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vet 360

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A Cough: Lungs or Heart?

Nutrition Placing Esophagostomy Tubes in Cats

Accredited CPD

Effusions Made Easy Cytological Evaluation

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Editor's Note

There is a saying " the devil is in the detail", and this is so true for much of what we do in veterinary science. Often we focus on the exciting stuff but then the whole case work-up is compromised because of something small - like poor quality slides for cytology, a poorly prepared patient for contrast radiography, a poorly prepared patient for surgery.

These seemingly little things can have a major impact on the patient and the workup as the quality of the information gained from the procedure is compromised. The CPD article on effusions and the collection and preparation of cytology slides may not sound exciting but I can promise you that the diagnostic yield of your cytology will improve with some of theses important little tips.

We can also not over-emphasize the importance of nutrition in our ill patients. Feeding is as important as medication but is often ignored, or a spoonful of a recovery formulation is considered a "yes" for eating. Caloric requirements of ill patients has been discussed in a previous issue. There is a step-by-step guide in this edition for the very simple process of placing an oesophagostomy tube. These can be placed in dogs and cats, are relatively low cost and make ensuring sufficient food intake straightforward. These tubes can be used in hospitals and clients can also easily learn to tube feed at home.

The short article on coughing is nice and clear. It uses the basic clinical examination as well as easily available diagnostic modalities (radiographs) to help the clinician to start classifying a cough as originating from pulmonary, airway or heart disease. Ideal for those fattish coughing small breed dogs with heart murmurs.

Enjoy the read.

Liesel

Index:

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Urinary Incontinence: Medical Management
Urinary Incontinence: Surgical Management
Vitamin K Antagonist Toxicity

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The Pruritic Cat – a Practical Approach to Diagnosis and Treatment

Pruritus is one of the most common presenting complaints of cat owners in practice as many dermatoses of cats are associated with pruritus. The pruritus symptoms may manifest as licking/overgrooming, scratching, chewing, or biting the skin, resulting in alopecia, erythema, and dermatitis.

Determining the cause of the pruritus can be more difficult in cats than dogs and it is important to understand that cats are not small dogs. The same cause may elicit different reaction patterns in different cats. This webinar will focus on identifying the reaction patterns, discuss a step-wise diagnostic approach to rule out the common causes of pruritus in cats and discuss management of the various causes.

She has been lecturing to veterinarians all over South Africa on a variety of dermatological topics and has written several CPD articles on various dermatology topics.

She was awarded a sponsorship by the World Association for Veterinary Dermatology (WAVD) to attend the 8th World congress of Veterinary Dermatology in Bordeaux in 2016.

Together with Prof Andy Leisewitz, she founded the South African Veterinary Dermatology Interest group which aims to promote dermatology in South Africa.

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Real Veterinary Hiring Problems (& Solutions)

Dr Dave Nicol, BVMS Cert Mgmt

I recently gave a talk where I asked delegates to tell me about their greatest veterinary hiring challenges, then we problem solved live to help address those issues. In case you missed it, here are the top four challenges and my solutions in summarised form.

The Top 4 Hiring Challenges

We struggle to find candidates that will fit with our culture.

1. Not getting enough candidates.
2. Getting too many candidates.
3. Not attracting "crazy" people.

The Solutions

1. We struggle to find candidates that will fit with our culture

If you are struggling to find candidates that will fit with your culture then you need to do one of two things. Either change your culture (very hard) or depict what your culture is accurately from the start (quite easy).

One way to do this is to infuse some personality into your job advert. Most people's job adverts are painfully boring and look exactly like everyone else's.

Instead, try to write about your practice accurately; using real words and phrases that you would use to describe it if you were talking to a stranger in a bar. A great way to do this is to have someone interview you about what life's like at your practice. If you record this then you'll find a few great phrases to weave into your job advert that will start to add some authenticity and personality.

2. Not getting enough candidates

If you aren't getting enough quality candidates applying for a role then three factors may be holding you back. Firstly where are you posting your advert? If you're looking for a receptionist and posting onto a clinical job board then the response rate will be poor. If you are not sure where to post your advert then call up someone you know would be good at the job and ask them where they would be looking for a new job.

Next, you should assess whether you are offering a job anyone wants to do, or be in an area anyone wants to go to? Job design inevitably has an impact on the number of people who will be attracted to a role.

If you are recruiting for a job where the jobs advertised massively outweigh the candidates applying as is frequently the case with nurses/technicians or experienced vets, then you may have to consider strengthening your offering or networking to raise awareness of your practice.

Finally, consider your reputation in the wider job market? If you are not well thought of then this will be inhibiting your ability to attract staff.

Any and all of the four above factors can be at play. The best advice is to seek feedback from your current and past employees. Scary but enormously valuable information.

3. Getting too many candidates

Getting too many candidates applying for a role is often a problem with customer service jobs or junior roles in veterinary hospitals. The issue is the enormous waste of time involved in managing large numbers of applicants. Most of whom will be a poor fit when you only have one job to offer.

Again we're going to use our job advert to help. By writing as detailed, descriptive and honest job advert as possible you will reduce the number of responses. Adding the pay rate will also stop people from applying who want more cash than you are prepared to pay.

Though this will reduce the workload, the best possible solution is to not review any CV's, but instead, direct all applicants to some online skill tests. Once you do this you will reduce the volume of applicants to about 20% of the original number. Sad but true, 80% of people who apply for a role will not do some basic tests of aptitude because they do not have the skills or they can't be bothered to put in the effort required to get a job.

Either way, you've ruled out many of those people who were just not suitable to work with you.

4. Not attracting "crazy" people

By not attracting crazy people my delegates meant the "emotionally challenged" (and challenging) - those folks who struggle to interact well with those around them and cause daily relational mayhem.

The importance of emotionally intelligent team members is well documented and relatively easy to test for. I strongly recommended for you to run an emotional intelligence test on each and every person you hire to make sure they are going to be able to negotiate the many social interactions required to run a successful veterinary practice. Who you hire is directly related to how well your practice performs and how much stress you invite into your life. That should be a very empowering thought because it means that you are in complete control of your business success and happiness.

DONT MISS OUT!

DR DAVE NICOL GUEST SPEAKER AT THE 2018 BUSINESS SEMINAR

Dr Dave Nicol is the guest speaker at the next business seminar of the IVPD on 9 April in Durban, 11 April in Cape Town and 12&13 April in Johannesburg. www.ivpd.co.za or www.vetlink.co.za for more information

Dr Dave Nicol is a veterinary marketing, HR and leadership expert. He has written three books, publishes the weekly Hamster Wheel Blog and hosts a popular monthly podcast on iTunes, exploring the anatomy of veterinary success, called Blunt Dissection. He has worked as a senior vet and performance coach in no fewer than three corporate groups and has also owned, managed and sold no fewer than three of his own independent veterinary hospitals.

You can learn more about his work on his Facebook page www.facebook.com/drdavenicol.

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Efficacy of Radiation Therapy for the Treatment of Sialocoele in Dogs

Journal of Veterinary Internal Medicine 2018, 32:107-110. VJ Poirier *et al*
Summarised by Dr L.L. van der Merwe

Why they did it
A sialocoele is a collection of saliva which has leaked from a damaged salivary gland or duct and is surrounded by granulation tissue. Surgery is the treatment of choice for sialocoeles and complete surgical excision is required for resolution. Between 5 – 14% of cases are recurrent.

In humans receiving radiation therapy to the head and neck for tumour treatment, the salivary glands have been shown to be very sensitive to even moderate doses of radiation. Functional impairment of the glands correlated to dose of radiation used and volume of salivary parenchyma exposed. Clinically xerostomia has been reported with as little as 2-3 fractions of 2 Gray (Gy) and doses of >30 Gy caused permanent xerostomia.

The hypothesis was that a relatively low dose of radiation would be useful for the treatment of recurrent sialocoele.

What They Did:
A retrospective cohort study was performed with 11 dogs eligible for inclusion in the study. The radiotherapy dose consisted of 4-5 fractions of 4 Gy for a total dose of 12 – 20 Gy given in 1 – 3 fractions per week. Total administration time ranged between 7 – 22 days. Treatment margins were set at a minimum of 1 -2 cm from the border of the sialocoele. Physical examination was performed 2 weeks after radiotherapy and then every 3 months thereafter.

What They Found
Of the 11 dogs, nine had had previous surgery to the sialocoele, with a median of 2 surgeries. Loss to follow up was at 6 – 43 months with a median of 17 months.

Three of the 11 dogs (27%) had recurrence of the sialocoele at 2, 3 and 9 months post radiotherapy. All three had originally received a dose of 12 Gy. Two were treated with an additional two treatments and one had partial response (decrease in in longest diameter) and another showed complete response .

All of the dogs which received a minimum of 16 – 20 Gy did not have recurrence of the sialocoele. The median time to progression of disease was not reached and a 70% 1-, 2- and 3 years progression free survival was observed.

No acute toxicity was reported. Late toxicity occurred rarely, and was only a mild alopecia over the region.

Take Home Message:
Although the study was limited by a small case number as well as its retrospective nature (alterations in treatment protocols among the patients as information was gained) the efficacy of radiotherapy for recurrent sialocoele was demonstrated and a minimum starting dose of 16 – 20 Gy appeared to be a reliable starting point for treatment.

Enrichment for Small Mammals

What Owners Need to Know

By Stacy Pritt, DVM, MS, MBA, CPIA, DACAW, Debra Hickman, DVM, MS, DACLAM, DACAW

Laboratory animal veterinarians are greatly concerned with caring for small mammals away from their natural habitats—giving them the best life possible while they're under these researchers' care. Share their wisdom with your pocket-pet-owning clients.

Mammals have exploded in popularity as pets over the past few years. Clients with these pets actively seek opportunities to enhance the lives of their small mammal pets just the same as they want to supplement the lives of cats and dogs with games, hiding spaces and toys to play with. However, clients are not as educated with regards to appropriate toys for small mammal pets. Since this market is rapidly growing and new items are available with regular frequency, veterinarians seeing these pets must be knowledgeable and up-to-date about what is available, what is suitable for the pet and the owners' lifestyle, and how to evaluate the items that accompany these pets on trips to your office.

Over the past decade, several reputable pet food companies have invested in research to improve our knowledge of small mammals' nutritional needs and enrichment preferences, resulting in drastic change in veterinary recommendations. Much has also been learned about these species from the field of laboratory animal medicine, where they are used in research to help develop cures and treatments for devastating diseases. Thanks to all of this work, veterinarians now have the opportunity to recommend or sell high-quality products from reputable vendors that enrich the lives of these pets.

What's Missing in Captivity

Because small mammals spend most of their time within a constrained cage environment for their safety, the challenge for veterinarians and owners is to ensure that these animals have opportunities to engage in species-specific behaviours that improve their overall well-being. For example, a wild mouse will spend a significant portion of its time foraging over a distance that measures in miles. When its domestic counterpart lives in a cage with food provided in a hopper or crock, there is a missed opportunity to allow the mouse to engage in a preferred behavior. A simple solution to this can be the provision of some or all of its food in a manner that encourages exploration of the cage environment and foraging for food.

Setting up the Right Stimulation

Mice

Most of the research that assesses environmental enrichment strategies in laboratory animal medicine focuses on the mouse. Studies have evaluated how a mouse interacts with its environment and with a variety of strategies to determine how to improve its well-being. Combined with an evaluation of the natural history of this species, the prevailing strategies involve interventions that mimic the natural environment. Mice thrive when provided with a complicated space, created with multi-level caging or the use of cage furniture, which recreates an environment similar to the burrows where their wild counterparts live. They also preferentially select and actively engage with nesting materials formulated from a combination of long strips of paper and softer cloths that allow them to make complicated nests where they can comfortably sleep and maintain their preferred body temperatures. These interventions are simple to implement in most mouse caging and provide significant improvements to animal well-being.

Community Living

Often, one of the simplest ways to enrich a rodent is to establish group housing. Rats, gerbils and guinea pigs tend to generally get along well with one another and preferentially select group housing when given the opportunity. A little more caution is required with male mice and female hamsters because some individuals of these species tend to fight when socially housed.

Rats

Extrapolating these results to other small mammals can be useful but needs to be done with caution and an eye to ensuring that the desired results have been achieved. For example, though mice universally enjoy engaging in nest-building behavior, this behaviour is much more strain-dependent for rats. A common albino rat, the Sprague Dawley, seems to benefit from the provision of nesting material, but its hooded cousin—the fancy rat, which is most commonly seen as a pet—does not interact with nesting material in a constructive manner. In general, rats benefit from the provision of complex environments that allow them to climb, explore and maintain normal postural adjustments, including rearing on the hind limbs.

Gerbils

Gerbils benefit from toys, running wheels and cage furniture and substrates that encourage digging and burrowing, allowing this species to more fully engage in their very active species-specific behaviours.

Hamsters

Hamsters enjoy digging and burrowing, so they benefit from the provision of deep bedding and shelters.

Nutrition Nuggets for All.

All of these species also benefit from the provision of wood or plastic materials that allow them to gnaw, assisting them in proper care of their continuously growing incisors. Their food is typically provided as an extruded block, which also wears down the incisors. Although other treats, such as sunflower seeds, can be provided for foraging enrichment, the amount of these treats should be controlled to prevent obesity and malocclusion problems.

