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Management Options for Chronic Gastrointestinal Conditions in Geriatric Cats and Dogs

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Chronic gastrointestinal conditions can be frustrating for clients and clinicians alike, and so adding the element of advanced patient age into the mix can bring about some unique challenges.

One trap to avoid, however, is making assumptions or taking shortcuts based on patient age. That being said, you might consider an “accelerated” workup or therapeutic trial in the interest of time. We assess patient weights at every single visit regardless of the reason for a visit. If you use an electronic record-keeping system, in particular, this can easily observe any

significant trends in weight loss or weight gain. Train your assistants in thorough history taking or consider “flipping” your visit style and take your histories while your assistants scribe for you. Have clients get in the habit of snapping photos of labels of food they are feeding at home or the containers they are using to measure out quantities of food. Sometimes they have deliberately (or unknowingly!) changed flavors resulting in significant changes in calories offered.

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OPHTHALMOLOGY

Top Ophthalmology Tips for the Practicing Veterinarian



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1 It's all in the holder

The key to performing a decent eye exam is to have the animal restrained appropriately, which may take one or two (and sometimes even three) assistants. The pet's eyes should be at the examiner's eye level, which means in most cases, the pet should be on an exam table, with the examiner seated at a good height to make eye-to-eye contact without sacrificing ergonomics. An adjusting stool or table will

therefore be needed. The pet's head should be restrained with one hand under the chin and one at the back of the skull. This means a second holder may be needed to control the body if the patient does not stay still. A third assistant may be needed to open the eyelids or control the front legs. Pre-visit sedation or anti-anxiety medications to facilitate a less-stressed, less fearful visit can be very helpful to perform a complete eye exam.^{1,2}

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If you are like me, you breathe a huge sigh of relief once you see stable body weight in your patient at an office visit. Weight loss (or weight gain) will trigger muscle memory patterns as you complete your physical exam. Are my patients' senses intact? How significant is periodontal disease? Nasal congestion? Neck pain? Overt abdominal abnormalities? Muscle condition? Arthritis symptoms? Weight loss in itself is a very significant clinical sign regardless of whether or not accompanied by other more classic GI signs such as vomiting, diarrhea, or decreased/absent appetite. Unless there is an obvious cause revealed during history-taking, try to obtain a minimum database at this visit: CBC, chemistry profile, UA, fecal float, T4 (feline). For geriatric cats, in particular, B12/Folate is part of my minimum database. Otherwise, schedule a weight check for two to four weeks and perform lab work at that visit. Encourage cat owners to purchase a baby scale for use at home.

Many of us are trained to keep routines intact for older patients, in particular our older cats. However, we might need to encourage clients to rethink the setup at home as cats age. Older cats may have difficulty getting to food without discomfort; this is often due to arthritis, but muscle mass and function loss can contribute. Weight loss can occur due to reduced access to food or reduced intake due to a decline in the ability to taste, smell, or see food. Do they need to jump on a counter or travel a set of stairs to get to their food, water, or litter boxes?

Most of what we discuss here applies to stable patients at home. If needed, supportive feeding should be considered when a patient has been hyporexic or anorexic for more than three to five days or is expected to have low voluntary intake for more than three to five days, or if severe underlying disease is discovered in the workup process.

How to Approach Diarrhea

If diarrhea is the only symptom, try to determine large bowel vs. small bowel diarrhea and take a thorough diet and medication/supplement history. This is where you can save yourself time by taking your own history (rather than an assistant). If there is no significant weight loss, consider a trial diet of a high-fiber food such as Hill's w/d or Purina OM for cases of large bowel diarrhea. In the case of small bowel diarrhea, an easily digestible, lower-fat diet such as Royal Canin GI LF or Hill's i/d could do the trick. If diarrhea is newly present in an older cat, I would have lab work pending and even schedule an abdominal ultrasound, although I might send home a new diet.

Dogs seem like they could have more variables contributing (indiscretion, treats), so I might give diet and medication a try regardless of age before I assume anything more ominous will be diagnosed. This is what I call their "first strike." If they are not



quickly improving with diets/meds, I recommend diagnostics to ensure no primary issue (hepatic, pancreatic, renal, metabolic, endocrine disease). At some point in treating chronic diarrhea, regardless of a negative fecal float, a course of dewormer (typically five days of fenbendazole) should be prescribed. With experience, I have become a much more prominent advocate of diet change alone. Clinical impression (and some studies) suggest that up to 50% of dogs and cats with "nonspecific GI disease" will respond to dietary therapy alone. This is worth it to many clients and me, and because responses can be seen within one to two weeks, we aren't losing precious time. Have an open conversation with clients. If you prescribe more than one therapy, you will face the challenge of knowing which one worked! In younger patients with more large bowel diarrhea, food responsive diarrhea will be present without significant lab work changes (absence of hypoproteinemia). However, given the frequency of "sensitive stomach" revealed in history taking, it's likely worth a try.

"Food Responsive" Gastrointestinal Disease

If lab work results from your visit are normal, consider a two-week dietary trial depending on clinical signs. It would be unusual for dietary allergy or intolerance to present in geriatric patients, but many patients have a history of chronic intermittent signs. These are the "sensitive stomach" cases or chronic intermittently vomiting cats or dogs. Furthermore, some cases of inflammatory bowel disease can improve from a novel protein or hydrolyzed diet trial. If you think your patient will eat it, I would jump right to a prescription hydrolyzed diet to avoid the possibility of prior antigen exposure. Despite this statement, we frequently offer Royal Canin limited ingredient diets in the Internal Medicine department because both canned and dry options are available (and because we suspect they are quite palatable).

Studies have shown that sometimes a quarter to a half of cats with chronic GI issues will respond to diet alone, sometimes with signs resolving within two to three days, perfect for a geriatric workup. Other studies have shown two weeks is necessary, but certainly not six to eight weeks. Royal Canin hypoallergenic formulas, Purina HA, and Hill's formulas such as z/d and limited ingredient diets are also stocked at Angell. Two weeks is often sufficient to look for improvement in signs. For dogs, this might be an instance where you consider having clients home cook a diet for a two-week trial.

Medications for Diarrhea

1. Metronidazole

Metronidazole is frequently used in GI cases but more and more, it has been suggested that long-term administration and potential side effects make it less desirable than other options. Further, metronidazole has been shown to cause DNA damage to feline lymphocytes *in vitro*. There is also evidence in laboratory animals that it has carcinogenic potential. Do we still prescribe it? Yes! A suggested GI dosage for metronidazole in cats and dogs is 7.5 to 10 mg/kg given twice a day orally.

At Angell, fenbendazole (Panacur) at 50 mg/kg SID with food for five consecutive days is the treatment of choice for giardiasis or other suspected cases of parasitism (as opposed to higher doses of metronidazole). You might save metronidazole for more challenging cases.

2. Tylosin

Tylosin is an oldie but goodie and definitely in favor right now amongst veterinary internists. Tylosin is a macrolide, bacteriostatic antibiotic with activity against most gram-positive and gram-negative cocci, gram-positive rods, and *Mycoplasma*. Tylosin works by transiently changing the GI enteric bacterial population, probably by promoting the growth of beneficial commensal bacteria while

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suppressing “bad” bacteria. Like many wonder antibiotics, there is also a suggestion that tylosin may exhibit anti-inflammatory properties. Also of great use, tylosin appears to have almost no systemic or toxic side effects. It is even approved for use in poultry (i.e., safe for human consumption). The initial dose recommendation for tylosin in both dogs and cats is 15 mg/kg orally, BID, mixed with the food (has a bitter taste) or given via gelatin capsule. (A helpful note from Dr. Twedt: it comes as a powder, and a #3 gelatin capsule holds 130 mg, a #1 capsule holds 240 mg, a #0 capsule holds 345 mg and a #00 capsule holds 430 mg).¹ The long-term dose can be reduced to as low as 5 mg/kg/day for responding cases. Tylosin is effective for most *Clostridium perfringens* and is considered by many to be the treatment of choice for suspected clostridial diarrhea. The biggest drawback is getting it into patients who aren’t eating well, are sensitive to its presence in their food, and cats!

