempted, including two of three cases with meningo-encephalitis.
Case studies - Harley

- 11 year old MN Cavalier King Charles Spaniel
- 10 month history of nasal obstruction, nasal discharge and intermittent epistaxis (left sided)
- Clinical exam:
  - No airflow through the left nostril
  - Firm mandibular lymph nodes
  - Mild left sided epistaxis
  - Mild SC swelling dorsal to the right eye
Case studies - Harley
Case studies - Harley

• Histopathological diagnosis: Chronic granulomatous rhinitis (biopsied twice)
• True diagnosis?
  - Granulomatous rhinitis – variable association with bartonella
  - Neoplasia
  - Orbital pseudotumour (reported in cats and humans)
• Treatment – conservative
Case studies - Shiloh

- 10 year old MN Groodle
- Single episode of epistaxis
- Pain on opening of the mouth
- Clinical examination normal (bar pain on opening of the mouth)
- Coagulation times and platelet count normal
Case studies - Shiloh

FNA- underlying neoplasm, suspect mesenchymal
Case studies – Stormy

• 2 year old FS Whippet
• 4 month history of sneezing and bilateral green nasal discharge
• Partial response to antibiotics/prednisolone
• Diagnosis: Idiopathic rhinitis
• Treatment: Doxycycline and piroxicam
Case studies – Luna

• 11 year old FS Labrador
• 2 month history of sneezing blood and ulceration of the nasal planum
• Non responsive to antibiotics
• Clinical exam:
  - Subtle swelling over the bridge of the nose
  - Ulceration of the nasal planum
  - Firm mandibular lymph nodes
Case studies – Luna
Case studies – Luna
Case studies – Luna

• Diagnosis: Nasal squamous cell carcinoma
Case Study - Blossum

• 15 year old female Pomeranian cross
• Acute onset of left epistaxis
• Severe dental disease with suspect tooth root abscess(es)
Case Study - Blossum

- Referred to Dr David Clarke for dental work
Questions?

Contact details:
Melbourne Veterinary Specialist Centre on 9887 8844
kheading@melbvet.com.au