Rabbits and Guinea Pigs

Original recommendations for rabbit and guinea pig care included an all-pelleted diet and chew toys. The current norm is to provide them with a diet primarily based on a grass hay (e.g. Timothy hay) supplemented by pellets. Enrichment should also be focused on their natural behavioural needs for security or hiding and continual grazing. Female rabbits will only build immediately before kindling, while guinea pigs do not create nests at all, but both species benefit from the provision of houses in which they can hide. Guinea pigs also enjoy the ability to move to, and circle, the perimeter of their cage.

Since both species need to wear down their incisors, structural items that are also edible are preferred. Additionally, nonedible items (e.g. items made of an appropriate hard plastic) that provide hiding spaces but do not pose a hazard after continual wear and can be easily sanitised are also preferred. Items that present hazards, such as sharp edges or holes big enough for teeth to get stuck in, should not be purchased for rabbits and guinea pigs. Items that become worn over time should eventually be discarded if a hazard becomes apparent or it cannot be kept clean.

Sugary or carbohydrate-based treats must be avoided as this will disrupt their gut metabolism. Many clients are still drawn to treats and toys that they themselves would want to have, so client education is key in order for them to understand what is best nutritionally and behaviorally for rabbits and guinea pigs.

Exercise your expertise

Veterinarians are now able to provide species-specific advice and guidance to clients based on recent research and advances focused on making the lives of small mammal pets better. As their population in the pet realm continues to increase, this will help ensure that veterinarians remain a primary source of information for the owners for these cute and fun pets.

*Stacy Pritt, DVM, MS, MBA, CPIA, DACAW, is the Director of the Institutional Animal Care and Use Committee Office at the University of Texas Southwestern Medical Center and the current vice president of the American Veterinary Medical Association. Debra Hickman, DVM, MS, DACLAM, DACAW, is the Attending Veterinarian for the School of Wound Management Medicine at Indiana University, Indianapolis. She also has an active research lab that evaluates interventions to improve the well-being of animals used in research. Both Drs. Pritt and Hickman have won numerous awards for training and research.

Cough! Gasp!

'Is it My Heart or My Lungs, Doc?'

By Sarah J. Wooten, DVM

When a veterinary patient presents with coughing, you know you must distinguish between a cardiac or respiratory cause. Which is it? This veterinary cardiologist helps you sort through your differentials.

If you've spent any time in small animal private practice, then you've dealt with coughing, geriatric small-breed dogs and understand that these cases can be diagnostic conundrums. There's a murmur. There are crackles, but the dog is also wheezing. Is it cardiac? Is it respiratory? Is it both? If both, which do you treat? Fetch dvm360 speaker Nicole Culwell, DVM, MS, DACVIM, a veterinary cardiologist at MedVet Dallas, is on hand with practical tips to help you sort out heart versus lung problems in both cats and dogs.

Be a breedist and an ageist

Even before you enter the room, the patient's chart will give you clues, Dr. Culwell says. Don't pigeonhole yourself, but know which heart and lung diseases are common in the breed or species you are treating. Age can also give you a hint as to whether the condition is congenital or acquired.

Has history repeated itself?

That all-important patient history. You need to know if the problem is acute or chronic, what therapies have been tried, and the patient's response to that therapy. In dogs, Dr. Culwell says, respiratory disease is usually chronic and episodic, and cardiac disease is usually associated with an acute onset of coughing unless there's chronic compression of the left mainstem bronchus. Intermittent and transient cyanosis is associated with respiratory disease, while cyanosis in congestive heart failure is present only with severe pulmonary oedema.

In cats, cardiac and respiratory disease are almost always of acute onset because our feline friends don't follow any textbook rules. Cats confound pet owners because they hide disease, and coughing can look like retching or be followed by vomiting. The most common causes of coughing in cats are asthma, bronchitis, and parasitic disease (not in SA), says Dr. Culwell. Cats almost never cough with cardiac disease unless they have a chylous pleural effusion.

Examine all the things

A physical examination will give you clues or it may give you the answer. Even if you can't touch the pet (e.g. the cat that's close to death anytime you take it out of the oxygen cage) and can only get a visual examination, that can still help you.

Here's what to look for:

- **Sort out stertor versus stridor**

Remember, stertor indicates the nasal cavity—anything above the larynx—while stridor indicates a problem in the laryngeal area, neck, or cervical trachea. Dr. Culwell says inspiratory issues without stridor are usually due to intrathoracic causes such as pneumonia or congestive heart failure, while an expiratory push means lower airway such as asthma (cats) or collapsing airway disease (dogs).

- **Weigh in on weight**

The body condition score can also help point you in the right direction, says Dr. Culwell. Most normal to obese patients present with respiratory disease. Thin or emaciated canine patients should cause you to consider late-stage cardiac disease because of cardiac cachexia. Meditate on the membranes. With cardiac disease, mucous membranes can be normal or demonstrate prolonged capillary refill time or pallor. With respiratory disease, mucous membranes can be normal or intermittently cyanotic.

- **Catch the patient's breath**

Thoracic auscultation can give you all sorts of clues. Remember that wheezes indicate lower airway disease, while focal crackles can be secondary to pneumonia, or congestive heart failure. If your patient has a murmur and crackles, don't immediately assume cardiac disease is the culprit.

If a small-breed geriatric dog presents with dyspnoea and you're going to blame it on cardiac disease, then Dr. Culwell says that dog must have a loud murmur. If it isn't loud, look for another cause. She says that if a patient presents with crackles in the lungs and a sinus arrhythmia, then think respiratory disease with high vagal tone.

Editor: In CHF the patient has maximal sympathetic tone to maintain cardiac output: increased heart rate and vaso-constriction. If the heart rate is normal with a sinus arrythmia, pulmonary oedema from CHF is excluded.

To make things more difficult, large breeds, such as Dobermans, often don't have crackles despite severe dyspnoea secondary to pulmonary oedema. And, once again, cats don't follow any rules. A third of cats with hypertrophic cardiomyopathy will not have a murmur, and it's not uncommon for older cats to present with nonpathologic gallop cardiac rhythms, Dr. Culwell says.

- **Other physical exam hints**

Looking for more clues? Dr. Culwell says pulse derangements, abdominal ascites or jugular distention all point to the heart.

When to Try a Therapeutic Trial with Furosemide

Per Dr. Culwell, a furosemide trial might be just what you, the doctor, ordered in these cases:

- Fragile patients—if you suspect cardiac disease but can't get a cat to the radiograph table without it decompensating, then it's time to try furosemide and an oxygen cage.
- Inconclusive radiographs
- While waiting on a radiography consultation
- Client financial constraints—however, if you go this route, your client needs to know that furosemide dries out respiratory secretions, and it may improve a cough that needs different treatment, so they may be back in a couple of days to get radiographs anyway.
- *A 24 hour trial with furosemide will definitely help differentiate CHF from other causes of coughing (Ed)*

Your pet needs radiographs

Thoracic radiographs are essential for the diagnosis or exclusion of congestive heart failure. Left atrial enlargement, pulmonary venous congestion and pulmonary perihilar infiltrates (caudal dorsal in dogs, patchy or ventral in cats) are the hallmark signs of cardiac disease.

Dr. Culwell's tips:

- You can't call it off of a lateral view, so don't even think about saving your client some money by scrimping on radiographs. Two views are the standard of care.
- Be a stickler for inspiratory films, which are necessary for accurate diagnosis. If you have a panting dog that's not dyspneic, try putting a muzzle on it to get it to slow down its breathing so you can take a picture.
- Butorphanol is very helpful in facilitating radiographs in fractious or fearful animals. Alfaxalone is a good choice for fractious cats.
- Are your radiographs inconclusive? Try again after furosemide therapy (see the sidebar, "When to try a therapeutic trial with furosemide")
- Lateral views are not helpful to see left atrial enlargement in cats.
- A valentine-shaped heart is seen with left-side enlargement in cats. (DV thoracic view)
- A ruptured cordae tendinae will fake you out! It presents acutely. On radiographs, the heart size can be normal without left atrial enlargement. These patients may need an echocardiogram for definitive diagnosis.

The ultimate goal—achieving a sigh of relief

Hopefully, these insights into coughing patients from Dr. Culwell will help you face these cases with a little more heartfelt hope while breathing a little easier.

A Pernicious Triad: Arthritis, Obesity and Chronic Pain

Each of these health problems causes harm in its own way, and it's not unusual for veterinary patients to present with all three. Early detection and intervention and a multimodal management strategy are keys to taming this tangled trio.

By Jennifer Gaumnitz, Senior Content Specialist

Arthritis affects at least 20 percent of the pet population, which can lead to chronic pain, and veterinarians are all too aware of the pet obesity epidemic in the United States. So how do you help these patients, either by slowing the progression of this triad or by tackling these intertwined, yet individual problems?

In a recent Fetch dvm360 session, Tara Edwards, DVM, DACVSMR, CCRT, CVPP, CVMA, said she often sees arthritis patients that are battling not only arthritis but also dealing with the consequences of obesity and, likewise, obese patients on the cusp of developing arthritis.

"There's often this negative cycle of obesity leading to inactivity, leading to weight gain, leading to arthritis. Or flip that around, where we have arthritis leading to inactivity, leading to weight gain, leading to obesity," she says.

Dr. Edwards explains that both arthritis and obesity limit movement, impact cartilage health, contribute to muscle atrophy, result in weakness and alter biomechanics. As such, both are significant contributors to chronic pain in pets. "Patients are painful before they have altered mobility or lameness," she says. "So, if we're waiting for lameness, we've missed the boat on early pain management and early arthritis detection."

Arthritis is a progressive disease, and any change in function is often due to an increase in pain. Among the goals of arthritis patient care are prevention of pain and minimization of disability, she says. This requires earlier identification of arthritis and the implementation of a multimodal arthritis treatment strategy. "Because veterinary patients are nonverbal," she says, "We need to excel at history taking and physical examinations."

Since veterinarians rely on clients to be their eyes and ears, it's also essential to educate clients about the clinical signs of arthritis, the progressive nature of the disease and the impact that contributing factors, such as obesity, have on the disease. Education also encourages compliance with your recommended treatments and helps clients understand the need for regular recheck appointments.

Pain Begets More Pain

When a patient suffers from osteoarthritis, obesity and chronic pain, it has long-term exposure to pain signals. "This can alter the physiology in the spinal cord, decrease pain thresholds, lead to the activation of pain pathways and result in spontaneous electrical activity, exaggerated response to stimuli and altered descending inhibition," she notes.

The central nervous system (CNS) has its own system of checks and balances, and the descending inhibition pathway is a way the body turns down the intensity of incoming pain signals, Dr. Edwards says. That can change when there is chronic pain. The more pain pathways are utilised, the more efficient the body becomes at transmitting and processing the pain signals. This is called central sensitisation or the amplification of pain. Pain begets more pain. These changes in the spinal cord result in hyperalgesia (an exaggerated pain response to a potentially painful stimulus) or perhaps even allodynia (an exaggerated pain response to a nonpainful stimulus). Chronic

pain patients may also have expanded receptor fields, which means they have areas that are sensitive well away from the sore joint. Dr. Edwards states that in 20 to 40 percent of human patients with osteoarthritis, their pain is coming from these CNS changes, not the peripheral joints themselves.

"The nervous system has been hijacked," she says. "We have altered structure and function of the nervous system. Because of that, there's no magic bullet from a treatment perspective. We have to think about multimodal treatment strategies, targeting the underlying neurophysiology and not just symptom control."

Acute pain assessments have become a standard of care for trauma, medical and surgical patients. The same is not true for chronic pain, but Dr. Edwards would like to change that. "Ideally, we need to evaluate every patient at every visit for pain. It should be like taking a vital sign," she says.

It's true that assessing pets for chronic pain is more difficult. The clinical signs are hard to recognise. Pets often don't complain and can even try to hide their discomfort. They slowly adapt to living with the pain and change their activity patterns. Owner observations are needed to help assess pets for chronic pain and changes in mobility. Their feedback can help to identify subtle behavior changes and clues about how the pet is functioning at home. Dr. Edwards recommends three online resources for assessing chronic pain in pets: *the Helsinki Chronic Pain Index, the Canine Brief Pain Inventory and the ACVS Canine Orthopedic Index*. Keeping track of pain scores at regular recheck appointments will help with evaluating the success of drug treatments and gauge whether a pet's fitness or rehabilitation program is at the appropriate level.

Assessing Mobility

Mobility evaluations start with a thorough patient history, followed by observations of the pet as it stands, sits and transitions between different positions and then thorough palpation. An overlooked source of discomfort in veterinary patients is muscle pain or myalgia. "Myofascial pain is often not recognised, or we're not looking for it. Pets can have primary myofascial pain from a trauma or secondary myalgia, where something else created the muscle pain. Our veterinary patients are often dealing with secondary myalgia," she says. "They have altered kinetics and changes to posture, weight-bearing and gait. These all can lead to activation of pain pathways." She says that, in people, myalgia is often described as aching or cramping, and the chronic activation of muscle pain sensors can activate areas in the brain associated with depression.

A retrospective study revealed that 22 percent of cats over 1 year old and 90 percent of cats over 12 years old had radiographic evidence of degenerative joint disease[3].Therefore, for feline patients, history taking is even more important. "We're looking for very gradual or subtle behavior or lifestyle changes rather than overt lameness," says Dr. Edwards. "Cats in general are more agile than dogs. Most clients don't take their cats on walks, so they are not observing gait changes. The fact that cats sleep 75 percent of the time can make mobility changes difficult to recognize."