What Tests to Run?

Regarding weight loss in cats, you can get yourself down a bit of a rabbit hole. I would be sure to keep communication open with clients. Some clients may have noticed no symptoms at home and suddenly face an exhaustive and expensive workup for weight loss. We sometimes ponder how a minimum database in cats should be redefined as CBC/chemistry panel/T4/UA/SDMA/B12/Folate, abdominal ultrasound, echo, and thoracic radiographs. You will eventually find something “wrong” and will need to use clinical experience and tracking to ascertain how significantly your finding contributes to weight loss, changes in appetite, or other signs. For example, mild chronic kidney disease, a soft heart murmur, or a mild elevation in a T4 might not be the primary issues but are revealed along the way.

As mentioned before, if large bowel diarrhea is the only issue, I would trial diet and medications first before spending extensive resources on testing (other than fecal testing). For dogs and cats with chronic diarrhea, I would not skip evaluation for parasitic infestation. Go ahead and deworm with a broad-spectrum dewormer (five-day course of fenbendazole). If diarrhea does not improve/resolve with diet/medication, or if vomiting is present, perform a CBC, serum chemistry profile, urinalysis (and total T4 in cats). The reason is to try to rule out other primary disease processes. If signs persist without identifying another primary disease process, it is reasonable to submit TLI/B12/Folate. Pancreatitis in dogs often is accompanied by anorexia, vomiting, and abdominal pain, so these signs may help you decide whether or not to run a cPLI. As cats can so often have nonspecific signs, you would be justified to submit serum fTLI, fPLI, cobalamin, and folate concentrations with any suspicion of chronic GI signs. You might find conflicting evidence about hypcobalaminemia in hyperthyroid cats. As I often screen older cats with

weight loss for B12 deficiency, I would use your judgment to submit this test as part of your workup.

Notes on TLI/PLI (adapted from Texas A&M GI Lab)

TLI: In dogs, values below 2.5 µg/L are diagnostic for EPI. Values between 3.5 and 5.7 µg/L are rarely associated with EPI signs but may reflect subclinical disease or part of the disease continuum. Consider repeating a TLI in one month if signs persist. Also, be sure your patient fasts 12 to 15 hours before a blood sample is collected.

In cats, values equal to or below 8.0 µg/L are diagnostic for EPI.

Serum TLI values above 50.0 µg/L (dogs) and 100.0 µg/L (cats) may be associated with acute or chronic pancreatitis or decreased renal excretion due to severe renal insufficiency. Elevated serum TLI concentrations are also seen in some malnourished patients (dogs usually) without evidence of pancreatitis and in some cats with patchy pancreatic hypertrophy/atrophy (generally considered to be a benign age-related change). **Perform a PLI test before concluding a patient has pancreatitis.**

In cats, increased serum TLI is often also observed with small intestinal disease. In these cases, serum concentrations of **cobalamin and folate** should be determined to evaluate the small intestine. As part of my initial workup in cats, I don’t always submit a “TLI/B12/Folate” panel. My patients have not always been fasted for 12 to 15 hours at the time of initial presentation. Furthermore, pricing is the same whether we run a TLI alone or a “TLI/B12/Folate,” so we could submit a TLI at a future appointment when the patient fasts if we are suspicious of EPI.

Antech Canine CE-IBD Assay

This test uses ELISA technology and requires a small blood sample. The IBD Assay delivers two results – “consistent with IBD” or “not consistent with IBD.” It also includes three biomarkers to substantiate and pinpoint diagnosis and monitoring:

- Gliadin sensitivity (similar to gluten sensitivity)
- Bacterial proliferation
- Intestinal inflammation

In a study published in *JVIM*, March 2020, Estruch *et al.* tried to identify serologic markers to differentiate dogs with chronic enteropathies, essentially an IBD blood test. Although there may be a place for this test in a diagnostic workup, we have not adopted its use at Angell as of September 2020.

GI Neoplasia in Cats

Unfortunately, neoplasia is more commonly diagnosed in older patients than younger ones. Lymphoma, adenocarcinoma, and mast cell tumors (MCT) are cats’ most common intestinal neoplasms. The most common tumors in dogs are lymphoma, adenocarcinoma, gastrointestinal stromal tumor (GIST), and leiomyoma or leiomyosarcoma. Sometimes adenomas or adenomatous polyps are diagnosed in the colorectal area.

GI signs are common when neoplasia is present, including vomiting, weight loss, anorexia, and diarrhea. Studies have shown that approximately 50% of dogs with lymphoma are anemic at the time of diagnosis. Additionally, many dogs have significantly higher numbers of RBC anomalies compared to dogs with IBD instead. An even higher number of cats with GI lymphoma may be anemic when GI lymphoma is present.

Lymphoma is the most common GI neoplasm in cats, and GI lymphoma is the most common form of lymphoma in cats.

Another common finding on labwork is hypcobalaminemia, present in 40 to 71% of dogs with small-cell intestinal lymphoma and 78% of cats with low-grade lymphoma.

Cats with low-grade or small-cell lymphoma have more chronic and less severe clinical signs than cats with large-cell or high-grade lymphoma. It can be helpful to obtain a specific diagnosis mostly because cats with low-grade lymphoma can have a much better prognosis. Some studies show complete response rates to treatment in half to most cats treated, with a median survival time close to two years or longer. The prognosis for large-cell/high-grade GI lymphoma is poorer, with a median survival time of seven weeks to 209 days reported in the literature.

Small-cell lymphoma sample treatment plan:

- Prednisolone treatment: Starting dose is 1-2 mg/kg PO q 24 hrs, then gradually reduced to 0.5-1 mg/kg q 24 hrs.

Chlorambucil dosage options:

- Continuous dose is 20 mg/m² PO q 2 wks.
- Intermittent dosage is 15 mg/m² PO q 24 hrs for four days q 3 wks.
- Another option is 2 mg PO q 48-72 hrs.

I have to remind myself that not all cats get lymphoma, but I become very suspicious if initial labwork reveals low albumin and B12 levels. I would not skip an abdominal ultrasound prior to obtaining biopsies but keep lines of communication open with clients. If clients are limited in finances or in how aggressive they want to be with diagnostics, there is a chance you may find something you can aspirate at the time of the

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ultrasound. Normal test results can be frustrating and feel “wasteful” to clients if they are left without a diagnosis. Unless imaging strongly points you to surgery, most of our internists recommend endoscopy before surgical biopsies.

“Steroid-Responsive” Gastrointestinal Disease

Corticosteroids are well accepted as highly effective drugs for the treatment of inflammatory bowel disease (IBD). Recall that some cats have better clinical responses to the metabolically active drug prednisolone than the pro-drug prednisone. For this reason, we prescribe prednisolone for all cats just in case they fall into this category. Studies suggest that prednisolone dosing should be based on lean or ideal body weight if cats or dogs are over-conditioned.

It is estimated that about 30% of the dogs that fail diet and antibiotics will respond to corticosteroids. Generally, oral prednisolone 1 to 2 mg/kg q 24h PO is given and then tapered over eight weeks. However, the side effects of glucocorticoids can be marked, and I try never to exceed a total of 40 mg per day in large-breed dogs.

Budesonide is a novel glucocorticoid that is reported to have a high first-pass hepatic metabolism and exerts a “local effect” on the intestine with minimal systemic effects. An enteric-coated formulation is used for humans with IBD, but a non-enteric coated formulation made by a compounding pharmacy should be used so that the drug targets the small intestines. There is plenty of apparent anecdotal efficacy using budesonide in dogs and cats. Some systemic steroid effects are possible, but it might be a safer choice in patients in which you are hesitant to try steroids (patients with cardiac disease or diabetes mellitus, for example). The recommended dose is 1 mg every 24 hours for cats and toy breeds and up to 3 mg every 12 hours for large-breed dogs.

