

RETCH, HEAVE, YACK, GAG 'N' HURL - WHAT DO WE REALLY MEAN?

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SOUNDS AND ACTIONS FROM THE FRONT OF THE CAT *THINGS CATS DO*

There are a somewhat limited number of things the front of a cat can do with respect to actions, sounds, and substances. Generically, the author has encompassed this topic with the phrase: *things cats do*.

For each of these *things cats do*, we, and our clients, have myriad terms to describe them. Some of these terms (e.g. gag) make sense and are medically appropriate to use to communicate what thing the cat is doing. Some of the terms are euphemistic, slang, and/or colloquial. While these terms easily roll off the tongue, are stylish, and meaningful to your family, coworkers, or regions, these terms may not be helpful when speaking to a medical colleague requiring a precise and meaningful history. The use of slang introduces confusion and can lead to incorrect diagnoses or unnecessary treatments. Many cats have undergone laparotomy for intestinal biopsy when, in fact, the presenting problem was coughing. Vomiting was simply a consequence of a cough.

For instance, the term ‘retch’ covers a lot of ground. If you Google synonyms you will find ‘gag, heave, cough and vomit.’ Medical articles use this term with the same variability in meaning. To the author, heave is something you do in sailing and something we learned about in veterinary school regarding horses with chronic obstructive respiratory disease. We may have seen ‘heaving horses’, but we do not see horses gag, vomit or sail.

As scientists (medical doctors) using precise communication is important. It saves time and prevents errors. It is incumbent that we speak the same language; that we hold ourselves accountable for saying what we mean and meaning what we say. (The author writes this, fully cognizant that spelling, grammar, and basic punctuation remain an endless challenge.)

There are many things cats can do with the front of their bodies that we will NOT be covering in this discussion as they are uncommonly misconstrued (or noticed) by clients or medical professionals. Including but not limited to:

- 🐾 Dermatologic signs
 - Alopecia
 - Face rubbing
 - Head shaking
- 🐾 Ophthalmologic signs
 - Anisocoria & dyscoria
 - Ocular axis rotation & deviation
- 🐾 Behavioral issues
 - Wool sucking,
 - Nail chewing, etc.

- 🐾 Oral Diseases
 - Dental pain
 - Tooth dislodgement
 - Caudal stomatitis
 - Dental dysfunction
 - Open mouthed lock
 - Closed mouth lock
 - Oral foreign bodies
 - Bones
 - Collars

SOUNDS, VOCALIZATION *THINGS CATS DO*

The main purpose of this discussion is to focus on clarifying terminology regarding sounds and actions relating to respiratory and gastrointestinal concerns; but first, it is worth mentioning a few communications sounds:

Normal Sounds:

- 🐾 Purr
- 🐾 Meow & mew
- 🐾 Trill/chirrup (really good cat friends)
- 🐾 Prusten/Chufffle (large cats)
- 🐾 Chatter (bird/prey noises)
- 🐾 Growl
- 🐾 Huff/woof (author's term: when angry cats warn you, usually goes along with growling)
- 🐾 Hiss & "spit"
- 🐾 Asexual yowling (includes painful and frightful screaming)
- 🐾 Sexual yowling

Hissing and blowing bubbles

Most of you have had a chance to see a cat hiss. In a veterinary practice this is a daily occurrence. In a feline practice, this can be an hourly occurrence. When cats hiss, the inquisitive observer will note that with each hiss bubbles are forming just caudal to the upper incisors.

These bubbles emanate from the paired nasopalatine ducts. The reason for this phenomenon is that when the cat hisses the levator labii and other facial muscles retract the upper lip and compresses the opening of the nares. In conjunction, the pharyngeal muscles contract, narrowing the caudal oropharynx. The cat forcibly exhales with an open glottis (otherwise they would make sound). The air forced into the nasopharynx is restricted from exiting the nose, and restricted from entering the oropharynx. Thus, then nasopalatine duct (normally engaged during flehmening, sensing of pheromones via the vomeronasal organ) allows for passage of air rostrally. The pair of nasopalatine openings lie lateral to the nasopalatine papilla, which is

approximately 2mm caudal to the two mesial incisors. This duct, which can be readily cannulated, communicates with the nasal cavity¹⁻³.

Folks speak casually about cats hissing and spitting. There may be a relationship to these bubbles and the reference to cats 'spitting', On the other hand, the spitting of fluid may just be due to the forced air passing through the saliva within the constricted pharyngeal muscles.