She advises asking clients about reduced activity, difficulty jumping, increased grumpiness, changes in sleep patterns, dislike for grooming, avoidance of interaction with people and housemates, appetite fluctuations, weight changes and changes in litterbox habits. She also recommends visiting the International Veterinary Academy of Pain Management website for handouts about common signs of pain to share with clients.

Treatment Goals for Arthritis Patients

Arthritis treatment goals include improving the patient's ability to function and its quality of life. Dr. Edwards states that these can be achieved by controlling pain and inflammation, slowing the progression of arthritis, improving joint function, maintaining muscle strength, preventing injury and promoting physical fitness. She says, "With respect to management, this is a lifelong disease. These patients are going to have this disease for the rest of their lives. So, we have to have good client communication and client support.

Management is also dynamic. It needs to change over time because the disease is progressive. It's important for these patients to come in for regular rechecks. One of the main reasons for lack of success for arthritis management is we've failed to adjust our treatments over time."

Dr. Edwards also states that, as with many areas of practice, managing arthritis becomes more successful with the involvement of the entire veterinary team.

And she says it's important for a management plan to be individualised, based on the patient's mobility evaluation. "We need to figure out the disability level to give us the baseline. Otherwise, it's very difficult to determine if our treatment has been successful, or if it's been a failure." So, what does Dr. Edwards use as her multimodal toolkit?

The multimodal toolkit

In a given management plan, she might include pharmaceuticals, disease-modifying agents to slow arthritis progression, nutrition, physical medicine and rehabilitation, joint injections, regenerative medicine options and surgery, if indicated. "Our goal with multimodal pain management is to maximize our treatment success while minimizing side effects," she says.

Pharmaceuticals

According to Dr. Edwards, the most commonly used pharmaceuticals in arthritic patients are nonsteroidal anti-inflammatory drugs (NSAIDs), gabapentin and amantadine. NSAIDs are the drugs of choice for initial therapy, since arthritis is an inflammatory disease process. NSAIDs can help increase activity, maintain muscle mass and, because the pet feels like moving again, assist with weight loss.

What about tramadol?

Tramadol is questionable as an appropriate choice for the management of chronic pain patients. Dr. Edwards says, "It's fairly insignificant from a pain management standpoint and it's fairly unreliable in dogs. It has poor oral bioavailability and a very short half-life. Dogs do not produce the ODM metabolite, which is the metabolite with the opioid effect." Besides the pharmacokinetic issues, tramadol can cause serious side effects including nausea, anorexia, sedation and serotonin syndrome issues. "It's not a benign drug," Dr. Edwards says. "And it tastes terribly bitter, which can lead to food aversion."

Determining the lowest effective NSAID dose is ideal, but it may be an unrealistic goal to discontinue the drug in patients with maladaptive pain. "Remember that it takes time to change all of the central and peripheral sensitisation that occurs with chronic pain," says Dr. Edwards. "We know that a longer NSAID course is more beneficial; it's almost cumulative. If we discontinue or taper the drug too soon, we may not see the maximal benefit. Continued daily dosing is much better than intermittent dosing as needed."

Many osteoarthritis patients benefit from the addition of a second pharmaceutical when an NSAID is no longer sufficient. "Gabapentin is a great choice for chronic and neuropathic pain," Dr. Edwards says. "It alters the calcium channels involved in excitatory pain synapse formation. It activates descending inhibitory pathways, the body's pathway to turn down the intensity of incoming pain information. It may affect glial cells, which are huge players in neuropathic pain. It modulates pain signals to unwind the windup and resets the pain thermostat."

She notes that in human patients with chronic pain, gabapentin administration is rarely discontinued. Therefore, she doesn't worry about getting her patients off of gabapentin. She continues it while tapering the NSAIDs.

Another drug she uses is amantadine (Symmetrol®), an NMDA receptor antagonist, which is in the same category as ketamine. "NMDA receptors play a key role in inducing and maintaining central sensitisation. So shutting down those receptors is beneficial," she says. "Amantadine is not an analgesic by itself, so it's used in conjunction with other pain medications. It quiets the receptors and allows the other medications that are on board to work more effectively."With any of these pharmaceuticals, Dr. Edwards waits 10 to 14 days to allow the patient to reach a steady state before changing a drug dose.

Disease-modifying agents

Despite pharmaceuticals targeting inflammation, providing pain relief and modulating neurophysiology, they do not alter the disease progression. As stated earlier, one goal is to slow the progression of arthritis and try to protect the joint cartilage, which is where disease-modifying supplements play a role. The earlier these are administered, the better the chance of modulating cartilage damage. "Use these products early, while we still have cartilage. You can't turn back the clock with cartilage damage," Dr. Edwards advises. "These are part of a multimodal plan; never use them as a sole agent or as a replacement for pain-relieving medications." Common disease-modifying agents include glucosamine, chondroitin, omega-3 fatty acids, green-lipped muscles, avocado soybean unsaponifiables and injectable chondroprotectants such as polysulfated glycosaminoglycan (Adequan) and pentosan polysulfate sodium (Cartrophen [available in Canada and other countries]).

Nutrition

Weight loss is the single most important factor to help with reducing pain in overweight and arthritic patients. Achieving an ideal body weight is critical for maintaining joint health and slowing the progression of arthritis. Arthritis is an inflammatory disease by nature and obesity is a source of chronic inflammation. Adipocytes release hormones that have local and systemic effects. Increases in body condition scores are associated with an increase in inflammatory markers, which means that overweight patients are in a constant state of inflammation. Obesity contributes to a pro-inflammatory state, which activates pain sensors, increases pain perception and aggravates joint degeneration by destructive enzymes. Obesity and arthritis exacerbate each other; it is a constant

> Management is dynamic. It needs to change over time because the disease is progressive. It's important for these patients to come in for regular rechecks. One of the main reasons for lack of success for arthritis management is we've failed to adjust our treatments over time.

struggle of arthritic patients becoming overweight because of reduced mobility, and overweight patients developing arthritis at faster rates than typical.
Dr. Edwards states that pet owners and, unfortunately, veterinary healthcare teams simply don't recognise obesity in pets. Despite obesity being easily visible, more than 50 percent of dogs and cats are overweight. Veterinarians need to focus on the pets that would benefit the most from early intervention, the ones with a 6 to 7 body score (on a scale of 1-9).

"When talking about obesity and weight control with clients, we need to remove emotion and focus on the health risks of excess weight—that it compromises mobility, compounds arthritis and contributes to the pet's pain." More importantly, she says, "Obesity affects quality and quantity of life, which impacts the human-animal bond."

Dr. Edwards recommends using one of the available scoring systems and recording a body condition score (BCS) for every patient at every visit. She says estimating a BCS allows you to determine a pet's ideal body weight, which is necessary to calculate the appropriate calorie intake for the pet. Simply reducing the current volume of food is not ideal for long-term balanced nutrition. It is important to choose a food that is appropriate for weight loss versus one for weight maintenance or obesity prevention. OTC diets are for less than five percent weight loss. Otherwise, use prescription diets that are lower calorie and nutrient dense. You don't want to just reduce the volume of normal food. Doing so may just slow metabolism. Use prescription weight-loss diets when you can.

Dr. Edwards also recommends the use of gram scales to measure feeding portions and encourages the use of food puzzles or games for mental stimulation. Once at an ideal body weight, patients are less likely to regain weight when they continue to be fed the weight-loss diet, adjusted for a caloric intake appropriate for weight maintenance.

TLC tips for the clinic and beyond

Giving these patients a little extra TLC in the clinic or at home can go a long way toward patient comfort. Dr. Edwards recommends taking the following steps in your veterinary clinic:

- Increase traction on slippery clinic floors
- Use mats for orthopaedic examinations
- Remember sore joints during handling for catheters, nail trims, and with positioning of sedated patients for dentistry and radiographs
- Send patients home with "nice feet." Dr. Edwards takes the time, especially when a patient is anaesthetised for another procedure, to trim the nails and trim the hair between the toes to provide more traction for the footpads.

Dr. Edwards also helps her clients make their homes more comfortable for arthritic and obese pets by having them:

- Take dogs for controlled and structured leash walks, rather than allowing uncontrolled off-leash activity
- Avoid high-impact activities
- Adapt the home environment by limiting access to stairs with gates and supplying ramps for access to the car or furniture
- Provide comfortable bedding
- Elevate feeding dishes
- Increase traction on the slippery floors
- Use assistive devices, such as slings or carts, as recommended by the veterinarian
- Trim nails and the hair between the toes.

According to Dr. Edwards, the overall goal with these patients is to minimize pain while maximizing mobility.

Physical medicine options

"Physical medicine is all about supporting the body as it heals and restoring functional ability," Dr. Edwards says. A tailored rehabilitation program can reduce pain and inflammation, improve joint health and mobility, maintain and improve muscle mass, improve proprioception and stimulate overall mental health and physical fitness. Physical medicine options for patients with arthritis and chronic pain include cryotherapy, thermotherapy, laser therapy, acupuncture, land-based treadmills, hydrotherapy and tailored exercise regimens. Low-intensity exercise can benefit patients by supporting the loss of fat versus muscle, increasing oxygen capacity and energy expenditure, improving joint and muscle function, improving stamina and reducing lameness.

She reminds practitioners, however, "You have to break the pain cycle before you can improve function with physical medicine. Adequate pain management is required for our patients to successfully engage in a rehab or fitness program. We should be assessing pain levels all of the time, at all stages. Any rehab or fitness program should be based on the patient's current limitations and physical fitness. Our goal is to challenge the body over time, based on the goals of treatment."

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The ABCs of Veterinary Dentistry

"L" is for "Looks Like we're too Late"

Dr. Bellows asks whether we're emphasising prevention enough in the dental care of our patients.

By Jan Bellows, DVM, DAVDC, DABVP, FAVD
DVM360 MAGAZINE

Recently I was asked to give a talk titled, "How can a Chihuahua have full dentition into old age?" I stressed starting plaque control early once the permanent teeth erupt and performing periodic professional oral assessment, treatment and prevention (oral ATP) visits when gingival inflammation and halitosis were present, including extracting teeth affected by advanced periodontal disease.

On the way home from the talk it dawned on me that this approach to dentistry is in the wrong order. Our office sends yearly oral ATP reminders, but our clients are usually motivated to make an appointment to have their pet's teeth cleaned in response to oral malodour and not a card that arrives in the mail. Following our approach, we get into the mouth too late, practicing fire engine dentistry necessitating multiple extractions (Figure 1).

Oral malodour originates from putrefying materia alba lying in periodontal pockets. This is the problem: Without proactive and very active plaque control, significant moderate to advanced periodontal disease arises in those dogs and cats that are prone. (Note: Not all dogs and cats automatically get periodontal disease because they have plaque and tartar. Periodontal disease is mostly an individual immune response resulting in inflammation and infection.)

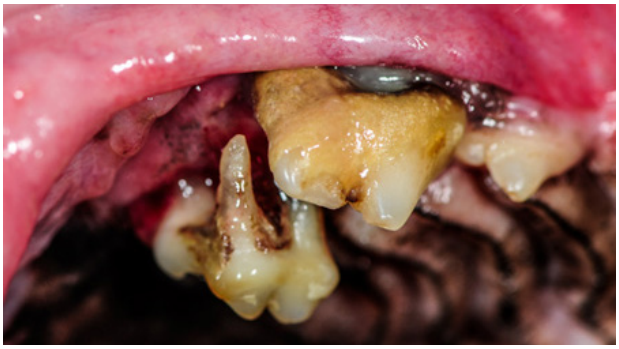


Figure 1. Advanced periodontal disease affecting the maxillary fourth premolar and first molar in a dog. (Photos courtesy of Dr. Jan Bellows)

Human dental patients are sent notices at least every six months for a prophylaxis, which is a procedure that involves cleaning the teeth ultrasonically and using hand instruments on a patient who does not have significant subgingival deposits or periodontal pocketing thanks to lifelong plaque prevention. The typical human prophylaxis patient has healthy gingival tissues, which do not bleed on gentle probing, and have no periodontal pockets over 4 mm in depth.

Human dentistry embraces prevention first. In our model of oral ATP, prevention is offered last. In the acronym that many veterinarians use—COHAT, or comprehensive oral assessment and treatment—prevention is not even mentioned. A small percentage of human patients need to have teeth extracted due to periodontal disease compared with the patients we work on, which generally have not benefited from dogged plaque control efforts.

Once you have embraced the concept of prevention first, share it with your clients. Consider replacing the terminology used in your practice from oral ATP or COHAT to COPAT—comprehensive oral prophylaxis, assessment and treatment—thus placing prevention

first on the list and in your mind. When your clients understand the reasons behind frequent professional care—preventing pain and tooth loss—they are more apt to comply. It is for their pets' good and long-term welfare.