Additional GI Medications

You could certainly consider medication trials when managing chronic GI conditions, but there are pros/cons in doing this depending on what medications you trial. For example, I rarely prescribe an appetite stimulant in cats without also treating presumed nausea. Although there is some evidence that mirtazapine can have mild anti-nausea effects in people, I reserve it primarily for its appetite stimulant benefits. So, if I am going to prescribe it for such, I also try to add Cerenia (maropitant) at least to start. Another pitfall, of

course, is that if you send home multiple medications and recommend a diet change, you may be hard-pressed to know which one is helping.

Fortiflora I happily send home to almost any cat or dog. Many of our clinicians swear by Fortiflora as an appetite stimulant in some cats. Fortiflora SA just came out, and we are trying it amongst ourselves first before switching over. We also stock Visbiome, which appears to be one of the pre/probiotics of choice of many internists. It is a little bit more expensive and needs to be refrigerated but is an excellent choice.

Cobalamin Therapy

Cats and dogs with gastrointestinal diseases can have tissue-level cobalamin deficiencies. Furthermore, a study published in the *Journal of Feline Medicine and Surgery* pointed out that geriatric cats, particularly independent of diet, are at an increased risk of cobalamin deficiency. Studies have demonstrated overall weight gain, resolution, or improvement in clinical signs such as vomiting or diarrhea with the introduction of cobalamin supplementation alone. Indeed, if exocrine pancreatic insufficiency is diagnosed, cobalamin levels should be checked, or empiric supplementation started. Cobalamin may also have a pharmacologic effect as an appetite stimulant. Anorectic feline patients with cobalamin deficiency often start to eat again once they are being supplemented. I will often give the first dose subcutaneously at the time of the appointment.

Per the Texas A & M website: For either oral or parenteral supplementation, serum cobalamin concentration should be supranormal at the time of reevaluation. Cobalamin should be supplemented whenever serum cobalamin concentration is in the low normal range (i.e., less than approximately 400 ng/L) in dogs and cats. However, if serum cobalamin concentration is within the normal range, treatment should be continued at least monthly (for parenteral supplementation), and the owner should be forewarned that clinical signs may recur sometime in the future.

For parenteral cobalamin supplementation

Protocol: weekly injections for six weeks, one dose a month later, and retesting one month after the last dose.

Dose: SC injection of 250 µg per injection in cats and 250-1500 µg per injection in dogs, depending on the size of the patient: (See chart below)

For oral cobalamin supplementation:

Protocol: daily administration for a total of 12 weeks and re-check serum cobalamin concentration one week after finishing supplementation. Dose: 250 µg in cats and 250-1000 µg in dogs, depending on the patient's size (follow package insert for Cobalequin).

Fortunately, since cobalamin is a water-soluble vitamin, excess cobalamin is excreted through the kidneys. Complications due to “over-supplementation” should not occur and have not been reported.

Folate

Deficiency: In theory, folate deficiency can have clinical consequences, so if it is diagnosed on B12/Folate result, you should consider supplementation. However, how severe a deficiency is present and the reality of supplementing your patient will impact your decision to recommend it. A recommended dose of 200 mcg for cats and smaller dogs (<20 kg BW) and 400 mcg for larger dogs (20 kg BW) orally once daily for four weeks would be a good starting point. Over-the-counter folic acid supplements would be used. The primary significance of severely low folate, however, would be undiagnosed proximal small intestinal disease.

Excess: Small intestinal bacterial dysbiosis (from EPI or other chronic enteropathies) may increase serum folate concentrations. However, this does not appear to predict whether patients will respond favorably to antimicrobials alone. I would still proceed with a diet trial and potentially antimicrobials, probiotics, or prebiotics (fermentable fibers) if the clinical picture justifies it.

Mirtazapine

Mirtazapine is a 5-HT₃ receptor antagonist with appetite-stimulant properties. Recent pharmacodynamic studies have shown it is safe and can be an excellent appetite stimulant. Higher doses, however, are commonly associated with side effects, such as vocalization, hyperexcitability, and tremors. Thus, the recommendation is the use of smaller, more frequent doses. Dosing cats has become much easier with the FDA approval of a transdermal ear gel for cats (Mirataz). The dose ends up being around 2 mg per cat when a 1.5-inch strip is applied to alternating inner ear flaps (dosing ruler is included with the packaging). Dog dosing ranges from 3.75 mg to 30 mg once daily depending on the dog's size, not to exceed 30 mg per dose (~1.1-1.3 mg/kg every 24 hours).

Dogs weight	Below 10 lbs	10 lbs-20 lbs	20 lbs-40 lbs	40 lbs-60 lbs	60 lbs-80 lbs	80 lbs-100 lbs	Above 100 lbs
Dose of Cobalamin	250 µg	400 µg	600 µg	800 µg	1000 µg	1200 µg	1500 µg

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Maropitant

Cerenia (Maropitant by Zoetis) is a neurokinin-1 (NK-1) receptor antagonist that acts in the central nervous system by inhibiting substance P, the key neurotransmitter involved in vomiting. Maropitant suppresses both peripheral and centrally mediated emesis. The injection is approved to prevent and treat acute vomiting in dogs and treat vomiting in cats. The oral tablets are indicated to prevent acute vomiting and vomiting due to motion sickness in dogs.

Maropitant has been effective for controlling vomiting secondary to a variety of stimuli, including reducing chemotherapy-induced nausea. It has also received fame as a “wonder cure” for all sorts of ailments and may ameliorate visceral pain. It should be used before anesthesia/sedation and can be used in conjunction with chemotherapy.

Capromorelin

Capromorelin (ENTYCE - Aratana Therapeutics) mimics the action of the hunger hormone ghrelin, which causes growth hormone secretion and appetite stimulation, increasing lean body mass. Capromorelin is an orally active small molecule with more sustained effects than its naturally found counterpart and has been shown to increase food intake and weight gain. Although studies suggest this drug is safe for both cats and dogs, we reserve its use for dogs only at Angell. Capromorelin oral solution is dosed at 3 mg/kg orally every 24 hours

(dog dose). It can cause salivation and be a little challenging to administer in dogs. We avoid its use in cats due to anecdotal reports of hypotension and bradycardia (plus ptialism can be dramatic).

In Conclusion

With both geriatric dogs and cats, please consider which medications and supplements they are already taking. How easy will it be to medicate them? Does your hospital offer compound medications or easy to administer formulations?

GI workups can be frustrating in even our youngest patients. Keep communication open with your clients and recognize the unique needs posed by advanced age. Consider when you might have the luxury of trialing different diets or medications and what will be reasonable to employ in a patient more likely to have comorbidities or other challenges such as finicky appetite, arthritis-related discomfort, or failing senses.

REFERENCE

- 1 Dr. David Twedt is a renowned GI specialist and on the faculty at Colorado State University.



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2. Darkness is key

The ideal examination room is one in which external light sources (windows, doors, and even light seeping in around doors) can be completely blocked out. An easily-accessible dimmer switch on the room lights can significantly help the eye exam perform at varying levels of light intensity. Red light can be used to provide working illumination. This reduces incidental light reflections on the eye's surface, maximizing the examiner's ability to look into the eye with direct illumination.

FIGURE 1

› Ophthalmology examination room; note blacked-out window on the door, red light, and adjustable stools. The main room lighting is controlled by a dimmer switch easily accessible under the examination table in this setup.