Inappropriate Vocalization

🐾 Continuous, nocturnal, or random

🐾 Normal Causes

- Hunger (normal, or abnormal)
- Other cats, territorial issues
- Separation anxiety⁴
- Mourning of a housemate- dog, cat, human, etc..
- Hormonally related issues
 - Non or incompletely ovariectomized female
 - Other cycling female(s) in area
- Mice or other prey (in walls/attics/closets) causing frustration
- Noxious stimuli (Smoke, Ozone, Carbon Monoxide, Chemicals)
- Weather and Barometric Changes
- Excessively vocal breed, individual variations

🐾 Abnormal Causes

- Sensory decline (especially hearing loss)
- Painful conditions (Periodontal disease-retained roots, GI, lower or upper urinary tract pain, ureters, musculoskeletal (spinal), otitis media)
- Cognitive dysfunction
- Hypertension
- Hyperthyroidism
- Primary central nervous system disease (CNS) disease (especially meningioma)
- Sex hormone producing adrenal gland tumors
- Hormone replacement cream (on owner's skin) ingested by cats
- Toxin accumulation
- Electrolyte imbalances associated with organ disease/dysfunction

Inappropriate vocalization: therapeutic considerations:

Anxiety

Feliway

Bupirone⁵

Fluoxetine

Alprazolam

Palliative

Amitriptyline 0.5 to 4 mg/kg q12-24h PO, tapered withdrawal

For loss of Cognition:

Selegiline (l-deprenyl) 0.25 to 1.0 mg/kg q24h PO⁶

Nicergoline 0.25 to 0.5 mg/kg q24h PO⁶

Propentofylline 12.5mg/cat q24h PO⁶

S-adenosylmethionine (SAMe) 100mg/cat q24h PO⁷

For management of ill defined pain:

Buprenex trial: 0.01 to 0.03mg/kg buccally q6-12h prn.

Gabapentin: 50mg/cat q24h x 14d, then increase prn.

Cannabinoids⁸ (> 100) (e.g. Canna Companion TM)

ABNORMAL UPPER GASTROINTESTINAL THINGS CATS DO

- Vomiting
- Regurgitation
- Burping (belch, eructate) (some use belch for vomit)
- Aerophagia
- Exaggerated swallowing & lip licking
- Bruxism
- Dysphagia and odynophagia
- Ptyalism

Vomiting and regurgitation

Vomiting is a huge topic whose adequate coverage is beyond the scope of this lecture. There are many text books and journal articles to help guide you in this endeavor⁹⁻¹².

The most important distinction between vomiting and regurgitation is, quite simply: did the projected material come from the stomach or the esophagus? If the food makes it to the stomach, then the cat is vomiting. If the food is unable to make it to the stomach due to esophageal disease or a vascular ring anomaly, then the cat is regurgitating. The incidence of regurgitation in cats is considerably less than vomiting¹³.

Classically, regurgitation is described as a 'passive' activity. While a cat may regurgitate quicker than it takes another to vomit, in this author's opinion it is not a passive activity. Authors have attempted to distinguish the two actions based on perceived nausea, salivation, volume, and timeliness to eating. One retrospective study found we often confuse the two¹³. Until you as the clinician working up the case are convinced, it would be best to keep both differentials active.

Vomiting can be acute or chronic. Etiopathologies for chronic vomiting would include any kind of infiltrative or inflammatory bowel disease, neoplasia, strictures, gastroduodenal polyps, ulcers, GERD, hiatal hernias, GE hernia, biliary tract disease, pancreatic disease, gastric mucosal hypertrophy, chronic FB, trichobezoars, GIT diverticuli, endoparasites, SIBO, metabolic disease,

etc. The list is long enough, so start with a minimum database of a CBC, serum biochemical profile, urine analysis, and plain radiographs. This will rule out many differentials so one can start with a shorter list of potential causes.

Avoiding multimodal empirical treatments is a goal until the list of etiopathologies has been dramatically reduced, or better, a diagnosis has been established. In short, work up the problem and better define the cause. Chronic nausea is a terrible thing for our patients to endure, even if we can "control" much of the vomiting with polypharmacy.

Etiopathologies of regurgitation include vascular ring anomalies, congenital strictures, acquired strictures (due to doxycycline and clindamycin, foreign bodies, and esophageal trichobezoars), and functional esophageal disease.

Burping, eructation

An uncommonly reported oddity. The author is not aware of any predictable pathological significance.

Aerophagia

Swallowing of air may result in varying degrees of gaseous distention of the esophagus, stomach, small and large bowel. Gastroesophageal disease, respiratory disease, and behavioral issues can lead to aerophagia in man; in cats it is often associated with respiratory disease. Upper respiratory disease seems to cause the most pronounced aerophagia in cats¹⁴⁻¹⁶. However, both upper and lower respiratory disease can lead to aerophagia^{17,18}. Additionally, oropharyngeal and esophageal disease can lead to aerophagia¹⁹.

Differentials for aerophagia would include gastrointestinal ileus.

Radiographic megaesophagus is diagnosed by visualizing a distended esophagus filled with food, fluid, or gas. Radiographic megaesophagus often occurs in cats associated with respiratory distress, oropharyngeal disorders, and generalized gastrointestinal ileus and the distended esophagus may be entirely incidental and transiently related to other disorders. Radiographic megaesophagus may be transient, secondary, and confusing.

Physiologic megaesophagus is the diagnosis of an aperistaltic esophagus based on imaging, clinical signs, clinical progression, and associated conditions (e.g. neuromuscular disease)²⁰. Physiologic megaesophagus has a neuromuscular cause (idiopathic, dysautonomia, myasthenia gravis, etc.) and typically needs to be managed long term. In almost all instances, if the cause of respiratory difficulty is resolved, the megaesophagus will resolve.

Exaggerated swallowing

In cats, exaggerated swallowing (frequent, excessive, with or w/out lip licking/lip smacking) is a vague clinical sign that has not been reviewed in the literature.