Prophylaxis and initial periodontal therapy: A quick review

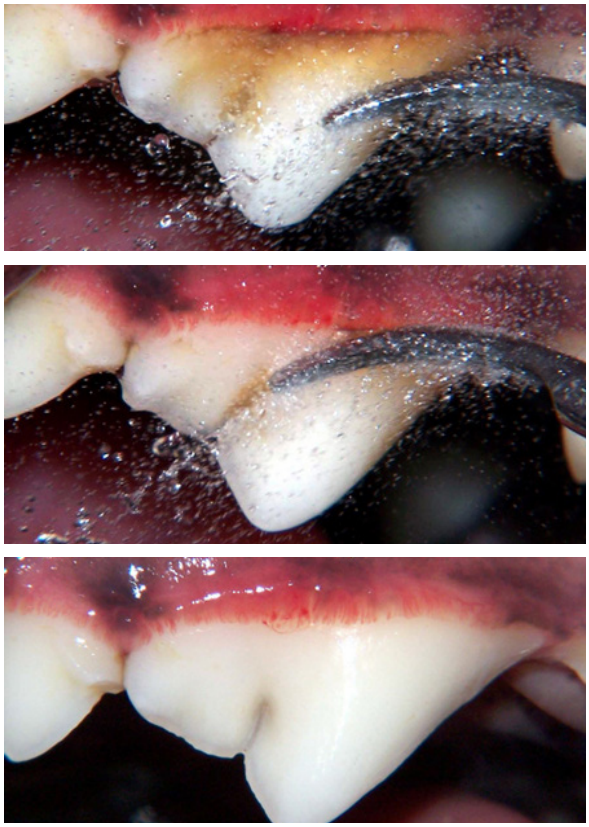
Although periodontal disease cannot be completely reversed, dental prophylaxis is one of the tools we have to effectively decrease the progression rate of its destructive advancement. For most adult humans, prophylaxis is recommended twice annually as a preventive measure and every three to four months for periodontitis sufferers.

Here's the Prophylaxis Process in Veterinary Patients.

1. **Supragingival Cleaning:** to thoroughly clean the area above the gum line with an ultrasonic scaler, removing most of the plaque and calculus (Figures 2A-2C).

2. **Subgingival Cleaning:** for patients with early and moderate stages of periodontal disease to remove plaque and calculus from small gingival pockets beneath the gum line (Figures 3A-3C).

3. **Tooth-by-Tooth Examination** with full-mouth intraoral radiographs: to show the extent of bone support loss.

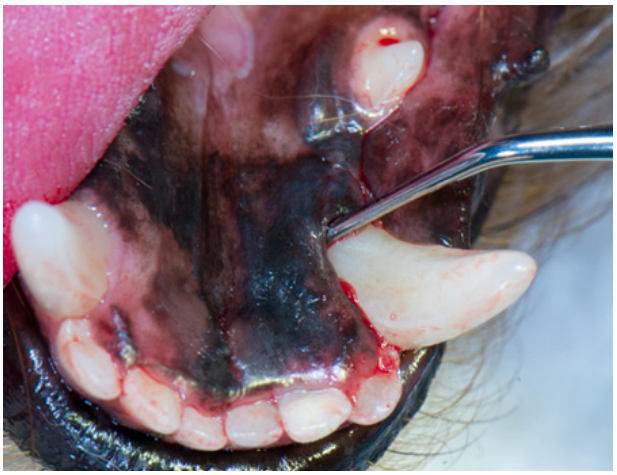


Figures 2A-2C. An ultrasonic scaler used to remove plaque and calculus from a dog's maxillary fourth premolar.

4. **Root Planing:** smoothing of the accessible tooth root with a curette by the veterinarian to eliminate remaining calculus and plaque.

5. **Medication:** following scaling and root planing, antimicrobial medication can be placed into bleeding sulci or moderate periodontal pockets (Figures 4A-4C).

Figure 3A. A curette before subgingival insertion. Figure



3B. Extension of the curette subgingivally.

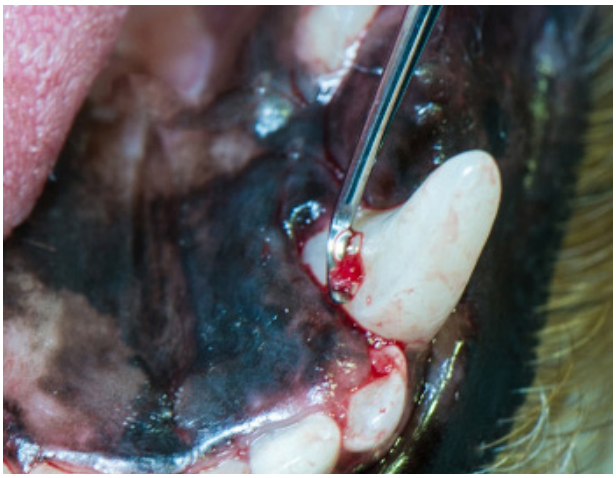


Figure 3C. Removal of subgingival debris.

What to do Now?

Here are the action steps to put prevention first to preserve your patients' teeth now rather than on the treatment table:

1. Start early with each puppy and kitten. Twice-daily efforts to decrease the accumulation of plaque are vital to keep teeth and gingiva healthy. Communication is the cornerstone to make this happen lifelong. The exchange of information and the connection to patients will result in understanding the value of why they need to practice this lifelong habit.
2. Show clients how to use wipes on the outside of a dog's deciduous teeth first and permanent teeth when they erupt (Figure 5). Watch clients perform a wiping. In cats, rubbing a long cotton-tipped applicator dipped in tuna juice on the buccal and labial surfaces of the gingival margin will help control the daily accumulation of plaque.

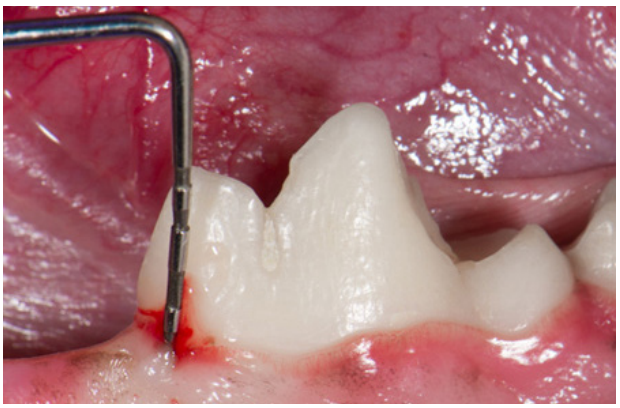


Figure 4A. Bleeding on probing and a 5-mm periodontal pocket along the mesial root of the left mandibular first molar.

Figure 4B. Application of a local antimicrobial (Clindoral—TriLogic Pharma) into the cleaned pocket.

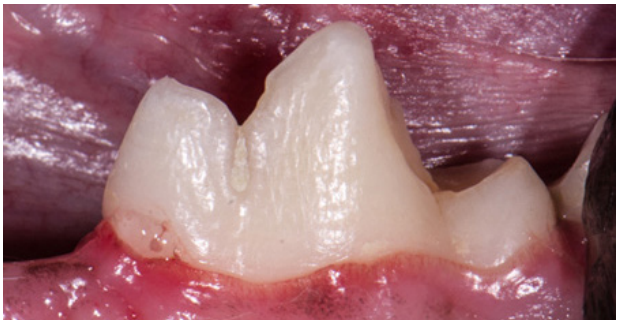


Figure 4C. A local antimicrobial bleb after application.

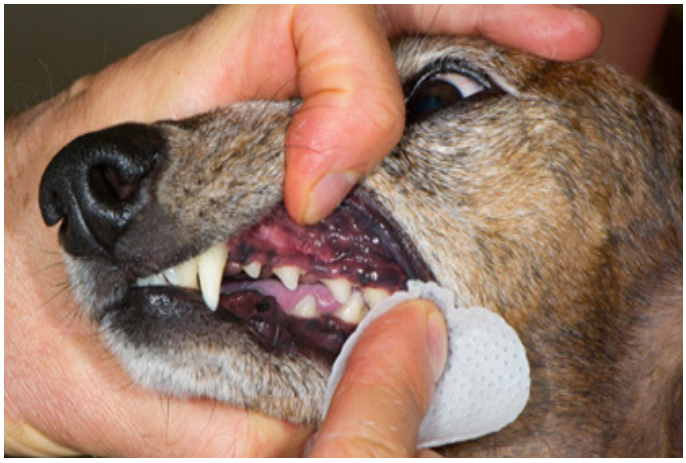


Figure 5. Using wipes to remove daily plaque accumulation.

3. Once a dog is 6 months old, tell clients to feed a Veterinary Oral Health Council (VOHC)-accepted daily chew.
4. Encourage the use of as many VOHC-accepted products as possible.
5. Perform the first COPAT at 1 year of age and repeat when there is inflammation at the gingival margin (*vs.* the calendar reminders).
6. Promote the use of dental sealants (OraVet plaque prevention gel and SANOS).
7. After the COPAT visit, encourage monthly dental progress visits to complement your client's efforts at plaque control and make improvement suggestions if needed.

Hurdles to Overcome

What has stopped us from practicing prevention-first companion animal dentistry? Three obstacles: 1) anesthesia for the prophylaxis, 2) cost and 3) perceived difficulty of performing home care. How can we diminish these concerns and place prevention first?

Anaesthesia

The delivery of safe anaesthaesia has come a long way over the past years. Thanks to routine preanaesthetic testing, we now know more about our patients, we can tailor the use of specific preanaesthetic and anaesthetic medications for each patient, and we monitor vital parameters throughout and after the prophylaxis. Adverse anaesthetic events are rare. A scientific study of 98,000 average 8-year-old dogs anaesthetised for at least one hour by general practitioners and specialists showed that the death rate under anaesthesia is 0.15%. This means 99.85% of patients survive anaesthesia and sedation.

Cost

Spending $300 plus on the preoperative testing, intravenous fluids, anaesthesia and COPAT may seem excessive when clients compare their pets' teeth cleaning with their own. Here is when discussion of the value of what we do before, during and after the prophylaxis pays off.

Fortunately with the advent of wellness plans, the prophylaxis in many hospitals is rolled into monthly or

yearly premiums similar to human dental insurance. For those patients not on a wellness plan there are many payment plan alternatives, which help alleviate the money issue.

Perceived Difficulty and Ineffectiveness of Home Care

The patient's immune response to plaque accumulation is the proximate cause of periodontal disease—more plaque and more rough tartar supports more plaque to irritate and infect underlying gingiva in those susceptible patients. The key to preserving teeth into old age lies in implementing a twice-daily plaque prevention program understood and supported by your clients and everyone in the office.

What you choose for home care is key. Tooth brushing, the gold standard, is not practiced enough because most clients are not willing (or able) to put their fingers inside their pets' mouths. Sending your clients to the pet store for nonefficacious homecare products is a waste of their time and money and is potentially dangerous for dogs chewing on bones, antlers, hard nylon toys and bully sticks.

The VOHC accepts products (diets, chews, toothpaste, water additives and even a toothbrush) that have been shown to decrease the accumulation of plaque and/or tartar by at least 15% and an average of 20% in two studies. Currently there are 36 dog and 12 cat products accepted.

Each prevention program needs to be tailored to the specific pet. What I have found most acceptable and effective is using dental wipes in the morning to rub away accumulated plaque and prescribing a VOHC-accepted dental diet followed by feeding a VOHC-accepted age- and size-appropriate dental chew in the evening after dinner. Aggressively promoting prevention first will make the largest impact in stopping periodontal disease and tooth loss. Your patients' (and clients') smiles will be easier to see with teeth.

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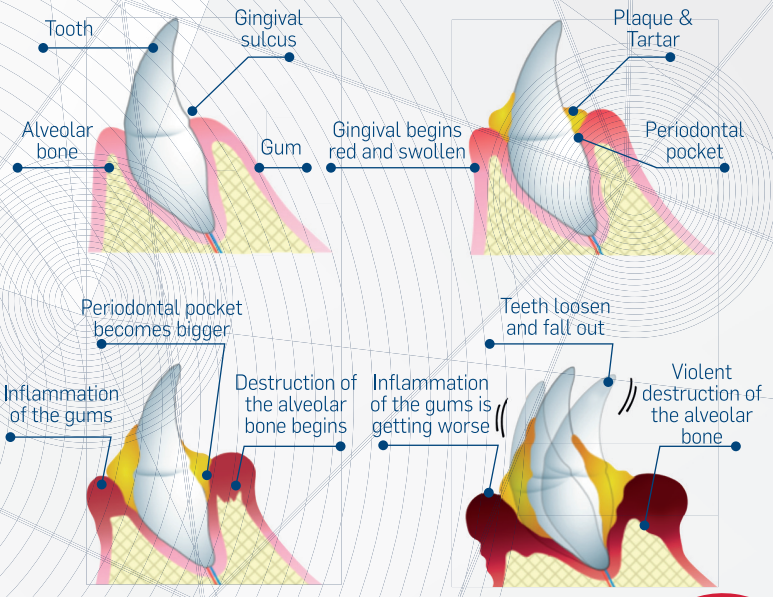

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From Cloudy to Clear
Effusions Made Easy

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Introduction

An effusion is the fluid that can accumulate in a body cavity due to various different pathologies. Mechanistically, effusions are caused by transudation, exudation, rupture of a blood/lymph vessel/ hollow organ, or neoplasia.

Types of effusions include transudates and exudates, but also haemorrhagic effusions, chyle and uroperitoneum. The composition of the fluid gives clues as to the pathology that caused it, and the goal of fluid cytology is to describe this composition, by looking at cellularity, cell types present, protein concentration, SG and the presence of other substances like bilirubin or creatinine.

Sample Preparation

Effusions can be examined in-house or sent away to reference laboratory for evaluation. Fluid should be collected into an EDTA tube for cytological analysis, and into a plain tube for culture. Two direct smears (using the blood-smear technique) should be made from the EDTA-fluid. If the samples are to be sent away, these smears should be left unstained, packaged in plastic slide-keepers and stored at room temperature until sent. The EDTA and serum tubes should be stored at 4°C.