3. Don't forget the basic tests

Performing Schirmer tear test, fluorescein stain, and intraocular pressure are essential tests to make a diagnosis. Dry eye is often overlooked for lack of a tear test, the normal value of which is 15mm/min or greater, in the

FIGURE 2

› Three generations of tonometers: the Reichert Tono-Pen® XL; the TONOVET®; the Icare® TONOVET Plus. The Schiøtz tonometer is not pictured as it has been consigned to our time capsule.



absence of clinical signs. Intraocular pressure should be interpreted in light of other exam findings. For example, although a standard pressure of approximately 15mmHg is expected, this may be considered glaucomatous in a case of severe uveitis. As a variety of Icare® TONOVETs have become increasingly popular due to ease of use compared with the Tono-Pen®, knowing the average values for your instrument is essential. For example, the TONOVET Plus may read around 4 to 5 mmHg higher than the standard TONOVET, although the TONOVET Plus may be providing a more accurate pressure measurement.³

4. Follow an ordered exam

A thorough eye exam should have an ordered approach that is consistent every time. This maximizes the chance that every structure will be looked at, and thus all conditions can be diagnosed. An “outside-in” approach is most common, assessing global vision and pupillary light reflex assessments, facial conformation and orbit, eyelids (including third eyelid) conjunctiva, cornea, anterior chamber, iris, lens, vitreous, and a retinal exam. Most practices do not have a slit-lamp biomicroscope as used by ophthalmologists. Therefore, the magnification provided by a head loupe is beneficial, and having a well-charged bright transilluminator can make a massive difference over a dimmer light source. An ophthalmoscope can be used with its slit beam for further anterior chamber assessment. Fundic examination is best performed with an indirect lens (20 or 28 diopters) and a bright transilluminator.

5. Prescribe out when necessary

Many veterinarians are unable to carry numerous ophthalmic medications in their pharmacies. Fortunately, most ophthalmic drugs are also used in humans and thus do not all need to be stocked in-house. This may sound like a simple tip, but all too often, we see referral patients in whom a correct diagnosis was made, but appropriate medications were not prescribed due to “lack” of availability.

6. Drugs that penetrate the eye

Not all topical drugs penetrate through an intact corneal epithelium. For antibiotics, choices are limited to fluoroquinolones (e.g., ofloxacin and ciprofloxacin) or chloramphenicol. Non-steroidal anti-inflammatory drugs (NSAIDs, e.g., diclofenac, flurbiprofen, and ketorolac) and, of course, all glaucoma drops penetrate the eye, but only certain steroid salts will penetrate.

These are prednisolone acetate and the dexamethasone found in neo-poly-dexamethasone; in this latter case, solution may penetrate better than ointment. Antibiotics, NSAIDs, and steroids will not penetrate much deeper than the aqueous humor, so posterior segment disease must be treated with systemic medications.

7. This author rarely uses Neo-Poly-Hydrocortisone

This steroid does not penetrate the eye to treat uveitis and is rarely strong enough for ocular surface inflammation. Its use is thus quite limited. Allergic inflammation might respond but may do better with specific antihistamine eye drops such as Patanol or ketotifen.

8. Never underestimate pain

Clients frequently report that their pet is comfortable while also reporting the animal squinting at home. A careful history can elucidate other pain symptoms, such as reduced appetite, altered behavior, or rubbing at the eye or face. Whether treating corneal ulcers, conjunctivitis, glaucoma, or uveitis, pain control should not be overlooked. Topical anesthesia (e.g., proparacaine) is inappropriate except for diagnostics due to potential epithelial toxicity. Systemic pain control with an oral NSAID, gabapentin, fentanyl patch, or injectable/oral opioids should be considered as indicated.

9. Sclerosis vs. cataract

One of the hardest determinations to make is whether an eye has cataract versus lenticular, a.k.a. nuclear sclerosis (complicated even further when both are present). Generally, nuclear sclerosis should not occur in an animal younger than seven to eight years of age and should be bilaterally symmetrical when

FIGURE 3

› Nuclear sclerosis, a.k.a. lenticular sclerosis, in the left eye of a dog. Note the pearlescent central (nuclear) opacity. This opacity should be in symmetry with the other eye. This eye is iatrogenically dilated with tropicamide.



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present. Iatrogenic dilation with tropicamide or darkroom examination with a relatively dim (so as not to elicit the pupillary light reflex) direct light source may be needed to visualize the perimeter of the lens. Dense nuclear sclerosis can obscure the fundus and behave like a cataract, but generally, the fundus should be easily visualized even through sclerosis. The outer cortex should be clear with sclerosis. True cataract can be bilaterally symmetrical but is rarely homogenous throughout the lens and obscures fundic examination.

FIGURE 4

➤ Nuclear cataract in the right eye of a dog. Note the dense, heterogeneous white opacity obscuring the central view of the yellow/green tapetal reflection.



10. Tips for a fundic exam

The retinal exam is the hardest part of an eye exam and is thus often unfortunately overlooked or skipped entirely. Iatrogenic dilation with tropicamide (assuming intraocular pressure is normal and glaucoma or lens luxation are not suspected) is extremely important for a complete retinal exam; however, the time limitations of private practice, and owner constraints on time, can often preclude this. In these instances, a darkroom examination using a slightly dimmer light source and a 28 diopter lens (as opposed to a 20 diopter lens used for dilated exams) can provide visualization through a mid-range pupil. Once again, it is essential to have a trained assistant or two to restrain the patient and hold open the eyelids as needed. Standing an arm's distance away from the patient's eye, bring a transilluminator up close to the eye, obtain a tapetal reflection, and then bring the light source back to the level of your eye, still directed at the fundus. At this point, align an indirect lens with the light and the patient's eye, close enough so you can observe the iris and pupil. Once the pupil is centered in the lens, bring the lens closer to you until it is about a finger's length away from the eye (stabilize your hand by extending a finger to touch the side of the face or bridge of the nose). If you lose the view of the fundus or alter position, swing the lens away, re-gain the tapetal reflection, and then swing the lens back into place.

FOOTNOTES AND REFERENCES

- 1 In an abstract presented at the 49th Annual Scientific Meeting of the American College of Veterinary Ophthalmologists, Minneapolis, Minnesota, Sept 26-29, 2018, titled "Effects of oral trazodone on canine tear production and intraocular pressure," Pelych *et al.* concluded that "administration of 5 or 9 mg/kg of trazodone does not significantly affect tear production or IOP in dogs within 6 hours."
- 2 If used for pre-visit sedation, gabapentin might lower intraocular pressure in the dog, but not a clinically significant amount; however, its effect on glaucoma has not been studied: Shukla AK, Pinard CL, Flynn BL, Bauman CA. Effects of orally administered gabapentin, tramadol, and meloxicam on ocular variables in healthy dogs. *Am J Vet Res.* 2020 Dec; 81(12):973-984. doi: 10.2460/ajvr.81.12.973. PMID: 33251843.
- 3 Minella AL, Kiland JA, Gloe S, McLellan GJ. Validation and comparison of four handheld tonometers in normal ex vivo canine eyes. *Vet Ophthalmol.* 2020 Jun 1. doi: 10.1111/vop.12780. Epub ahead of print. PMID: 32478941.

➤ Update on Angell's ECC and Urgent Care Services in Waltham

The 24/7 Emergency and Critical Care service at our Waltham location remains closed, but with the addition of Dr. Alina Ermilio, we are pleased to have recently expanded the MSPCA-Angell West Urgent Care service for dogs, cats, and exotic mammals. Clients can call up to one day in advance to book an Urgent Care appointment. Angell's ECC service at our Boston location remains open for more serious cases except when diversion status is announced on our MSPCA-Angell Facebook page (facebook.com/mspcaangell).

Established to treat less critical cases when appropriate staff is scheduled, Angell West's Urgent Care is an appointment-based service, NOT a walk-in service. Afternoon and evening appointments are available throughout the week by calling 781-902-8400.



We anticipate reopening our MSPCA-Angell West 24/7 ECC service in 2022 once staffing permits, and we will alert our referring partners of any changes in status.



Stay and Play vs. Scoop and Run: Emergency Scenarios and Areas for Stabilization

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Flail chest

Rib fractures and flail chest most commonly occur after blunt or penetrating trauma. Blunt trauma can be from motor vehicle or high-rise trauma. Penetrating trauma causing rib fractures is from bite wounds or gunshot wounds. A spectrum of clinical signs associated with thoracic trauma can range from superficial injuries to respiratory failure. Flail chest is when a proximal and distal fracture in two or more adjacent ribs creates a free-floating chest wall segment. Patients can present with severe dyspnea due to concurrent conditions of pulmonary contusions, pneumothorax, and hemothorax that can be exacerbated by flail chest. Stabilization of the affected chest wall should be delayed until the patient's shock is stabilized but may need attention if it is causing impairment of ventilator function. Medical or surgical stabilization of rib fractures is controversial in human medicine, and less information is available in veterinary medicine.