Etiopathologies include:

- Respiratory disease:

- Sinus and postnasal drainage,
- Exudative and inflammatory lower respiratory disease,
- Heartworm disease
- Pleural effusion (carcinoma, others)
- Oropharyngeal disorders
- Neurologic disease
 - Complex partial cluster seizures with orofacial involvement (hippocampal necrosis)
- Ptyalism
- Esophageal disease (reflux, FB, stricture)
- Nausea
- Gastrointestinal pain (FB, mass, ulcer, infiltrative)
- and other causes

Awake Bruxism

Bruxism is the chewing movement that causes grinding of teeth. Generally, in cats, this results in an audible crunching or squeaking sound. Most issues with bruxism in man are associated with sleeping.

Etiopathologies include:

- Dental pain: tooth resorption, malocclusion, fractured teeth, incisor disease, base narrow mandibular canines
- Dysfunction: TMJ disorder, fracture, malalignment
- Esophageal pain, esophagitis
- Abdominal discomfort: nausea, GI pain: neoplasia, FB, ulcer, polyp, diverticuli, pancreatitis, liver disease (neoplasia). Note, 17% of ferrets with systemic coronavirus infection demonstrated bruxism²¹
- Dehydration (Personal communication, Ken Thorley)
- Behavior: stress/anxiety
- CNS disorders: brain lesions (hypothalamus), partial focal facial seizure²²

Dysphagia and odynophagia

Difficulty swallowing food (dysphagia) and pain on swallowing food (odynophagia) is uncommon in cats. Rarely are these clinical signs the primary presenting problem. Most of these disorders include CNS and disorders of the peripheral nerves. Etiopathologies would include oropharyngeal disease and esophageal disease:

- Muscles and mechanics of mastication (fractures, myopathy, neuropathy)
- Motor diseases of the tongue
- Disorder of the pharyngeal muscles
- Cricopharyngeal disorders
- Esophageal disease (stricture, inflammation)

Ptyalism

Ptyalism has also been called ptialism, drooling, sialorrhea, hypersialia, hypersalivation, and salivary incontinence. Drooling may be caused by an oral motor dysfunction, inadequate

swallowing capacity, a deficit of the oral sphincter and, less frequently, sialorrhea. Most causes do not result in an increase production of saliva, but rather a disturbance preventing swallowing.

- 🐾 Oral mucosal irritants (ants, bees, teeth, uremia, others)
- 🐾 Dental Disease
- 🐾 CNS disease
- 🐾 Neuromuscular disease
 - Peripheral nerve disease.... inability to swallow (Dysphagia).
 - Myopathy...inability to swallow
- 🐾 Metabolic disease
 - Renal failure (gastritis/uremic ulcers)
 - Liver Disease, dysfunction, PSS etc. (Secondary to CNS)
 - Hypoglycemia (secondary to CNS)
- 🐾 GI disease
 - Nausea
 - Gastric outflow, gastric pain
 - Esophageal Disease (esophagitis, obstruction, FB, parasites, others)
 - Tongue (String?? Fiberglass insulation, burrs)
- 🐾 Psychogenic causes
 - Affectionate drooling
 - Fear
 - Travel anxiety
 - Psychosomatic anticipation of pilling
- 🐾 Drugs reactions & side effects
- 🐾 Toxin (GI ulceration, pain, nausea; CNS effects, Metabolic effects, others).
 - Pyrethrins, Organophosphates
- 🐾 Neoplasia (= oral disease, GI disease, other).
- 🐾 Respiratory Disease...
 - URI/reluctance to swallow since can't breathe; oral ulcers?
- 🐾 Infectious Diseases
 - Parvovirus²³

CONFUSING & IMPRECISE TERMS ***THINGS PEOPLE SAY***

Terms which have imprecise meanings in feline medicine:

- "Cough up a hairball"
- Retch (cough, vomit, or gag)
- Ralph, barf, spew, puke, chuck, upchuck, chunder, hurl (vomit and javelins), Buick, and so many more
- Hack (choke, gag, retch, yack, or gack)
- Hork (vomit, belch or expectorate)
- Snort (forced nasal expiration in a horse, nasal inspiratory clearing suck in man).
- Snorkel (I have no idea)
- Choke (gag, and/or asphyxiate)

- Throat clearing: a learned behavior in man accomplished by exhaling against a closed glottis.
- Spit (cats can drool, and drop things [pills] from their mouths, but cats are unable to spit)
- Wheeze (insert any respiratory word you can think of)

ABNORMAL ORAL-NASAL-PHARYNGEAL-LARYNGEAL THINGS CATS DO

🐾 Actions

- Exaggerated swallowing
- Gag/pharyngeal reflex
- Choke
- Flehmen
- Sneeze
- Reverse Sneeze- aspiration reflex

🐾 Sounds

- Change in voice (mucus, mass, or laryngitis)
- Congested
- Stertor
- Stridor

🐾 Substances

- Mucus
- Exudate
- Blood
- Tissue: mass or inflammation

Exaggerated swallowing

(See above)

Gagging, or the pharyngeal reflex

A complex reflex intended to clear the pharynx of foreign bodies and noxious substances²⁴. In man psychogenic causes (dentistry) are more important than somatogenic causes²⁵. In this species, five trigger zones for gagging have been identified: palatoglossal and palatopharyngeal folds, base of tongue, palate, uvula, and posterior pharyngeal wall. Additionally, sights, sounds, and smells can trigger man to gag²⁶. In people, the absence of the gag reflex does not appear to have a functional consequence²⁷. While gagging can occur independently or other complex reflexes, in cats it is often associated with coughing, regurgitating, and vomiting. Conversely, gagging can trigger vomiting.