For in-house analysis, the total nucleated cell count (TNCC) can be determined from the uncentrifuged EDTA fluid sample on an automated cell counter – in most cases the same analyzer used for measuring haematology/ CBC samples. If this is not available, an estimate of cellularity ("low" or "high") can be made from the direct smears, with some experience. After TNCC measurement, the EDTA tube is centrifuged. Total protein and SG of the supernatant is measured with a refractometer. If the TNCC is < 30 000 cells/ µL, or cellularity is low on the direct smear, smears should be made from the sediment after centrifugation. The supernatant should be saved in case any biochemical tests need to be performed.

If the fluid is very bloody, prepare a buffy coat smear to concentrate any nucleated cells of interest.

It is usual to perform a 100-cell differential count, or at least estimated the proportions of the different nucleated cell populations, when examining the smears. Note should be made of any infectious agents, foreign material, background or atypical cells.

Normal pleural fluid has a protein concentration of < 25 g/L with very low numbers of macrophages and mesothelial cells. Mesothelial cells line the pleural, pericardial and peritoneal cavities and will be present in most effusions. They are large cells, present singly or in clusters, as seen in Figure 1.

Mesothelial cells become hyperplastic very quickly in response to an increased volume of any type of fluid. Numbers increase, and they display many atypical features – multinucleation, mitotic figures, prominent

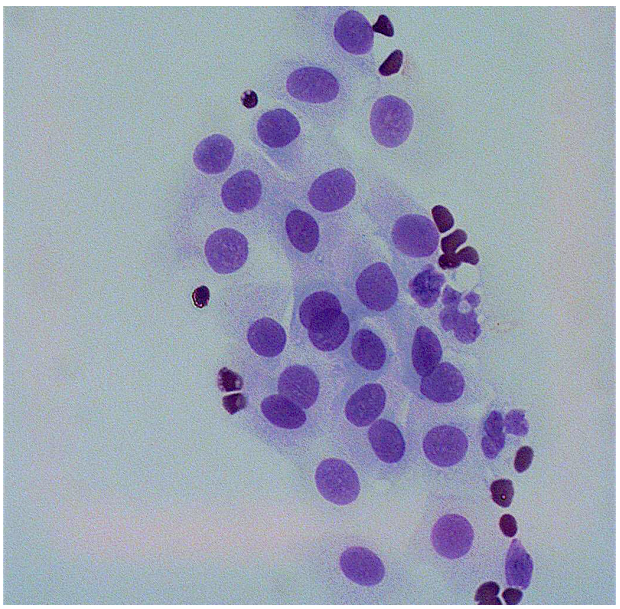

Figure 1: An aggregate of morphologically normal mesothelial cells (500x; Diff-Quick)

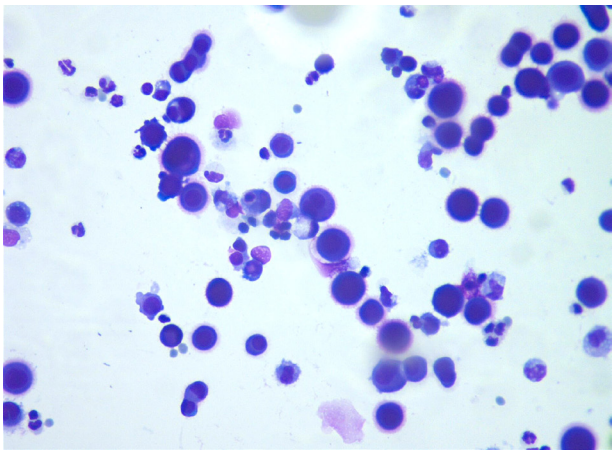

Figure 2: A pleomorphic population of reactive mesothelial cells displaying anisocytosis, anisokaryosis, increased cytoplasmic basophilia, variable nucleocytoplasmic ratios, multinucleation and nuclear moulding. Also the note the pink brush-like cytoplasmic border, which is typical for mesothelial cells. (500x; Diff-Quick)

nucleoli, coarse chromatin and nuclear moulding are not unusual (Figure 2).

They also tend to slough off in sheets when reactive. It is almost impossible to differentiate highly reactive mesothelial cells from a neoplastic population, as well as from cells originating from an adenocarcinoma. Diagnosis of a mesothelioma based on cytology alone is not considered accurate, and imaging findings should always be taken into consideration. If cytology is suspicious, fluid sediment/ pellet can be fixed in formalin and processed as a histopathology sample. Evaluation of the arrangement of the cells as well as immunohistochemical staining can then be performed.

Classification of Effusions

Readers may notice the absence of the "modified transudate" in the descriptions below. This classification is only used in veterinary, and not human medicine. The classification of transudate and exudate, based on cut-offs for TNCC, SG and protein was first introduced in a veterinary internal medicine textbook in 1968. The modified transudate appeared in 1971, in order to cover fluids that did not fit the criteria for transudate or exudate. Rather alarmingly, the veterinary classification system, using cellularity and total protein to indicate the mechanism of effusion formation, is not evidence-based and has been shown to be inaccurate. The modified transudate, in particular, is considered by many veterinary clinical pathologists to be a meaningless and unhelpful category.

The classification system used here attempts to give information about the underlying aetiology for the effusion.
(Regarding units for total nucleated cell counts: 1 x 10^9/L = 1000 /µL. The former is the SI unit, but the latter is more commonly used.)

1. Transudate

Transudates appear when there is increased vascular hydrostatic pressure with or without loss of oncotic pressure due to hypoalbuminaemia (i.e. a disruption of Starling's forces). Transudates are further subdivided as:

i. Low protein transudate: clear colourless effusions with low protein concentrations and low nucleated cell count (NCC):

- Dogs/ cats: TP < 25 g/L, NCC< 1500 cells/ µL
- Cell types present: mixture of non-degenerate neutrophils, lymphocytes, macrophages and reactive mesothelial cells (all in very low numbers).
- Caused by leakage of low protein fluid from the blood vessels into a body cavity, usually due to hypoalbuminaemia together an increase in hydrostatic pressure.

For transudative effusions to be present solely due to hypoalbuminaemia, it has been suggested (but not proven in animals) that the serum albumin level has to be <15 g/L.

The 2 main disorders causing the formation of a low protein transudate are

- protein-losing nephropathy (protein lost through the kidney – hypoalbuminaemia – decreased oncotic pressure + abnormal regulation of blood volume – water retention – increased hydrostatic pressure)
- hepatic cirrhosis (liver cannot produce proteins - hypoalbuminaemia – decreased oncotic pressure + abnormal regulation of blood volume – water retention – increased hydrostatic pressure)

Other rarer disorders than can cause a low-protein transudate in the absence of hypoalbuminaemia are: portal vein anomalies, pulmonary hypertension
Low protein transudates are rare.

ii .High protein transudate: clear to cloudy, yellow, orange or red effusions with medium to high protein concentrations and low to medium nucleated cell count (NCC):

- Dogs/ cats: TP ≥ 25 g/L, NCC< 5000 cells/ µL
- Cell types present: mixture of non-degenerate neutrophils and macrophages and reactive mesothelial cells.

Caused by increased hydrostatic pressure in the lungs or liver (sinusoidal/ post-sinusoidal) due to venous congestion. The increased hydrostatic pressure causes fluid to leak out into the pleural/ peritoneal space. The protein concentration of the fluid is not low.

The two main disorders causing venous congestion in the lungs or liver, leading to a high protein transudate are:

- congestive heart failure
- chronic hepatic disease

2. Exudate

An exudate forms due to increased vascular permeability caused by inflammation. The exudation of protein-rich fluid is accompanied by migration of inflammatory cells into the effusion:

- Dogs/ cats: TP >25 g/L, NCC >5000 cells/ µL
- Exudates are hazy to cloudy, yellow, tan, cream, orange, and may have a putrid smell if bacteria are involved.

Neutrophils are the dominant cell present in most exudates. With inflammation due to bacterial infections, degenerate neutrophils will be the predominant cells present, unless the bacterial toxin is weak or produced in small amounts. Lack of bacteria and/or organisms does not rule out an infectious cause.

A septic exudate refers to the presence of intra- and extracellular bacteria, and a non-septic exudate refers to the absence of bacteria and a negative culture. The classification of an effusion as non-septic should be based on a negative culture. Non-septic exudates are caused by acute pancreatitis, necrosis associated with intracavitatory neoplasia or secondary to intracavitatory organ inflammation. Septic exudates are caused by disorders like GIT rupture or penetrating wounds. (Figure 3)

If acute pancreatitis is suspected to be the cause of a non-septic exudate, fluid lipase may be helpful. A DGGR-lipase activity in fluid of > 500 U/L, or twice serum lipase; or a SpecCPL of > 500 µg/L is highly specific for pancreatitis as the cause of the exudate.

Exception: FIP exudate: Caused by the FIP virus, has a very specific appearance – straw-coloured, viscous, TP > 25 g/L, NCC < 5000 cells/ µL. Cell population is a mixture of neutrophils and macrophages. (The reason for the low cellularity is that although there is a vasculitis in FIP, the focus of inflammation is inside the blood vessels and not in the body cavity – so vessels are leaky to plasma proteins, but inflammatory cells remain in the blood vessel walls)

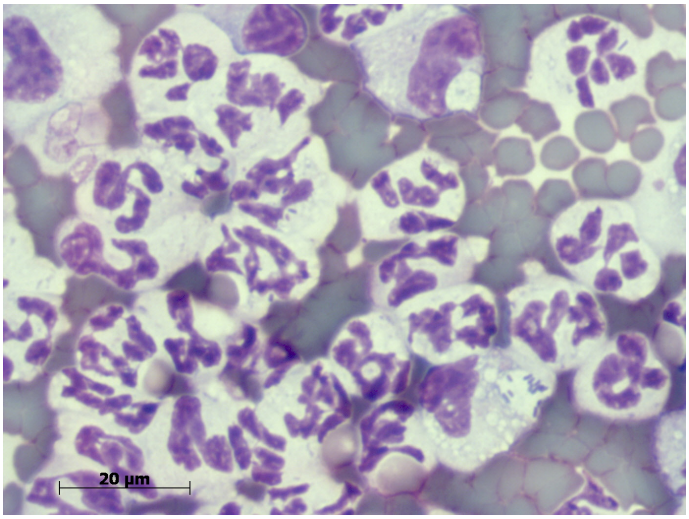

Figure 3: Sediment smear of a septic peritoneal exudate from a horse with caecal rupture. The dominant population consists of degenerate neutrophils, some of which contain intracellular bacteria. (1000x, Diff-Quick)

3. Haemorrhagic Effusion

Causes include haemostatic defects, trauma or neoplasia invading blood vessel walls. The fluid is red and bloody in appearance. Dominated by red blood cells. PCV >1%

- All species: TP >25 g/L, NCC >2000 cells/ µL

With haemorrhage of more than 24 hours duration or chronic persistent haemorrhage, erythrophagocytosis and/or haemosiderin or haematoidin should be present. With peracute haemorrhage or iatrogenic blood contamination, platelets could be present. If both erythrophagocytosis and platelets are present, chronic persistent haemorrhage or previous haemorrhage and iatrogenic blood contamination are present. A fluid PCV of > 1% indicates that haemorrhage is contributing to the effusion. Inadvertent aspiration of the liver or spleen could also cause a cytological appearance similar to haemorrhage. The PCV of this fluid will then be higher or similar to the peripheral blood PCV.

The most common causes of haemoperitoneum in dogs is splenic disease, specifically haemangiosarcoma. However, fluid cytology has a very low sensitivity for detecting cells from haemangiosarcomas in haemorrhagic fluids, due to the dilution effect of the blood and poor exfoliation of cells from these tumours. In other words, neoplastic cells from haemangiosarcoma are rarely seen in haemoperitoneum caused by this tumour. The absence of neoplastic cells does not at all rule out a haemangiosarcoma.

In cats, the most common cause of haemorrhagic effusions is trauma, followed by various types of neoplasia.

4. Uroperitoneum

Caused by a ruptured bladder. TP and NCC are variable – both very low initially (because urine has a very low protein and cell content), then increasing with time as urine is irritant to the peritoneum and causes a low-grade inflammation, so that the fluid becomes an exudate with time. There may be a urine odour. If uroperitoneum is suspected, fluid creatinine concentrations must be measured.

Two out of the following three criteria are diagnostic for uroperitoneum:

- Fluid creatinine > 2x serum creatinine
- Fluid creatinine > 4x normal serum creatinine (upper reference limit)
- Fluid K^+ > 1.4 x serum K^+

5. Chylus Effusion / Chyle

Chylus effusions occur due to leakage of lymphatic fluid into body cavities due to physical or functional obstructions to lymphatic ducts or to trauma (rare). These effusions therefore have characteristics similar to lymphatic fluid in the lymph ducts draining the GIT.

- They are milky and white, TP >25 g/L, NCC < 10 000 cells/ µL.
- The dominant cell population is small lymphocytes, but cytology may vary if the chylus fluid causes irritation of and inflammation is present.

Lipids are absorbed from the GIT as chylomicrons into the intestinal lymphatic vessels, and enter the blood via the thoracic duct. Chylus effusions are therefore high in triglycerides. If a chylus effusion is suspected, triglyceride concentrations should be measured in the fluid. If TGL > 1.13 mmol/L then the effusion is confirmed as chyle.

Chylus effusions may occur in both the peritoneal and pleural cavities, depending on where the disruption to the lymphatics has occurred.