Autologous blood transfusion

Auto-transfusion is the administration of autologous blood from the patient and re-administration back to the patient. Trauma is a common reason for blood transfusion, and the clinical signs that trigger this decision are usually the treatment of shock, clinically relevant worsening anemia, perioperative hemodynamic optimization (for penetrating wounds), and coagulopathy. Fluid resuscitation with crystalloids is a standard practice in veterinary emergency medicine for treating hypoperfusion, but in the context of severe acute hemorrhage, the administration of large volume crystalloids may worsen hemostatic dysfunction and induce further hemorrhage. Blood product resuscitation is appealing due to the positive effects of colloidal support, replacement of clotting factors and hemostatic proteins, and increasing oxygen-carrying capacity. In a pinch, autologous blood transfusion is a reasonable resuscitative measure in scenarios with ongoing hemorrhage secondary to trauma. It is readily accessible, cost-efficient, and avoids compatibility issues of using allogeneic red cells or risks associated with the storage of red blood cells. A sterile technique should be utilized for thoracocentesis or abdominocentesis, and

typically collected blood does not need to be anticoagulated. It should be reinfused through an appropriate blood administration filter. Blood can be transfused as a bolus if required.

Heatstroke

Heatstroke is a form of hyperthermia associated with a systemic inflammatory response leading to a syndrome of dysfunction in which encephalopathy predominates. It is a disease process that is progressive and life-threatening. The most severe is a spectrum of heat-related illnesses, from heat cramps (muscle spasms) to heat exhaustion, heat prostration, and heatstroke. Dogs confined to automobiles, tied outdoors without access to shade or water, or on walks/runs on the first few days of warm weather are commonly susceptible to heatstroke. Early aggressive treatment of heat-related signs and proactive treatment protocols directed at the complications of heatstroke may reduce patient morbidity and mortality. An essential part of initial treatment is lowering the core temperature quickly. Secondly, resuscitation to optimize cardiovascular support and management of secondary complications (e.g., shock, hypoglycemia, AKI, DIC, ARDS).

Gastric Dilatation-Volvulus

Gastric dilatation-volvulus (GDV) is a life-threatening condition requiring aggressive emergency medical stabilization and surgical intervention. It is typically a syndrome of large breed dogs (e.g., Great Dane, Weimaraner, Saint Bernard, Gordon Setter, Irish Setter, Standard Poodle) and likely has a genetic influence; however, small dogs, cats, and other mammals can develop GDV as well. Once GDV occurs, there is cardiovascular compromise secondary to obstructive shock. The gastric distention compresses abdominal veins so that venous return to the heart is impeded. Respiratory compromise can also be appreciated due to increased abdominal pressure preventing normal diaphragmatic movement. Gastric necrosis is a potential complication of GDV and can be secondary to a complication of shock, thrombosis, avulsion of the splenic and short gastric arteries, and reduced cardiac output. Gastric necrosis is unfortunately associated with increased morbidity and mortality. Diagnosis of gastric necrosis is performed during abdominal surgery, but lactate and lactate clearance may raise suspicion. Lidocaine has been evaluated and may decrease AKI incidence, post-op arrhythmias, and length of hospital stay. Treatment goals are aimed at treatment of shock and stabilizing the patient before surgery.





Incisional Tension Relief: Simple Intraoperative Options

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Preoperative Assessment of the Surgical Patient

Every veterinarian performing basic skin surgery occasionally encounters a problematic incisional closure due to significant skin tension. Unless this potential complication is assessed before surgery, the surgeon may find this intraoperative problem daunting.

Before surgery, manually assessing the regional skin's natural or inherent elasticity will give the veterinary surgeon an idea of which area(s) of adjacent elastic skin can be recruited to close the surgical defect.

Example: From my clinical experience, the caudal-lateral thigh region is prone to dehiscence when the surgeon does not properly assess the skin tension prior to surgery. *In this region, skin tension is best assessed with the dog standing on the rear legs.* When standing, the muscles contract and exert tension to the overlying skin. In contrast, when the patient is under anesthesia, the muscles relax in this area and the skin may appear deceptively pliable and elastic. If a tumor is removed from this area, the wound closure may appear fine, only to be subject to significantly greater incisional tension when the patient is ambulatory postoperatively. For more challenging defects in this area, a transposition flap can effectively close the surgical defect and eliminate the risk of postoperative incisional dehiscence (See Figure 1).

The ability to flex and extend the limb *intraoperatively* better allows for assessment of skin tension during wound closure. For example, the lateral flank area, cranial to the thigh, is subject to stretch forces as the patient extends its rear leg during ambulation. The veterinarian is better prepared to consider various closure options to reduce incisional tension by anticipating this risk before surgery.

The preoperative assessment also will allow the surgeon to select the size of the area that will require clipping of fur and preparation for surgery. Should a large area of skin be excised, a wider clip will provide the surgeon with greater latitude to recruit additional skin in the form of a skin flap if needed.

The inherent elasticity of the skin can vary considerably between individual dogs and cats. The skin's inherent elasticity and skin thickness also vary in different body regions. The author has seen multiple cases in which a defect in one patient required a skin flap for closure. In contrast, a similar wound in another patient was closed by basic skin undermining and advancement. Again, careful skin assessment before surgery can help avoid the need to address

excessive incisional tension during the closure of the cutaneous defect.

Options to Reduce Incisional Tension Intraoperatively

1. In large dogs, consider the placement of sandbags or rolled towels beneath the shoulders and pelvis to raise the trunk off the surgical table. This improves the mobility of the trunk skin by freeing the skin otherwise compressed or "trapped" against the table surface by the patient's body weight. (See Figure 2.) As a result, the veterinarian can more effectively mobilize this source of elastic skin to close challenging skin wounds of the trunk.

Example: In a chain mastectomy, veterinarians may underestimate the degree of skin preparation necessary for this procedure. Following resection, closure will require the advancement of the lateral skin of the trunk. Preparation of the skin must include clipping of the fur at the mid-thoracic.

2. When dealing with cutaneous defects in the inguinal and ventral pelvic area, loosening the tape or strap stirrups applied to the rear legs can facilitate skin closure, allowing the surgeon to adduct the limbs.
3. Intraoperatively, skin hooks can be used to stretch the incisional margins ("Load Cycling") to gain a few centimeters of skin, reducing incisional tension. For example, stretching the skin for 30 to 60 seconds followed by 30 seconds of relaxation is repeated over a five to 10 minute period. In so doing, one to three centimeters may be gained to facilitate closure. The net gain depends on the area of the body and the regional elastic properties of the patient's skin. (See Figure 3.)
4. Undermining is one of the first surgical options employed to mobilize skin intraoperatively. It can be performed in relative safety if the surgeon keeps in mind the need to protect the regional cutaneous circulation.

- a. Undermine the skin safely below the dermis to avoid trauma to the deep or subdermal plexus.
 - b. Undermine beneath the panniculus muscle layer, where present, to help preserve circulation to the overlying skin.
 - c. Minimize damaging or ligating regional direct cutaneous vessels. Extensive undermining can be safely performed if these major cutaneous vessels are preserved.
5. "Skin Directing" is a term I use to describe the manual shifting of the skin surrounding a cutaneous defect to see how best to *direct*

the loose, more elastic skin to the closure area under the greatest tension. [In more challenging closures, simple linear edge-to-edge apposition may result in greater incisional pressure than shifting the skin. The result usually is a sigmoid-shaped closure, reducing incisional tension.] (See Figure 4.)