This reflex results in a coordinated contraction of the pharyngeal muscles, elevation of the soft palate, closing of the larynx, as well as a coordinate recruitment of the muscles of the ribs and diaphragm.

Gagging can be associated with disorders of:

- Retropharyngeal space

- Pharyngeal
- Palatal (uvula in man)
- Tonsil
- Tongue
- Larynx (paralysis, mass, mucus)
- Salivary glands
- Esophagus

Etiopathologies include:

- Inflammation- bacterial, fungal, parasitic, eosinophilic granuloma complex
- Neoplasia
- Trauma- impaling more common in canines
- Foreign body- grass, post nasal mucus
- Toxic:
 - o Contact: chemical, burns, trauma, & smoke inhalation
 - o Systemic: heavy metals, medications
 - o Insects: myiasis, Oak Processionary Moths (UK)²⁸
- Psychological (man)²⁴

Choke

Choking is a sudden partial or complete obstruction to the flow of air caused by internal objects (toys, food), or external pressures (accidental or purposeful). Cats may, in fact, choke on a hairball, or vomitus, but this is rarely reported. More commonly it is reported that a cat has been choked. Clients may present a cat for ‘choking’ who is actually gagging, coughing, or reverse sneezing. For those actions that are recurrent or paroxysmal the veterinary professional is generally able to sort this out.

Flehmen

Felines and ungulates may display flehmen during social and sexual encounters. The flehmen response involves raising or curling the upper lip in order to detect pheromones via the vomeronasal organ, or Jacobson’s organ³. This process allows for males to sense whether a female is in heat. Flehmening exposing the vomeronasal organ to scents and fluids and is important for feline communication. This behavior is associated with anatomical specialization. Animals that flehmen have incisive papilla and nasopalatine ducts leading to the vomeronasal organ. Horses are the exception, they exhibit Flehmen response but do not have an incisive duct between the nasal and the oral cavity.

Sneeze

Sneezing is a coordinated, complex, protective respiratory reflex. Commonly in man, the sneeze is associated with rhinitis of allergic and viral etiology. Sneezing can also be precipitated by bright lights, and physical and psychological triggers. Bright lights, such as the sun, causing a sneeze is referred to as photic sneezing²⁹.

Sneezing in cats is a common clinical presentation³⁰. A sneeze is a difficult reflex to mimic for a client; however, clients rarely have difficulty recognizing or communicating that their cat is

sneezing. Sneezing in can be associated many disorders including infections, neoplasia, foreign bodies, mass lesions, and dental disease^{30,31}.

Reverse Sneeze, or aspiration reflex

This is a strong, sudden, and paroxysmal inspiratory gasp-like reflex. “Reverse Sneezing” occurs in cats when the dorsal pharyngeal or nasal mucosa (or the glossopharyngeal nerve) is stimulated mechanically or electrically^{30,32,33}. Inflammation in the region of the nasopalatine duct has also been associated by the author with reverse sneezing. Stimulating this region, even under anesthesia may cause reflexive movement¹. Similarly, retraction of the soft palate in the anesthetized cat will invariably lead to reflexive reverse sneezing.

Etiopathologies include:

- Acute/chronic inflammation (viral/bacterial)
 - o Eustachian tube drainage
- Tenacious post nasal mucus
- Grass/plant foreign bodies
- Nasal mites, *Pneumonyssus caninum* (WA State, Midwest. Not documented in cats³⁴)
- Nasal cavity myiasis (Cuterebra or Diptera)
- Nasopharyngeal neoplasia/polyp
- Secondary to dental disease (usually forward sneezing)
- Nasopalatine duct irritation (usually forward sneezing)
- Traction of the soft palate is one mechanism of causing reverses sneezing.

Upper airway sounds

If you search, you can find a source to legitimize and confound the meaning of many descriptive respiratory words. Somewhere, someone has referred to a burp as upper airway flatulence. Eventually, terms start to lose their incisiveness.

Change in voice

A change in voice signifies a change in structure of function of the larynx. Etiopathologies may include inflammation, benign or neoplastic masses lesions, and coatings of mucus, blood, exudates, or gastric contents.

Congestion sounds

Congestion is created by air flow through a fluid-air admixture.

Stertor

Stertor is noise created by obstructed and turbulent air flow through the upper airways, above the level of the larynx. This is generally, and primarily an inspiratory noise. Some cats would ‘rather die’ than mouth breathe. One ‘test’ to differentiate nasopharyngeal inspiratory dyspnea from something lower down is to coerce the cat to mouth breathe. During your examination (some like the cat in their lap) extend the head and neck and open the mouth just a bit, if the cat extends the tongue just a bit, then the seal between the roof of the mouth and the surface of the tongue is broken and the cat can breathe orolaryngeally.