6. Bile Peritoneum

Caused by a rupture in the biliary system due to gall bladder disease, choleliths or cholangitis. Starts off as a low protein transudate, but as bile is extremely irritant to the peritoneum, the protein and cellularity increase and the process becomes exudative.

The fluid may have a greenish or orange tinge. Bilirubin concentrations in the fluid are >2x bilirubin in serum. Bilirubin crystals may be seen on cytology.

7. Neoplastic Effusion

Neoplasia may cause:

- obstruction to lymphatics resulting in a chylus effusion
- obstruction to blood vessels resulting in a high-protein transudate
- invasion of blood vessels resulting in a haemorrhagic effusion
- inflammation resulting in an exudate

A neoplastic effusion is identified as such when malignant cells are seen in the effusion. (Figure 4) The most common tumours associated with effusions are lymphoma and carcinomas.

A cytological diagnosis of neoplasia in an effusion (excluding mesothelioma) has a high specificity and high positive predictive value. Sensitivity is however low, and a negative diagnosis does not rule out neoplasia.

8. Pericardial Effusions

In dogs, the most common causes are neoplasia (haemangiosarcoma) and idiopathic. Rarely, a pericardial effusion may be caused by left atrial rupture, coagulopathy or bacteria. Cytology usually reveals a haemorrhagic effusion with highly reactive, atypical looking mesothelial cells. Sensitivity for identifying HAS is very low. Around 75% of pericardial effusions in cats are caused by chronic heart failure (i.e. will have cellularity and protein concentration consistent with high protein transudate). However, periocardiocentesis is performed extremely rarely in cats.

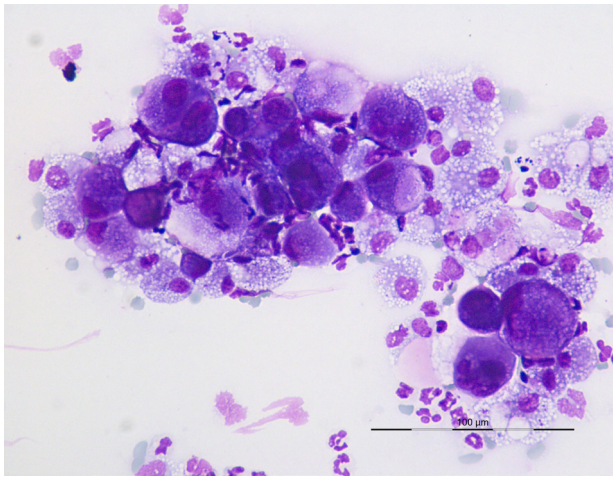

Figure 4: Peritoneal effusion from a dog with high numbers of neoplastic epithelial cells, originating from metastasis of a mammary adenocarcinoma.(x500, Diff-Quick)

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Correct Sample Collection and Preparation Technique for Cytological Evaluation

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Other than the experience of the cytopathologist evaluating the samples, one of the major factors determining the diagnostic value of cytologic specimens is the quality of the sample.

Cytology is a reliable method of obtaining a tissue diagnosis in a minimally invasive way and is most frequently used to investigate superficial cutaneous or subcutaneous masses, lymphadenomegaly and body cavity effusions. The widespread availability of ultrasonography has, however, greatly enhanced the ability to accurately sample focal lesions deep within body cavities. Cytology and histopathology remain complementary diagnostic procedures, reflecting a trade-off between the lower degree of invasiveness of sample collection and short turn-around time with cytology and the increased amount of information available due to the ability to evaluate the tissue architecture with histopathology.

With cytology, the clinician is faced with the responsibility of not only collecting an adequately representative sample, but also preparing the slides that are to be examined.

Benefits of cytology:

- Sample collection usually quick, easy and inexpensive.
- No requirement for general anaesthesia – may need light sedation in some cases.
- Less invasive collection techniques – little or no risk to the patient.
- Diagnosis within hours
- Useful for making a specific diagnosis, identifying the disease process, directing therapy, prognostication and to determine the next diagnostic step.

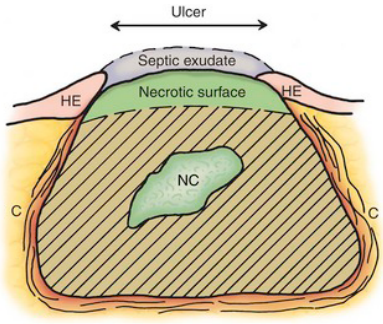


Fig 1: A mass is often made up of multiple"anatomical" regions . The area aspirated will affect the diagnostic quality of the sample

Limitations:

- Does not preserve tissue architecture; therefore less information regarding tissue of origin and behaviour of tumour (e.g. grading, degree of tissue infiltration, presence/absence of necrosis).
- Cellular yield may be very poor for certain tissues or tumours e.g. tumours of mesenchymal origin – may require concurrent histopathological examination.
- May not be representative of the lesion under investigation.(Fig 1)

SAMPLE COLLECTION AND PREPARATION

Table 1. Cytological sample collection methods and indications:

Collection method	Indication for uses	Comments
Fine needle aspiration	Masses (surface or internal), lymph nodes, internal organs, fluid collection	Best method for non-invasive sampling of internal organs/masses and cutaneous/ subcutaneous masses
Impression smear	Exudative cutaneous lesions, cytology from biopsy samples	May yield only surface cells and contamination – a problem with ulcerated tumours
Scraping	Flat cutaneous lesions, cytology from poorly exfoliative biopsy specimens	Obtain some blood/ serum to make cells stick to slide
Swab	Vaginal smears, fistulous tracts	Used when anatomical location is not amenable to other methods

Terminology

- Hypertrophy: An increase in cellular size and/or functional activity in response to a stimulus.
- Hyperplasia: An increase in cellular numbers in response to a stimulus. Increased mitotic activity is a common finding. This is a reversible change. Example – generalised reactive hyperplasia of lymph nodes seen with chronic canine ehrlichiosis.
- Neoplasia: An increase in cellular growth and multiplication that is not dependent on a stimulus external to the neoplastic tissue.
- Metaplasia: A process where one mature cell type is replaced by another mature cell type. This change is seen as an adaptive replacement that is reversible e.g. chronic rhinitis.
- Dysplasia: A reversible, irregular, atypical, proliferative cellular change in response to irritation or inflammation. Can be confused with malignant changes.
- Anaplasia: A lack of differentiation of tissue cells. Usually an indicator of malignant potential.
- Dyscrasia: An increase/decrease in the numbers of one or more cell components/maturational stages of a tissue out of proportion to other cell components/ maturational stages.

1. Fine-needle aspiration (FNA)

The sample is collected with a 22-25 G needle and a 3-20 ml syringe. The softer the tissue is, the smaller the needle and syringe that should be used. With larger needles, tissue cores with few free cells are aspirated and blood contamination (haemodilution) is more common. Softer tissues such as lymph nodes are aspirated with a 3 ml syringe, whilst firm tissues such as fibromas and squamous cell carcinomas require a larger syringe to maintain adequate negative pressure/suction in order to collect sufficient cells. If the texture of the tissue is unknown, a 12 ml syringe should be used.

Skin preparation is similar to that required for venipuncture, i.e. an alcohol swab can be used to clean the area. In the case of ultrasound-guided aspiration, it is very important to clean the skin of any ultrasound gel before sampling, as even a very small amount of ultrasound gel contamination during aspiration could obscure cells and render a slide non-diagnostic.

There are 2 basic harvesting techniques.

- **Aspiration technique**
  The mass is stabilized between thumb and forefinger, while the needle with syringe attached is introduced into the mass. The plunger is withdrawn two-thirds to three-fourths the syringe volume. If the animal is calm enough and the mass is large enough, the needle is redirected in the mass while negative pressure is maintained. With small masses and fractious animals, negative pressure is released, the needle redirected and negative pressure then reapplied. Negative pressure is released before the mass is exited to prevent the aspiration of surrounding tissues, the aspiration of the sample into the needle hub/syringe and excessive blood contamination.
  After several areas of the mass have been sampled, negative pressure is released, the needle removed from the mass and then the needle is removed from the syringe. Air is drawn into the syringe, the needle is replaced and the sample is forced onto a clean glass slide. The material is smeared and allowed to air dry.

- **Stab technique**
  This technique relies only on the passage of the needle through the tissue to collect enough cells, and not negative pressure. Most commonly, a needle without an attached syringe is used, but a syringe can be connected to use as a handle only. No negative pressure is applied during collection. The hub of the needle is grasped with thumb and forefinger (as if throwing a dart), the mass is stabilized and the needle is inserted into the mass. About 8–10 stabbing motions are made, staying in the same tract, but making sure that the tip of the needle stays inside the mass so that contamination by surrounding tissues is avoided.

  The needle is removed from the mass; a syringe with plunger drawn back attached, and the material expelled onto a clean glass slide. It is then smeared and left to air dry. This procedure must be repeated in multiple areas of the mass. If multiple masses are sampled, always use new needles and syringes with each mass.

2. Impression smears

Impression smears (also called imprints) can be made of superficial cutaneous lesions or from tissues obtained by surgical biopsy. Ulcerative lesions must be imprinted, then cleaned with a moistened surgical swab and again imprinted. Freshly cut surfaces from biopsy samples must be blotted with absorbent paper repeatedly until dry of blood, and gently touched to the surface of a clean microscope slide, without a smearing action, as this will rupture cells.(Fig 2)

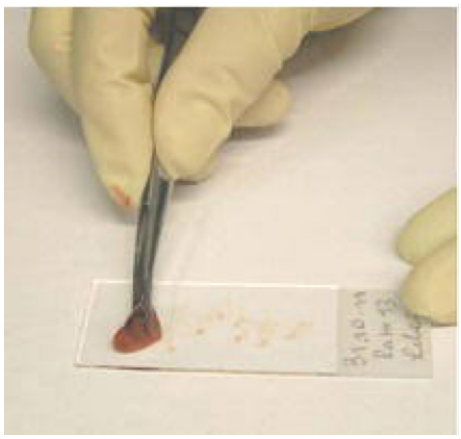


Fig 2: Impression smear being made from a blotted freshly cut edge of a biopsy sample

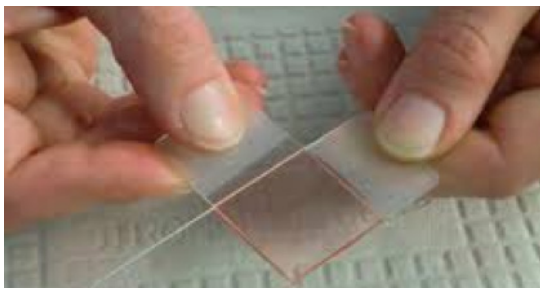
3. Scrapings
   Scrapings could be useful for obtaining cells from firm surfaces, such as firm cutaneous lesions. Cells obtained by means of a scalpel blade are gently smeared onto a clean glass slide. This often gives many broken cells, but areas of intact cells can usually be found.
4. Swabs
   Swabs can be used to obtain cells from mucosal surfaces such as the rectum or vagina, or in areas where the other sampling methods are not practical, such as fistulous tracts. The swab must be gently rolled along the surface of a clean glass slide.

Preparation of slides

Once a sample has been collected, it needs to be transferred to a clean glass slide and spread out - the aim is to obtain a monolayer of cells. This needs to be done quickly before the material dries out or clots. There are various techniques, depending on the volume and consistency of collected material.

1. Solid tissue aspirates

- Slide over slide ("squash") preparation
  This is generally the best method for preparing slides, if done properly but does need some practice. The material collected is placed in the middle of a clean glass slide (the smear slide). A second slide (the spreader slide) is placed over the sample, perpendicular or parallel to the smear slide. The weight of the spreader slide will cause the sample to spread. Once this has happened, the spreader is gently drawn across the smear slide, without any downward pressure, as this will rupture cells. (Fig 3) The weight of the second slide is enough to cause the cells to spread. Non-fragile tissues (e.g. from carcinomas) or any thick viscous material (such as mucous strands from trans-tracheal aspirates) can be spread by this method. With some experience, and a gentle touch, this method can also be used for more fragile tissues like lymph node or spleen.



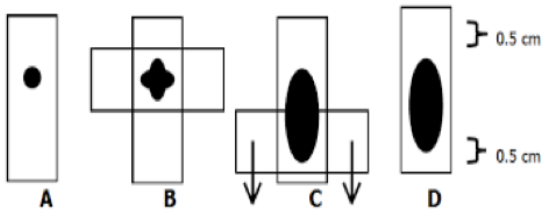


Fig 3: Slide over slide ("squash") preparation

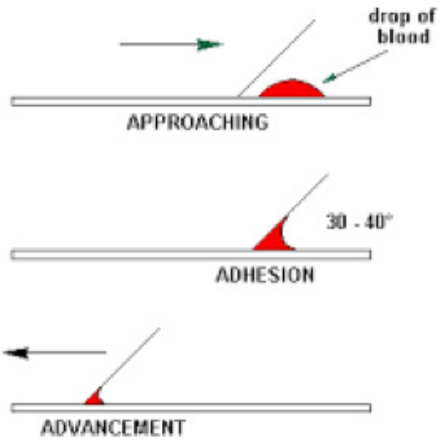


Fig 4: Blood smear technique

- Blood smear technique
  This is done in a similar manner to making a blood smear. The material is placed near the end of a smear slide. The spreader slide is placed in front of the material at a 45-degree angle, backed up until the material is touched and then moved forward. (Fig 4) The feathered edge should not be right on the edge of the slide, as the stage retaining clamps on the microscope will interfere with the oil immersion lens and the sample then cannot be viewed. Malignant cells are often found in the feathered edge. This technique works well for tissues with a fluid component, like internal organs and lymph nodes.