6. "Angular closure" can help close some problematic skin defects of the upper tail and extremities instead of closing a wound in a proximal-distal direction or perpendicular to the axis of the tail/limb. With the closure of the incision at a diagonal to these axes, tension is distributed in an angular or spiral fashion while helping to avoid circumferential tension. (See Figure 5.)
7. Never close extremity wounds and surgical defects under circumferential tension to avoid creating a biologic tourniquet. Unless detected early, biologic tourniquets impair lower extremity circulation, resulting in extensive tissue swelling and necrosis. Simply leaving the wound partially open to heal by 2nd intention may be your best option.
8. If additional tension relief is needed, consider using small, 1cm staggered incisional release incisions, especially in the zone of greatest incisional tension. (See Figure 6.)
9. *Other techniques* to consider include using Z-Plasty to reduce incisional tension and the use of "Walking Sutures" to help advance or "Walk" the undermined skin toward the opposing skin border. Details of their use are in the author's Atlas. Although both methods can be useful in facilitating closure, the author normally prefers the other options presented in this article.
10. *Should tension remains a concern after closure, skin stretchers can be used for a few days postoperatively to remove skin tension generally in the central area of the incisional closure.* (See Figure 7.)

Closure Options to Reduce the Risk of Dehiscence

Figure 8 is an illustration from my referenced Atlas. This layered closure technique is highly effective in reducing the risk of dehiscence in areas where a mild amount of incisional tension persists. You will note that *interrupted intradermal* sutures help distribute skin tension while serving as a "safety or backup layer" of sutures to the external skin sutures. Note the zone of greatest tension is often the central third of the closure, which usually corresponds to the widest portion of the wound. Interrupted skin sutures are used to closely approximate the incisional margins. In the central tension zone, vertical mattress sutures are used to further protect the incision from wound dehiscence. [As noted, skin stretcher pads and cables can be applied postoperatively to further reduce incisional tension.]

SURGERY

Incisional Tension Relief: Simple Intraoperative Options

CONTINUED FROM PAGE 9

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FIGURE 1A

➤ Postoperative dehiscence in the caudal-lateral aspect of the left hind limb. Preoperatively, the veterinarian failed to assess proper skin tension with the dog standing. This resulted in closing the incision without taking into account the stretching force exerted by the underlying musculature when the dog is standing and walking.



FIGURE 1B

➤ This wound required time to heal by second intention. Note the skin staples used to close the incision. It is the author's experience to avoid the use of skin staples to close incisions under tension. There is a risk that the staples will deform and open when subject to prolonged incisional tension. Had the tension been better assessed prior to surgery, a small transpositional flap would have been an effective option to close this surgical wound.



FIGURE 3

➤ Intraoperative stretching of the skin using moderate force using skin hooks. The skin is stretched and relaxed in a cyclic fashion [30 to 60 seconds of tension followed by 30 seconds of relaxation] over a five to 10-minute period. This is repeated on the opposing cutaneous margin.



FIGURE 4A

➤ Wide resection of a fibrosarcoma involving the right lateral thigh of a cat.



FIGURE 4B

➤ The more elastic skin of the cranial thigh region was undermined and "directed" to the widest central area of the defect. This shifting of skin resulted in less tension when compared to closing the defect in a direct linear fashion.²



FIGURE 2

➤ In large dogs, the skin is compressed against the surgical table, restricting the ability of the surgeon to close the large wounds illustrated. Sand bags or rolled cloth towels are used to elevate the weight of the dog's trunk off the surgical table, facilitating the closure of these respective skin defects.¹

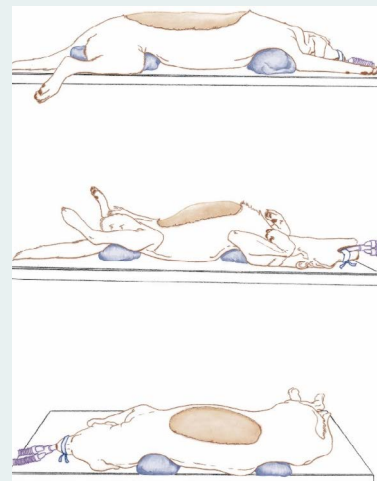


FIGURE 5A

➤ Angular or spiral closure technique. This cutaneous adenoma of the upper tail is resected.



FIGURE 5B

➤ Following resection, closure in a proximal-distal direction or laterally would result in moderate skin tension in these two planes, risking dehiscence. Lateral closure also could result in creating a biologic tourniquet from excessive circumferential skin tension.



FIGURE 5C

➤ Closure at an angle or in a spiral fashion distributes tension in a more uniform fashion. Note three placed vertical mattress sutures were used to reduce incision tension in the central area of the closure.



Incisional Tension Relief: Simple Intraoperative Options

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FIGURE 6

» To further reduce circumferential skin tension after resection of a tail mass, mini-release incisions were used to reduce incisional tension.⁶ Following creation of the incisions, perpendicular to the line of tension, the mini-release incision may close (partially or completely) in the opposite direction. Any gaps will heal by second intention healing.



FIGURE 8

» The author's favorite combination of sutures patterns is illustrated to close wounds under mild to moderate skin tension. (As noted, closure should not create circumferential tension that could compromise circulation to an extremity.) Buried intradermal sutures are used to align incisional borders. This is followed by external interrupted skin sutures to accurately align cutaneous borders. Incisional tension is normally greatest in the central area of wound closure, as denoted in the "x-box" area. In this "central zone," vertical mattress skin sutures are applied to further reduce the risk of dehiscence. Average thickness skin is normally aligned with 3-0 intradermal suture material; external sutures are normally 3-0 sized simple interrupted sutures. In thick skin, 2-0 sized sutures are used for intradermal sutures; 2-0 sized sutures can be used to approximate the skin in a simple interrupted suture pattern. In most cases, 2-0 suture material is used for vertical mattress sutures. Surgical glue also can be applied over the incision to seal its surface and give additional security. (Surgical glue has the general suture holding strength of 5-0 suture material.)⁶

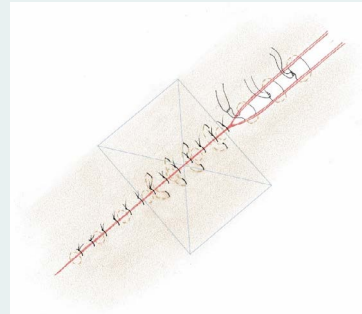


FIGURE 7A

» Sarcoma involving the right lateral thigh of a dog.



FIGURE 7B

» Wide resection of the fibrosarcoma. The skin was undermined and stretched intraoperatively with skin hooks.



FIGURE 7C

» Skin stretcher pads, comprised of a Velcro pad and adhesive membrane, were applied with surgical cyanoacrylate glue. Note the pads were placed cranial and caudal to the central area of the incision, where the greatest incisional tension was noted. See **Figure 8** regarding the most effective suture pattern combination to consider for incisional closures under tension.



FIGURE 7D

» Application of the skin stretcher cable after placement of a protective cotton pad over the incision. The mild elastic force of the cable draws the skin pads towards the incision, further decreasing incisional tension postoperatively.⁵





Primary Secretory Otitis Media (PSOM)

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PPrimary secretory otitis media (commonly abbreviated as PSOM) is a relatively uncommon disease reported primarily in Cavalier King Charles spaniels. Very few other reports have been noted in breeds outside the Cavaliers, and unfortunately, the breed preference is unknown.

Pathogenesis

The pathogenesis of PSOM is unfortunately unknown as well. The theories that have been postulated include that either an increase in mucus production, decreased drainage of the middle ear through the Eustachian tube, or a combination of both are contributing factors. In human patients, chronic drainage of the tympanic cavity occurs through the Eustachian tube; if we assume that this is a similar pathomechanism in our canine patients, there is likely an impaired patency of the Eustachian tube and tympanic cavity mucociliary clearance that is compromised in cases of PSOM.

Clinical Signs

The primary presenting complaint in this author's experience is gradual hearing loss that can occur over a three- to eight-month period, sometimes

concurrently with head-shaking/ear irritation with no evidence of concurrent otitis externa.