Stridor

Stridor is generally inspiratory noise (but it can be bidirectional) that is created by obstructed and turbulent airflow through the larynx or extrathoracic trachea.

Substances

Substances that can create inspiratory challenges and cytologic opportunities include mucus, exudates, blood, proliferative tissues, foreign bodies, and ingested (and vomiting/regurgitated) food and fluids.

NASOPHARYNGOSCOPY & RELATED TECHNIQUES

In feline practice we are commonly asked to examine cats with upper respiratory disease³⁵⁻³⁷. Signs include inspiratory dyspnea, stertor, gagging, dysphagia, exaggerated swallowing, etc. As such, we need tools to investigate the upper airways. Laryngoscopy, pharyngostomy, rhinoscopy and otoscopy are simple techniques feline practitioners should be skilled at. While retroflex endoscopic exam is a good tool, the author has never had the benefit of this tool. Standard and intraoral radiography are both necessary.

Additional equipment needed is minimal. A spay hook, cotton-tipped applicators, micro-brushes, syringes, and standard red rubber catheters are the primary tools used in most cases. The author does not use a dental mirror. Use a spatulated (flat-bladed) spay-hook to retract the soft palate (rather than a Snook-hook). Advanced imaging (CT, MRI) are uncommonly required. There is a tendency for radiology to be relied on, when in fact direct examination is generally more rewarding.

You need 4 coordinated hands, so having a skilled technician to work with is important. Much like a dance, the process involves timing and anticipation, so be sure you have an assistant to dance with who can follow your lead. An anesthetized patient is a must (we don't also want to dance with the patient). The external exam, and the laryngeal examination is done prior to endotracheal intubation, but the remainder of the examination will be performed following intubation.

Prior to anesthesia the patient should be examined and specific attention paid to symmetry. The ears, nose, and eyes should be examined closely. Is the ear carriage symmetrical? Is there obvious pathology within the ear canals? Are you able to see the malleus, tympanic membrane, and the middle ear chamber beyond? Is the nose symmetrical? Are the ocular fissures, pupils size, and ocular axes symmetrical? A chilled microscope slide may be used to subjectively assess the airflow through respective nares. Once the patient is anesthetized, it is important to have a systematic plan in place.

A simple diagnostic otoscope is perfectly suited for examination of the tympanic membrane, visible middle ear, rostral nasal passages, and eustachian tube orifices. Video otoscopy is rewarding and allows for documentation of your findings. Don't forget to simply look up the nose with an otoscope as well. You may find nasal mites or verminous nasal infections (both more common in dogs; rarely reported in cats), nasal foreign bodies, fungal masses, or rafts of saprophytic fungi. You should almost always have examined the deep ear canal and anatomy of the tympanic membrane prior to induction, but once the patient is anesthetized a more focused

examination is possible. Be sure you can see the manubrium of the malleus and examine the middle ear via the transparent tympanic membrane.

The process should become practiced and routine. Once the patient is induced, the patient is typically positioned sternally. Use an adjustable chair, so your head is in a comfortable position, and you are relaxed. Don't rush the procedure. An assistant holds the head extended rostrally (sort of howling at the moon). To increase visibility, the lips are rolled away from the oral cavity, rather than held over the teeth. If the patient has inspiratory dyspnea that resolves when you open the mouth (breathing easily via the oropharynx and trachea) then you have effectively localized a nasopharyngeal obstruction.

Pay attention to the nasopalatine papilla and associated ducts as pathology can be evident here. Occasionally, these ducts are directly flushed when the nasal flush is performed. These (and the vomeronasal apparatus) are very sensitive to inflammation and occasionally a FB or periodontal disease of the incisors causing persistent sneezing (or reverse sneezing).

A lighted laryngoscope is essential. The author prefers a small diameter battery powered handle paired with a Michael's blade (Drager, no longer available) or a modified Miller's blade. The Miller's blade can be modified by grinding off the vertical flange, thereby creating a larger working area (Fig. No. 1). Position the laryngoscope to retract the base of the tongue, and illuminate the region of interest. Hand off the laryngoscope to your assistant to maintain position. As they cannot see, you may need to repeatedly adjust your assistant's aim to ensure proper lighting. You must work as a 4 handed team.

Figure No. 1



The author prefers to hold the spay-hook to judge how much traction is applied. While retracting the soft palate rostrally, simultaneously apply some dorsal pressure to 'pin' the soft palate in place and out of the way for the laryngeal examination. It should be anticipated that retraction of

the soft palate in the anesthetized cat will trigger reflexive reverse sneezing. Increasing the depth of anesthesia will usually resolve this.

Don't forget that you can examine much of the cranial esophagus with your laryngoscope. Inserting the blade over the larynx, down the esophagus and twisting it just right will give you clear view of the passively opened esophageal lumen. A longer blade will give you a deeper view. An inexpensive indestructible rigid colonoscope can reach the gastric lumen in many cats.