- "Starfish" preparation
  Here the tip of a needle is used to drag the material in several different directions. It is a gentle technique that does not cause much rupture of the cells, but it does leave a thick layer of tissue fluid around the cells that may stop them from spreading to an acceptable shape and size.(Fig 5) Usually some areas that can be interpreted are found. This is not a commonly used or preferred technique (rather try a squash prep), but can be used when grainy or viscous material is aspirated.

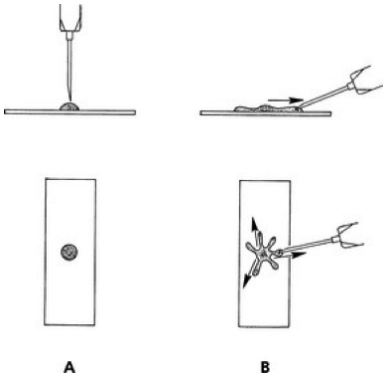


Fig 5: "Starfish" preparation

2. Fluid samples

Examples of fluid samples are pleural or peritoneal effusions, synovial and broncho-alveolar lavages. The main considerations with fluid samples are the preservation of cell morphology during transit to the laboratory (which should happen as soon as possible after collection) and preparing smears that are sufficiently cellular.

A fluid sample must be transferred to an EDTA tube straight after sampling, which will prevent coagulation and preserve cell morphology. A sufficient amount of fluid must be placed in the EDTA tube so that protein determination by means of a refractometer is not artificially elevated by the relatively large amount of very refractive EDTA.

EDTA should preserve cell morphology overnight. Refrigeration will prolong this time. However, even if fluid is placed in an EDTA tube and kept cool, major morphological changes due to cell ageing could occur within 24 hours. It is therefore important to also make fresh smears of the fluid: use the blood smear technique, allow the smears to air-dry and send to the lab unfixed and unstained, together with the fluid in EDTA. Do not place these smears in a refrigerator, as condensation will cause lysis of cells.

If the fluid is to be evaluated in-house, and not by a referral lab, the following is done:

- A direct smear from the uncentrifuged fluid (invert the tube a few times to mix first) should always be made in order to assess cellularity.
- After this, part of the well-mixed fluid can be centrifuged for five minutes at 1000–1500 rpm in a bench top centrifuge. This will result in cellular material forming a sediment or pellet at the bottom of the tube, covered by acellular fluid, the supernatant.
- The supernatant is decanted into a clear plastic tube, leaving the sediment in the original tube (as for urinalysis). A refractometer is used to determine the total protein concentration and specific gravity of the supernatant.
- The sediment is then aspirated and smeared on to a glass slide as described previously using the blood smear technique. If the sediment is thick/too cellular, use the squash technique.

Transparent fluids are usually low in cells and are always centrifuged after a direct smear has been prepared. The sediment can be smeared by means of the concentration line technique. This is very similar to the blood smear technique, except that the spreader slide is lifted directly upwards after advancing the material about two-thirds to three-quarters of the distance required to make a smear. The smear will have a line of concentrated cells at its end, but no feathered edge.

If fluid is visibly turbid (i.e. very cellular) often only a direct smear is sufficient. The sample can also be centrifuged and the sediment smeared. If sediment is very viscous, a squash preparation can be made.
When fluid is obtained from sampling a solid lesion, drain as much fluid from the lesion as possible and prepare as described above. If a solid tissue component

remains, attempt a fine needle aspiration of the lesion, and prepare as previously described. Cystic neoplasia will not exfoliate overtly neoplastic cells into the fluid, and the two types of material/methods might reveal completely different cell populations.

Staining of cytological samples

It is generally not necessary to fix or stain slides before submission to a laboratory as cytologists prefer to fix and stain smears themselves, with stains and techniques that they will adapt to the type and thickness of the smear. Sometimes special stains are required. All that is therefore required from private practitioners is to air dry the smear, and to identify and package them properly before submitting it to a laboratory. Submit the sample together with the patient history and identification and owner detail. Smears must be stained within a week after making them. Never submit slides for cytology in the same package as samples in formalin. Formalin fumes diffuse even from tightly closed containers and influence the staining properties of the cytology slides.

If the slides are to be examined in-house, they should be air-dried and can be stained with a modified Romanowsky stain like Diff-Quik.

The following measures will ensure good staining quality:

- Use only new clean slides. Samples will not spread out well on re-used slides even if they are cleaned and dried, as the surface properties of the glass will have been changed.
- Use fresh, well filtered stains to avoid precipitates and contamination with organisms or cell debris.
- Stain only completely air-dried slide, or dry slide quickly with a hair dryer.

The most common problem encountered is under-staining of slides. This will render cells and nuclei pink (while nuclei should be dark purple, with a clear demarcation of nucleus and cytoplasm). Neutrophils on the slide can be used as an internal control for staining quality. If understained, place the slide in the stains for an additional time period. If immersion oil has already been placed on the slide, wipe this off gently and place the slide in the fixative solution for a minute. This will remove the oil and also most of the stain, and the slide will need to be restained.

Identify slides by marking with pencil on the frosted end of the slide. Do not use paper labels to identify the slide – the staining process will damage/dirty paper labels or wash ink off.

CYTOLOGIST WISH LIST

- ☑ Don't place slide preparations in the fridge
- ☑ Don't place slide preparations anywhere near formalin
- ☑ "Less is More" : excessive suction force during aspiration causes more blood contamination
- ☑ Use the correct collecion technique for the tissue type (stab for fragile tissue and aspirate for firm tissue)
- ☑ Don't get the feather edge right on the end of slide - cannot focus properly
- ☑ Immediately place fluid samples into EDTA
- ☑ Take more than one sample to get a better representation of the tissue
- ☑ Send in a few unstained direct smears with fluid cytology
- ☑ In liver/spleen/lymphnode aspirates send in a blood smear for comparison

Additional material from the internet

1. Refer to IVD 300 Clinical Pathology notes for information regarding sample dispatch to laboratory. This video will remind you of the general principles: https://www.youtube.com/watch?v=JwcsQcQshBs&list=PLNjV05pK4JEVLl3x8_mLYXxpjfMV-Gq4P&index=9

2. This video shows the stab ("woodpecker") and aspiration ("syringe attached") techniques for sample collection, as well as how to make a squash preparation. https://www.youtube.com/watch?v=JTYJBNxeTH8

3. This video which shows how impression smears are made from biopsy samples: https://www.youtube.com/watch?v=hey21Z459X0&t=2s

4. This video shows hoe smear from swabs are made. https://www.youtube.com/h?v=GsLFO8zodKk&index=3&list=PLNjV05pK4JEVLl3x8_mLYXxpjfMV-Gq4P

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Articles - Cytology of effusions as well as Sample collection and preparation technique

Question 1
Which one of the options bellows is typical for a pericardial effusion in a dog
a. transudate
b. exudate
c. haemorrhagic effusion
d. high protein transudate
e. serosanguinous fluid

Question 2
Which one of the mecahnisms below is NOT a likely cause for a neoplastic effusion?
a. obstruction to lymphatics
b. obstruction to blood vessels
c. invasion of blood vessels
d. inflammation
e. secretory activation

Question 3
Which one of the processes listed below is least correct when considering gall bladder rupture/leakage
a. initially a low protein transudate
b. bile is extremely irritant
c. bilirubin crystals may be seen on cytology
d. process becomes exudative
e. culminates in an septic exudative peritonitis

Question 4
Which one of the characteristics listed below is NOT typical of a chylus effusion?
a. chylus effusions occur only in the pleural cavity
b. accumulated fluid is milky and white
c. the dominant cell population is small lymphocytes,
d. the cytology may show inflammatory change.
e. the fluid is high in triglycerides

Question 5
What condition will typically cause the following type of effusion in cats: straw-coloured viscous, TP > 25 g/L, NCC < 5000 cells/ µL – the cell population is a mixture of neutrophils and macrophages.
a. FIP virus
b. FIP
c. FIV
d. FeLV
e. Enteric corona virus infection

Question 6
Which one of the factors listed below is the underlying cause of an exudate?
a. bacterial infection
b. bacterial toxin release
c. inflammation and vasculitis
d. activation of the coagulation cascade
e. obstruction of blood vessels and lymphatics

Question 7
Which one of the factors listed below is **NOT** typically an advantage when deciding on performing cytology as a diagnostic technique?
a. sample collection usually quick, easy and inexpensive.
b. no requirement for general anaesthesia
c. less invasive collection techniques
d. sample collection and handling process is robust
e. rapid turnaround time

Question 8
Which one of the techniques described below is best suited to sampling an enlarged superficial lymphnode
a. stab technique with a 23 G needle
b. aspiration technique with a 21G needle and a 5 ml syringe
c. aspiration technique with a 23G needle and a 3 ml syringe
d. star fish spreading technique
e. concentration line technique

Question 9
Transparent fluids are difficult to smear. Which one of the techniques listed below will maximize results ?
a. the sediment can be smeared by the squash preparation technique
b. a direct smear is made and is superior in quality to the sediment smear.
c. the sediment can be smeared by the blood smear technique
d. the sediment can be smeared by means of the concentration line technique
e. a drop of the sediment can be allowed to dry on the slide

Question 10
Which one of the factors below will not affect sample quality of a tissue/FNA smear?
a. sides placed in the fridge
b. contamination with ultrasound gel
c. slides stored or sent with the patients histopathology samples to the laboratory
d. using cleaned recycled slides
e. sending un-fixed slides in to the laboratory

Don't Forget Nutrition!
Placing Oesophagostomy Tubes in Cats

This simple procedure ensures adequate nutrition for post-surgical feline veterinary patients—which can speed recovery time and minimise hospitalisation.

By Marc Hirshenson, DVM, DACVS, American College of Veterinary Surgeons
DVM360 MAGAZINE

Adequate nutritional support is an essential, yet often overlooked, aspect of postsurgical care. Ill patients frequently present with decreased appetite, anorexia or weight loss related to their underlying condition. These signs may be related to pain or structural disease of the mouth (e.g. oral tumors) or generalised feelings of illness due to systemic disease (e.g. lymphoma, renal disease).

The negative effects of malnutrition are well-established and include decreased wound and fracture healing, decreased immune response and organ dysfunction. Enteral nutrition can hasten recovery time, decrease hospitalisation stays and avoid unwanted sequelae such as hepatic lipidosis.

Oesophagostomy tube placement in cats is a technically simple procedure, requiring minimal anaesthetic time, and it carries a low risk of complications.

i. Oesophagostomy tubes have a larger diameter than naso-oesophageal or nasogastric tubes, allowing for administration of blenderised diets and medications.

ii. Compared to gastrostomy or jejunostomy tubes, oesophagostomy tubes can be easily removed at any point.

iii. *Causes less discomfort than a naso-oesophageal tube. (Ed)*

Required Equipment

Here's what you'll need to place an oesophagostomy tube in a cat:

- Surgical preparation materials: clippers, scrub, sterile gloves
- Scalpel blade
- Curved haemostatic forceps
- Red rubber, silicone or polyurethane tube (minimum 10-F; often greater than 14-F—depends on size of patient)
- Tube adapter (i.e. "Christmas tree") and injection cap
- Nylon suture
- Bandage material.

Patient Considerations

Oesophagostomy tubes are placed under general anesthesia. Consider the anaesthetic risk to the patient and perform appropriate preanaesthetic diagnostics as necessary. Patients with oesophageal disease are not candidates for oesophagostomy tubes.

Patient preparation

Anaesthetise the patient with endotracheal intubation. I personally prefer to place the patient in right lateral recumbency so I can place the oesophagostomy tube on the left side of the cervical region; however,

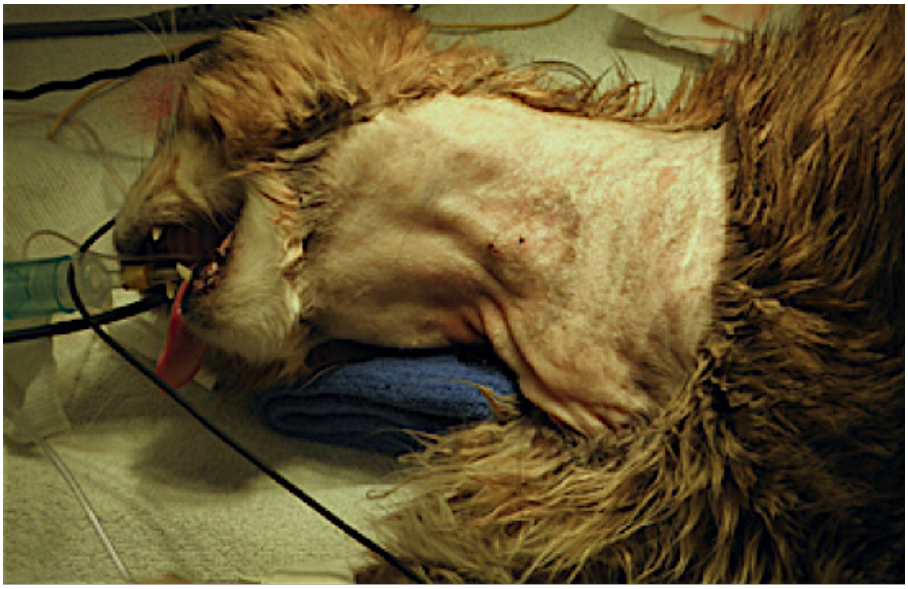

Figure 1. Preparation of the surgical site. The left side of the neck is preferred as the oesophagus runs more on this side in the proximal neck. (All photos courtesy of Dr. Marc Hirshenson.)