In other cases, pain can be localized to the head/neck with spontaneous episodes of neck guarding. Intense pruritus affecting the pinna and/or external ear canals (with no concurrent otitis externa), head tilt, nystagmus, ataxia, facial nerve paralysis, fatigue, and varying degrees of otitis externa can also be seen.

Diagnosis

Diagnosis of PSOM is dependent on signalment, clinical signs, and clinical findings. Otoscopic examination in a PSOM patient should reveal a bulging pars flaccida and pars tensa; however, a normal appearance to the tympanic membrane does not rule out PSOM. In many cases, if one tympanic membrane appears affected on otoscopy but the other appears overtly normal, there will be some level of disease still present in the normal-appearing side (bilateral in approximately 60% of cases, according to one study).

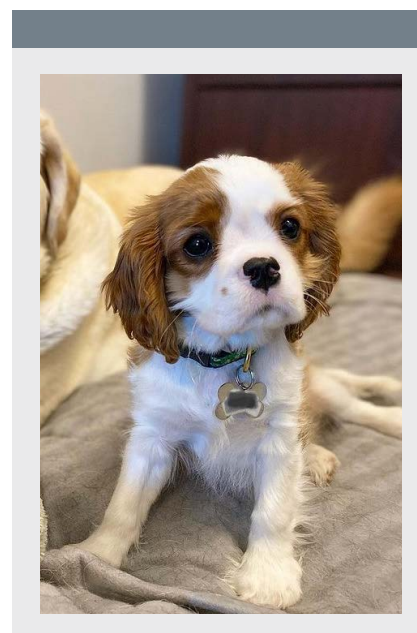
Diagnostic imaging with either radiography or computer tomography (CT is preferred) of the bulla should reveal changes consistent with effusion of the middle ear, with or without concurrent osteitis.

After myringotomy, a definitive diagnosis is achieved to reveal a typically dense, opaque, grey to yellow plug of mucous present in the bulla.

Treatment

The primary treatment recommendations in a symptomatic patient affected with PSOM is the removal of the plug of mucous in the tympanic cavity through a myringotomy incision. Repeated myringotomies/bulla flushings have been required in some cases due to the healing of the myringotomy site and continued accumulation of mucoid discharge in the bulla over time.

Pharmacological intervention in some PSOM cases has not been fully explored, including mucolytics and leukotriene inhibitors, which appear ineffective. However, pharmacological



interventions have primarily been unrewarding in this disease process.

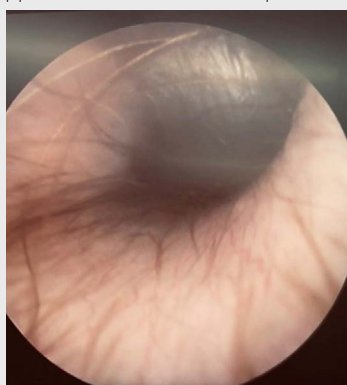
A few studies have been performed to assess whether tympanostomy tubes (as those used in human medicine) provided enough continued tympanic cavity ventilation and drainage.

Post-operative medications have included corticosteroids (both topical and systemic), antibiotics, and in some cases, a mucolytic (acetylcysteine or bromhexine).

Recurrence of PSOM is common, with one study reporting almost 20% of dogs having relapses of clinical PSOM six to 18 months after their first procedure.

FIGURE 1

» Photograph of a visible bulging pars tensa component of the tympanic membrane on video otoscopy. Note the hairs extending from the base of the tympanic membrane, and "shiny" appearance of the distended pars tensa.



DERMATOLOGY

Primary Secretory Otitis Media (PSOM)

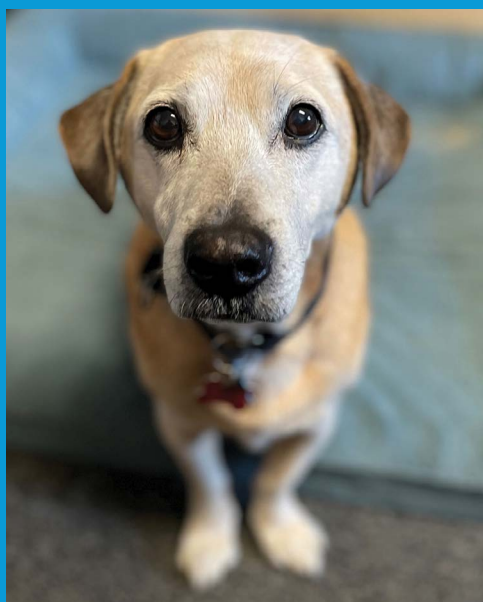
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FIGURE 2

➤ An example of the discharge flushed from the bulla after a myringotomy has been performed in a PSOM-affected patient.



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Technician's Corner

Canine Infectious Respiratory Disease / Community-Acquired Pneumonia in Dogs

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The coughing dog is a common presentation in any veterinary ER. Coughing can be a clinical sign of various disease processes, including primary disease of the lungs/airway, heart disease, or cancer. A common cause for coughing in an otherwise healthy dog is a condition called Canine Infectious Respiratory Disease (CIRD), commonly referred to as “kennel cough.” This is an umbrella term for several different viruses and bacteria, most highly contagious and can lead to respiratory infections in dogs.

The most common CIRD pathogens include *Bordetella bronchiseptica*, canine parainfluenza virus, canine adenovirus-2, and *Mycoplasma cynos*. Two of the LESS common causes with potentially higher morbidity are canine influenza and distemper viruses. Except for Mycoplasmas, a normal but opportunistic inhabitant of the respiratory tract in dogs, all of these pathogens are spread via respiratory secretions of other infected dogs. They can also be spread via direct dog-to-dog contact and contaminated objects (i.e., a human’s hands, clothing, etc.). Depending on the infectious agent, the incubation period for CIRD can be anywhere from 48 hours to 10 days.



In most cases of CIRD, clinical signs are mild and can include frequent and sometimes a pretty loud and alarming cough, sneezing, and yellow to green mucoid discharge from the eyes and nose.

The cough can be described as a hacking cough, often ending in a terminal retch where mucus and even gastric contents can be produced, often mistaken for vomiting. This sometimes also prompts concern that there is something caught in the dog’s throat. On physical exam, a cough can usually be elicited upon palpation of the trachea.

Fever, lethargy, loss of appetite, and labored breathing are relatively uncommon but can occur in dogs who are more severely affected: usually puppies, unvaccinated, or immunosuppressed dogs. When these more severe clinical signs are present, pneumonia secondary to CIRD is a primary concern (also known as community acquired pneumonia). More often than not, dogs with more severe signs and pneumonia are infected with more than one CIRD antigen.

In cases where *Mycoplasma* or *Bordetella* (both bacteria) are one of the causative agents, they can directly colonize in the lungs and result in pneumonia. However, viral CIRD antigens can also lead to pneumonia, as the viruses often destroy the normal respiratory cells and reduce the ability of the respiratory tract to protect itself, leading to secondary bacterial infections with opportunistic pathogens (such as *Staphylococcus spp.*, *Streptococcus spp.*, *Pasteurella spp.*). Ideally, when pneumonia is present, a sample of the respiratory tract secretions should be obtained to determine which bacteria are present and which antibiotic would be most effective.

Some of these viruses are reportable diseases (namely canine distemper virus and canine influenza virus), so it’s always recommended to perform testing in severely affected animals to determine the causative agent(s). Bacterial agents can be grown on culture, but PCR (polymerase chain reaction) assay is the most practical, accurate, and readily available test for viral detection. This test only requires a deep nasal swab and pharyngeal (back of the throat) swab, so obtaining samples is relatively easy and painless for the pet. The presence of pneumonia is detected with thoracic radiographs. Baseline blood work is recommended to assess hydration status and the patient’s immune response (ensuring they have enough white blood cells to fight the infection). In rare cases, community acquired pneumonia can be severe enough to cause sepsis or lead to respiratory fatigue and arrest.