Prior to intubation, examine the posterior pharynx and larynx for symmetry as obvious lesions such as nasopharyngeal polyps may be evident (even without soft palate traction)³⁸. Be sure to assess the laryngeal movement. If you think abduction is poor, you may need to employ Propofol and Doxapram: <http://beta.vin.com/Members/Link.plx?ID=5613298>. The patient is intubated with an appropriately large (4.5mm cuffed, low pressure, high volume) endotracheal tube. Following intubation, intraoral dental radiographic evaluation of the nasal cavity and maxillary teeth to better r/o dental disease as a cause of the rhinitis. Standard radiography of the head, cervical airways, frontal sinuses and bulla is usually warranted.

Once the laryngeal exam is complete, then inspect the nasopharynx dorsal to the soft palate. The caudal margin of the soft palate is retracted cranially and slightly ventrally as the nose is pointed up, the neck extended, and the mandible is held down with the laryngoscope. This allows for a very limited examination of the posterior nasopharynx. Substantial traction is judiciously used as the soft palate is fragile enough to tear. Smaller polyps, neoplastic tissue, tenacious nasopharyngeal mucus, and nasopharyngeal stenosis may be evident during this examination.

Next, perform intraoral palpation of both bullae for symmetry. Use the palmar aspect of your little finger (5th digit) to perform intraoral palpation of the bulla through the caudal pharyngeal tissues. Follow the roof of the mouth from the hard, to the soft palate, along the pterygoid fossa, past the sharp pterygoid processes, where you can then feel the bulla laterally. You are palpating for symmetry of size, and texture. This is a very easy and informative technique; however, you do need to watch anesthesia depth as patients can reflexively bite and you may end up with two upper canine teeth in the meaty part of your palm.

If no obvious pathology is found on inspection, then a nasal flush (nasal retrohydropulsion) should be considered^{39,40}. This is generally a diagnostic procedure, but occasionally it can be a therapeutic procedure. The goal is to dislodge foreign bodies⁴¹ or neoplastic tissue, and to collect fluid and cells for cytology. A moist 3x3 gauze (or two), is usually used to dam the posterior pharynx, positioned just posterior to the larynx in the surrounding esophagus. The soft palate is kept retracted to better visualize what may be flushed from the nasal cavity into the posterior pharynx.

Alternately flush one nostril, and then suction the posterior pharynx. Don't leave a pool of fluid overlying the larynx as you may invite aspiration. Flush with 12ml "blasts" of warmed NaCl (blast might be too strong of a word). Suction with a 20ml syringe attached to a 10F, open end, red rubber catheter shortened to 7 inches. Flush one side at a time, and collect your samples separately, as aseptically as possible, in a plastic cup for cytology.

Another rewarding technique is called ‘milking the pterygoid fossa’. Using your gloved digit forcibly ‘milk’ from the hard palate caudally toward the soft palate, through the pterygoid fossa, ending rostral to the pterygoid processes and see if this dislodges any nasal tissues into the posterior nasopharynx.

If no tissue is collected, and a neoplastic infiltrate is still suspected, consider the technique of aspiration via an 8 or 10F red rubber tube passed in/out of the ventral nasal meatus while applying moderate continuous suction. Be sure the catheter is passing freely into the oropharynx. Never force the catheter. Occasionally, several grams of friable neoplastic tissue can be suctioned and collected for histopathology.

Cytological exam of nasal and posterior nasal swabs, as well as cellular material collected during nasal flush is very rewarding and often diagnostic. Perform in-house cytology on tissues or fluids prior to sending them in to the outside lab. Rarely is this material cultured, unless specific fungal infections are suspected. Evaluating for FHV by PCR can help keep that etiology as a likely differential.

If an etiology is not disclosed, then repeating the procedure again in a few weeks or months is not unreasonable. The author has worked up patients with anesthesia, inspection, and flushing multiple times before finding the ultimate answer; so, if empirical treatment does not resolve the clinical signs, feel comfortable recommending a 2nd (or 3rd) anesthetic examination.

Nasopharyngeal Examination Checklist
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2016

- Prior to anesthesia, open the mouth and coerce the cat to mouth breathe (bypassing the nasal passages). If noise, congestion, and inspiratory difficulty resolve, then you have localized the site of dysfunction to the nasopharynx.
- Prior to intubation: assessment of laryngeal anatomy & abduction (movement), prior to intubation
 - o Techniques using Propofol and Doxapram may help
- Assessment of respiratory effort when mouth breathing under anesthesia (should be normal)
- Under anesthesia, closely examine the middle ear through the tympanic membranes (TMs)
 - o Can you see rostral to the malleus, TM transparency, movement, mass or fluid in the bulla?
- Intraoral palpation of the tympanic bullae for symmetry and smoothness Nasal otoscopic exam (FB, fungal ball, rafts of hyphae)
- Oropharyngeal exam for dental disease, inflammation, mass lesions
- Maxillary dental imaging
- Standard skull films imaging the frontal sinus, nose, & tympanic bulla
- Intraoral nasal imaging (size 4 dental film)
- Examination of the nasopalatine ducts (which communicate the oral cavity with the vomeronasal organ and nasal cavity) for symmetry, sensitivity, foreign bodies, exudates, and parasites
 - o A 3-0 suture can be based via the NP duct into the caudal pharynx-esophagus to assess patency if questioned. The NP duct can be flushed, but it is hard to assess the effluent.
- Palpation of the hard and soft palate for swelling, color, firmness & texture
- Milking the pterygoid fossa for tissue or exudates.
- Retraction of the soft palate and inspection of the posterior nasopharynx for stricture, polyp, mucous, or mass.
 - o If appropriate, otoscopic examination of the NP eustachian tube orifices.
- Diagnostic nasopharyngeal wash
- Gentle passage of an 8 to 10F red rubber catheter in/out while applying suction can also yield diagnostic tissue for histopathology.
- In-house cytological examination of all exudates prior to sending out