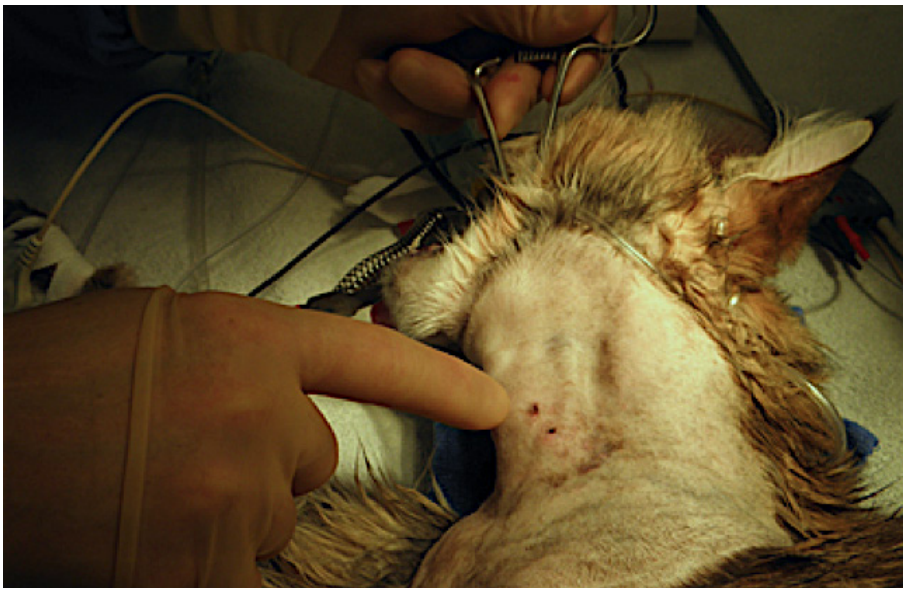

Figure 2. Insert the haemostatic forceps into the oral cavity, down to the cervical oesophagus. Push downwards on the handle to lever the tip of the haemostat against the oesophagal wall and skin of the neck to make a "point". Using a scalpel blade, cut down directly onto the tip of the haemostat "nibbling" through the skin and oesophageal wall.

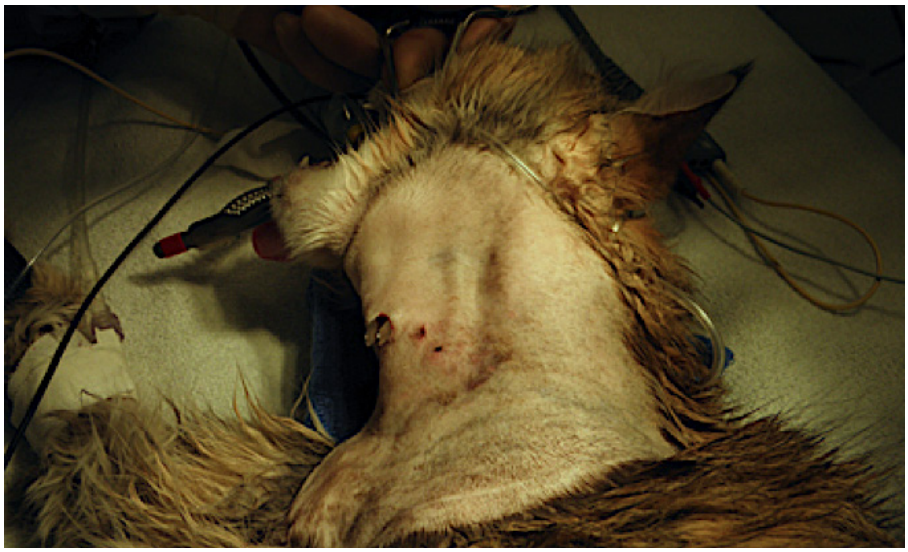

Figure 3. Gently push the haemostatic forceps through the small incision. Once through, open the forceps to stretch the opening and grasp the distal portion of the tube. Insert the tube tip snugly into the forceps to maintain a smooth profile.

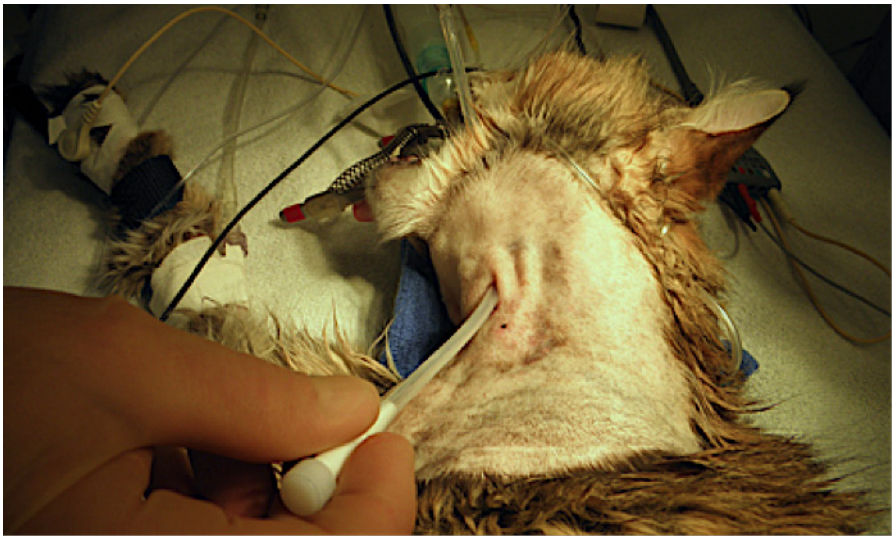

Figure 4. Pull the tube through the oesophagus and out through the oral cavity, use a "arced" pulling motion to follow the curve of the haemostat.

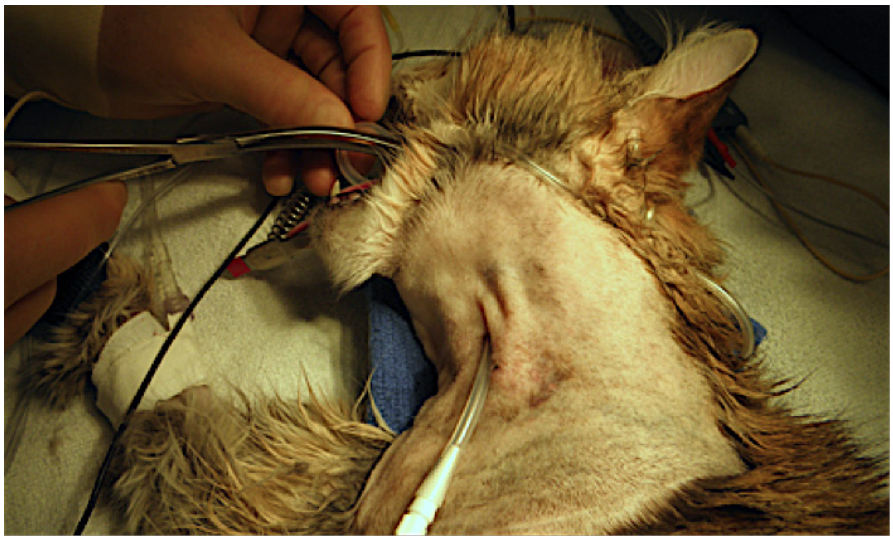

Figure 5. Redirect the tip of the tube back into the oral cavity and distally into the oesophagus as far as possible.

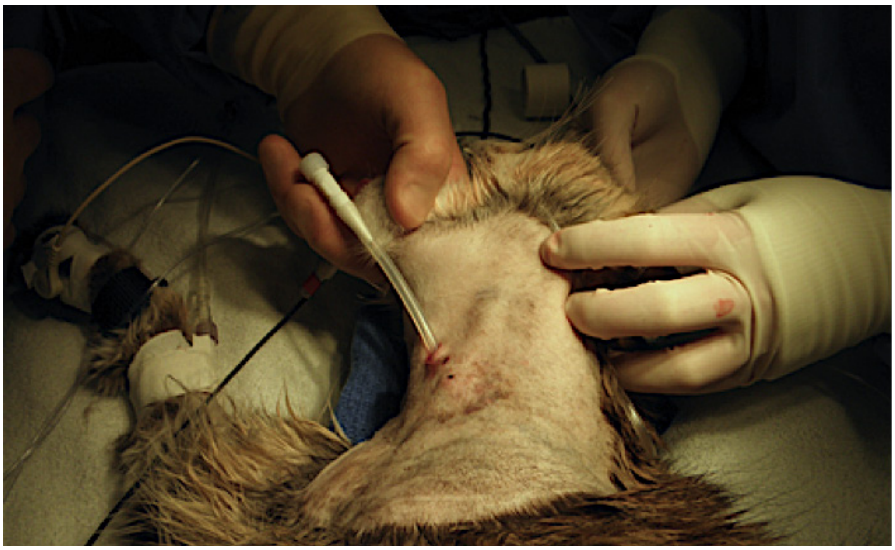

Figure 6. Once the tube tip is pushed as deep as you can back down the oesophagus, gently pull on the distal end which is exiting the incision. You will feel a "flip" as the bend inside the oesophagus straightens.

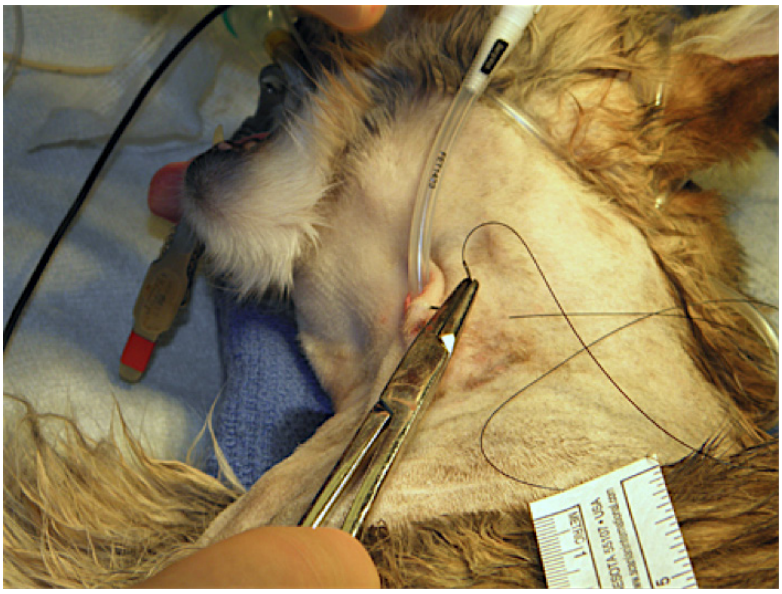

Figure 7. Secure the tube using nylon suture with a finger trap pattern. Additional support can be provided using butterflies sutured or glued to the skin.

the tube can be placed on the right side of the neck if necessary. Clip and prepare the region in standard fashion (Figure 1).

1. Premeasure the tube from the midcervical region to approximately the sixth to 10th rib space. Marking the tube with a permanent marker can help you insert the tube to the appropriate level.
2. Cut the end of the tube to remove a blind end, if present.
3. Insert haemostatic forceps into the oral cavity, down to the cervical oesophagus (Figure 2).
4. Palpate the haemostatic forceps dorsal to the jugular vein and use the blade to incise through skin and oesophagus over the tips of forceps.
5. Open the hemostatic forceps tips to grasp the distal portion of the tube (Figure 3). Pull the tube through the oesophagus and out through the oral cavity (Figure 4), leaving the proximal portion of the tube exiting from the cervical incision.
6. Redirect the tip of the tube back into the oral cavity and distally into the oesophagus as far as possible, using your fingers or tips of the haemostat. (Figure 5). Gently pull on the distal end of the tube; you'll feel a "flip" of the tube in
7. Adjust tube placement to the predetermined length (Figure 6).
8. Secure the tube using nylon suture with a finger trap pattern (Figure 7) and cap the tube. Combine with a purse-string suture if that's your preference (or butterfly).
9. Perform a lateral radiograph to ensure placement to the appropriate rib space and place a cervical bandage to cover the tube insertion site.

Postoperative Care

Blenderised canned (soaked or pelleted diets) commercial diets can be administered through the tube once the patient is fully awake. Start feedings at 25% of caloric requirement per day (divided into four to six feedings per day) for the first day, increasing in 25% increments each day until the daily requirements are met. Many medications can also be administered if the tube is large enough in diameter. Administer a small volume of warm water (5 to 10 ml) before and after each feeding.

EDITOR COMMENTS:

- To avoid volume overload in cats, I usually just flush after feeding. Use warm water.
- To avoid painful oesophageal spasm, food must be fed at body temperature and slowly over 5 - 10 minutes.
- Support the patient in a sitting position, when feeding.

Complications

Complications are uncommon but include vomiting, stoma irritation and inflammation, clogging of the tube and infection.

Conclusion

Oesophagostomy tubes are relatively simple to place and are essential for those patients where prolonged inappetence is anticipated. If necessary, they can be left in place for several months. In my own experience, most owners find tube feedings and management uncomplicated to a caudal direction within the oesophagus.

Orijen
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