Diagnostic and treatment recommendations will vary based on individual patient assessments. Dogs only mildly affected with minor clinical signs often do not require antibiotic therapy. The infections are self-limiting and will resolve within seven to 10 days. Antibiotics should be considered if fever, lethargy, loss of appetite, or mucopurulent nasal discharge is present or pneumonia is detected. Dogs with pneumonia often require hospitalization for intravenous antibiotics and possibly oxygen therapy. Antitussives (anti-cough medications) can be considered for dogs who do not have pneumonia but are contraindicated in any animal with pneumonia.

Vaccination is the most important preventative measure in controlling and preventing CIRD. Vaccines are available for most causative agents. Although most of these vaccinations do not produce complete immunity (except for canine distemper virus), vaccinated dogs tend to have lower morbidity (clinical signs are less severe) and tend to shed less antigen in their respiratory secretions (so can be less contagious to other dogs). Because most of the CIRD antigens are highly infectious, managing the environment is also very important in reducing the spread of CIRD. Affected dogs should be isolated from other dogs for at least several days beyond the resolution of clinical signs.

» Dog with bilateral nasal discharge.
Photo by Dr. Craig Datz, courtesy of VIN.



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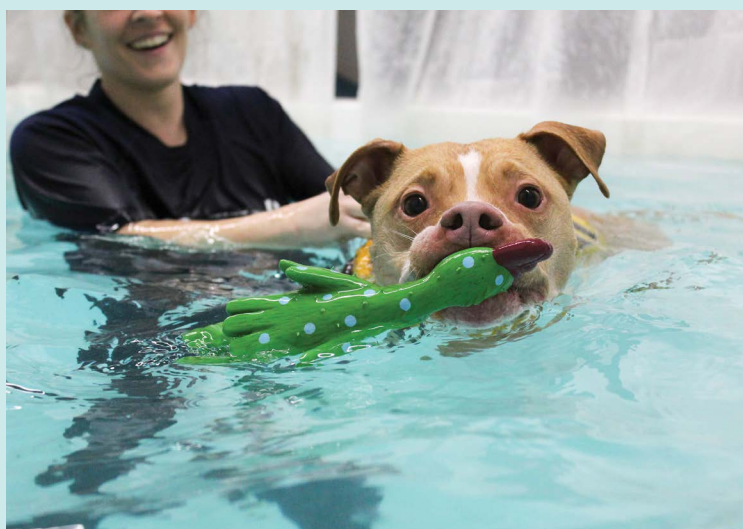
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Land-based Exercise Area



Hydrotherapy – AquaPaws Water Treadmills



Hydrotherapy – Indoor Pool

➤ Angell Spring Continuing Education – Registration is Open!

Feline Focus

Sunday, March 27, 2022

8:15am – 2:45pm

5 Interactive CE Credits (Pending RACE Approval)

TOPICS:

- **Cats and Difficult Intubations**, *Sandra Allweiler, DVM, DACVAA, CMVA, CCRT*
- **10 Things to Look for When Presented with a Blind Cat**, *Dan Biro, DVM, DACVO*
- **Hypokalemia and Hyperaldosteronism**, *Kiko Bracker, DVM, DACVECC*
- **Feline Pemphigus Foliaceus – A Review**, *Brooke Simon, DVM (Practice limited to Dermatology)*
- **Feline Chronic Gingivostomatitis**, *Joyce Tai, DVM, MS (Practice limited to Dentistry)*

Endocrinology

Wednesday, April 6, 2022

6:15pm – 8:45pm

2 Interactive CE Credits (Pending RACE Approval)

SPEAKERS:

- **Evan Mariotti, DVM, DACVIM**
- **Susan O'Bell, DVM, DACVIM**



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➤ Angell Offers 5 Low-Cost, Need-Based Clinics

Angell at Essex (Danvers, MA) and **Angell at Nashoba** (Westford, MA) clinics are dedicated to providing quality care to the general public as well as offering deeply-discounted services for qualified low-income families. The clinics provide primary veterinary care, spay/neuter services, vaccinations, and surgery and dental services.

The clinics do not provide overnight care, specialty service care, or 24/7 emergency care. Appropriate cases will be referred to Angell's Boston or Waltham facilities or a surrounding specialty veterinary referral hospital.

To see if your clients qualify for financial assistance, please visit angell.org/essex or angell.org/nashoba



angell at nashoba

To schedule an appointment with the Angell at Nashoba clinic, please call **978-577-5992**.

angell at essex

To schedule an appointment with the Angell at Essex clinic, please call **978-304-4648**.



Left to Right: Dr. Laurence Sawyer. Angell at Nashoba on campus at Nashoba Valley Technical High School (Westford, MA).



Left to Right: Dr. Erin Turowski. Angell at Essex on campus at Essex North Shore Agricultural and Technical School (Danvers, MA).

➤ MSPCA-Angell Clinics in Boston, Methuen, and on Cape Cod

Offering subsidized veterinary care to help keep pets and families together.

The clinics provide spay/neuter services as well as acute outpatient surgical care, but they do not provide primary, overnight, or emergency veterinary care. The clinics are meant for families who cannot afford urgent medical care and are faced with a painful choice between euthanasia, surrender, or bringing an animal home against medical recommendations. By providing subsidized, low-cost veterinary care, the clinic provides a new pathway for families in need. We welcome your referrals to our clinics.

mspca **angell clinic**

Boston | Cape Cod | Nevins Farm

MSPCA-Angell Cape Cod and Boston clinics
Monday – Friday 8am-4pm

MSPCA-Angell Nevins Farm in Methuen
Monday – Saturday 8am-4pm

To refer low-income clients, please visit angell.org/referrals

MSPCA-Angell Clinic Boston: 617-541-5007 | MSPCA-Angell Clinic Cape Cod: 508-815-5226 | MSPCA-Angell Clinic Nevins Farm: 978-379-6605



STAFF DOCTORS AND RESIDENTS

■ We encourage you to contact Angell's specialists with questions.

Main Phone: 617-522-7282 (Boston) | Main Phone: 781-902-8400 (Waltham) | Veterinary Referrals: 617-522-5011
Angell at Nashoba: 978-577-5992 | Angell at Essex: 978-304-4648

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ANGELL AT NASHOBA

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(W/B) Services also available at our Waltham location

*Boston-based pathologists and radiologists serve both Boston and Waltham locations **Available only in Waltham



› Courtesy Shuttle for Patients Needing Further Specialized Care

Angell Animal Medical Center offers the convenience of our MSPCA-Angell West facility in Waltham, MA. The Waltham facility offers Urgent Care and specialized service appointments Monday through Saturday. If needed, an oxygen-equipped courtesy shuttle can transport animals to Boston for further specialized care and then return them to Waltham. Whether in Boston or in Waltham, our specialists regularly collaborate and plan treatments tailored to our patients' emergency, surgical, and specialty needs.

WE OFFER A BROAD RANGE OF EXPERTISE AND DELIVER THIS CARE WITH
THE ONE-ON-ONE COMPASSION THAT OUR CLIENTS AND PATIENTS DESERVE.

We mail one complimentary copy of our newsletter to each of our referring partners. Please circulate this copy within your practice.

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MSPCA-ANGELL CLINICS
Boston | Cape Cod | Methuen
angell.org/clinics

ANGELL.ORG/DIRECTIONS (FREE PARKING) | ANGELL.ORG/HOURS | ANGELL.ORG/CE

Please consider adding Angell's main numbers to your after-hours phone message.

➤ Our Service Locations

BOSTON & WALTHAM

Avian & Exotic Medicine
617-989-1561

Behavior
617-989-1520

Cardiology
617-541-5038

Dermatology
617-524-5733

Diagnostic Imaging
617-541-5139

Internal Medicine
617-541-5186

Physical Rehabilitation*
781-902-8400

Surgery
617-541-5048

Urgent Care*
781-902-8400

BOSTON ONLY

Anesthesiology
617-541-5048

Dentistry
617-522-7282

Neurology
617-541-5140

Oncology
617-541-5136

Ophthalmology
617-541-5095

Pathology
614-541-5014

*Available only in Waltham



24/7 Emergency & Critical Care ■ Boston: 617-522-5011