ABNORMAL (LOWER) RESPIRATORY SIGNS *THINGS CATS DO*

- 🐾 Actions
 - Cough
 - Hiccough
 - Change respiratory rate, depth, effort, or pattern.
- 🐾 Sounds
 - Wheeze
 - Crackle
- 🐾 Substances
 - Expectorated rafts of mucous
 - Hemoptysis
 - Aspirated materials

COUGHING, VOMITING, AND VASELINE®

Coughing is a complex physiologic event intended to clear large airways of mucus, irritants, or foreign particles from the airways^{42,43}. We can easily recognize a cough in man; however, when our cats cough, the act is often misconstrued with vomiting or ‘hairballs’.

As with man, cats can have a wide variety of different coughing sounds. Their cough can be loud or quiet, wheezy or honking, congested (productive) or dry. They may cough once, a few times or have coughing jags (paroxysmal coughing). Further, a cat may have a different cough associated with different illnesses, so coughing may manifest differently at different stages of the cat’s life.

A substantial challenge in revealing a history of cough in a cat is that clients (as well as veterinarians) too often attribute the act to ‘hairballs’. A cat can cough up mucus, blood, or aspirated material; but a cat cannot cough up a gastrointestinal trichobezoar. Furthermore, contrary to widely held unfounded opinions, a trichobezoar does not cause coughing in cats.

Coughing in cats is most often associated with respiratory diseases, including chronic tracheobronchitis. While cats can cough from upper airway causes, most coughing is due to lower airway disease. Not all (lower airway) coughing in cats is due to allergic airway disease (‘asthma’) as there are many different causes of chronic tracheobronchitis.

Illuminating this history of a cough with a client can be difficult. One must first raise the question, then explain the distinction, then mimic or demonstrate with video the difference between vomiting and coughing. If we don't have a high index of suspicion, if we don't have the time to get a good history, and if we don't have the tools to open the client's mind and help them understand the differences, then we will overlook the history of a chronic cough.

Using mimicry or video can be very helpful. Be aware that most videos on YouTube of cats vomiting are actually of cats who are coughing. Confusion also arises with video as clients, watching videos of 3 coughing cats, will argue that their cat is doing what one cat is doing, but not the other two. Cats have a variety of coughing sounds and postures.

Tracheobronchitis in cats is common and can lead to a persistent cough. Coughing in cats (and man) may be followed by a gag. A hard bout of coughing, paroxysmal coughing, regularly leads to terminal gagging, which can itself lead to vomiting. In man this is referred to as post-tussive gagging or vomiting. This combination in the cat may be referred to as the cough-gag-vomit triad.

When a cat vomits (following coughing or not) the vomitus may contain mucus, food, loose hair, or a well formed trichobezoar. This is where the confusion in understanding arises. Many coughing cats have a history of chronic (post-tussive) vomiting as well. Most cats groom themselves and they will usually have varying amounts of hair in their stomach. This hair will be evident in their vomitus (or their stool)^{44,45}.

It is reasonable that a lodged esophageal trichobezoar could compress pulmonary structures and/or prevent swallowing of oral secretions and thereby elicit a cough. This uncommon cause of a cough has not been reported in cats, but it has been reported in man and other species⁴⁶. Gastrointestinal complications associated with trichobezoars in cats are commonly seen in private practice, but uncommonly reported in the literature⁴⁷. Chronic cough in man attributed to gastrointestinal disease such as gastroesophageal reflux disease (GER) and lower esophageal damage is common and reported to cause up to 20% of cases⁴⁸⁻⁵⁰. In this regard, coughing has been reported in man in cases of surgical gastric trichobezoars⁵¹⁻⁵³. However, attempts to create a feline model of GER failed to stimulate a cough in this species⁵⁴. Thus, it is unlikely that an uncomplicated gastric trichobezoar would cause a cough in a cat, and there are no reports of this in the literature to support this contention. Attributing a cough in cats due to a trichobezoar is a medical misnomer, yet this notion will likely never be expunged from lay dogma as it is a perpetuated idiom.

While white petrolatum, Vaseline®, is often recommended and administered to cats for treating constipation and or trichobezoars, giving Laxatone ® (or any other flavored white petrolatum product) orally has not been shown to aid in the passage of hair from the stomach or change the consistency, volume, or slipperiness of either the hair in the stomach or stool in the colon. Theoretically, if you want to lubricate the rectum you could administer white petrolatum rectally, but giving it orally results in the petrolatum being incorporated into the interior of the fecal balls. More than 80% of normal stools in cats are reported to contain hair, and 25% contain 'hairballs'⁴⁴. The recommendation of administering product containing white petrolatum as a means of dealing with constipation or 'hairball' is unsupported and should not be perpetuated.

Searching PubMed (Aug. 2012) reveals no published studies in man, or animals, that demonstrate any the effectiveness white petrolatum containing products. There is not a significant risk of administering many of these hairball products (and some cats love this stuff).

There are no published studies supporting the use of mineral oil in the treatment of hairballs. Mineral oil, of course, should be avoided because it can be easily and silently aspirated cause a lipid pneumonia. Aspiration of mineral oil does not elicit a cough reflex (like aqueous based products do) leading to lipid-like pneumonia⁵⁵.

There are over 50 published reports related to the efficacy of liquid paraffin for treating constipation in man, but none in cats. There is one report of liquid paraffin being superior to lactulose in children⁵⁶. The use of Vaseline® in cats may be intended to result in the same effect, but they are very different products. There is also a concern for silent aspiration of paraffin and lipid pneumonia in man⁵⁷. This has not been reported in cats, likely due to its infrequent use. If constipation is a concern in cats (difficulty passing hard stools, straining) and a stool softener was needed then consider feeding canned foods, adding water to the existing diet, water-soluble fibers, PEG3550 (Miralax), and lactulose⁵⁸⁻⁶⁰.

There is a 2004 report of a psyllium husk and slippery elm nutritional supplement decreasing the clinical signs of 'hairball' in cats⁶¹. Another 2011 study that feeding a diet with added cellulose decreased clinical signs attributed to 'hairballs'⁶². Both studies were sponsored by pet food companies and both studies unfortunately used owner observed endpoints of "vomiting, retching, and coughing." In the first study, data manipulation combining the three, incongruent, clinical signs was the only means by which the author showed a significant reduction in these dubious endpoints. In the second study, only the vomiting was significantly reduced. Showing a reduction in "vomiting, retching, or coughing" is not the same as showing that trichobezoars were related to the clinical signs, or that the supplement addressed a trichobezoar. Published studies on the myriad available diets is lacking. Blinded studies, with well-defined endpoints are needed.

Perhaps the best way to eliminate ingested hair as a perpetuating cause of any clinical sign would be to have the cat shaved (e.g. a 'lion-cut') as this will markedly decrease hair ingestion for several months⁴⁵.

Hiccough in Cats

A hiccough (hiccup, or singultus) is characterized by rhythmic, sudden, reflexive inspiratory attempts against a closed glottis⁶³. Hiccoughing is well recognized in man, yet still poorly understood^{64,65}. Hiccoughs can occur in health, as well as with CNS disease⁶⁶⁻⁶⁸. Hiccups have been reported in association with anesthesia in a dog⁶³. There are several reports of 'hiccup reflex' in cats demonstrating the reflex is mediated by the pharyngeal branch of the glossopharyngeal nerve⁶⁹⁻⁷¹. In this author's opinion those article descriptions are more consistent with investigations into the reverse sneeze, or aspiration reflex in the cat^{33,72,73}. More work needs to be done to correctly identify hiccoughs in the cats.

Video of a young cat: <https://www.youtube.com/watch?v=uzyB-KRcGQ0>

Hiccoughs need to be differentiated from partial focal seizures²², audiogenic reflex seizures⁷⁴, synchronous diaphragmatic flutter^{75,76}, and undefined neurologic twitching of the head/neck.

Breathing Patterns

Changes in respiratory rate, depth, effort, or pattern are clinically very important, but beyond the scope of this lecture. However, a limited discussion of terms is appropriate.

Dyspnea

Dyspnea is a symptom. It is a sensation of an unpleasant or uncomfortable need to breath⁷⁷. Symptoms need to be reported by the sentient patient who can communicate. Labored breathing is a clinical sign that can be observed. That being said, it is common practice to infer that our feline patients are dyspneic.

The bigger problem with this term, dyspnea, is that the word is imprecise without an adjective. We need to ascertain and communicate if the dyspnea is inspiratory or expiratory. Saying the patient is dyspneic leaves out valuable localizing information. In this case, the adjective is more important than noun.

Wheeze

Wheeze is expiratory or end expiratory high pitched noise caused by small airways narrowing and causing turbulent airflow around obstructions. Rhonchi are lower pitched expiratory sounds caused by larger bronchi narrowing around fluid. Rhonchi are rarely reported in our small cats.

The term ‘wheeze’ is more abused by veterinarians and clients alike. Wheezing imply lower airways disease. Yet the most common client reported audible noises are inspiratory; and veterinarians buy into the lay terminology. Adding the adjective ‘inspiratory’ to the term wheeze makes this a tad less offensive. It is best to use ‘wheeze’ to refer to expiratory noise, and in cats this noise will generally be heard with a stethoscope and not overtly audible.

Crackle

Crackles are caused by air moving through fluid that has collected in the airways. Typical of the sound of mild percolating into fresh breakfast cereal.

Substances

The lower airways substances would include expectorated rafts of mucous, exudates, and aspirated food, fluids and foreign bodies. Sputum, should be coughed onto the floor is cytological gold and should never be wiped up with a paper towel and discarded.

ABNORMAL NEUROLOGICAL THINGS CATS DO

- Feline Audiogenic reflex seizures (FARS)⁷⁴
- Feline oral pain syndrome (FOPS)⁷⁸
- Complex partial facial seizures²²
- Uncategorized facial twitches
- Weakness and paralysis
- Yawn

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