C/E for the one who doesn't have time for C/E

"Pearls" of Veterinary Medicine

THE CAPSULE REPORT® FOR VETERINARIANS

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Volume 36 Number 9 December 2017

AT A GLANCE

A note from your editor

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Keeping the patient hydrated

Any hospitalized animal should always have access to fresh, clean water unless it is contraindicated due to vomiting, pancreatitis, fasting for anesthesia or sedation, or to maximize mannitol or furosemide effects (fasted for 20 minutes only). If a hospitalized patient on IV fluids continues to drink water in front of you, you should be concerned that the patient is still dehydrated. Due to the timidity of cats, they often will not drink water when stressed and hospitalized. If a dog or cat drinks in your presence, that patient is probably still dehydrated, and their thirst mechanism continues to be stimulated in an attempt to hydrate. Take that as a hint that ***your patient is trying to tell you to increase the fluid rate!*** Rare situations when hydration status cannot be based on the thirst mechanism include diabetes insipidus and psychogenic polydipsia.

Justine A. Lee, DVM, DACVECC, DABT
3rd Gulf-Atl Conf, 11:15

Fluids in shock

Initial treatment of a patient in shock should be administration of supplemental oxygen with early volume expansion. Crystalloid only resuscitation has been the mainstay of treatment for shock for many decades. It has the advantage of being relatively cheap and is readily available. Typically, a replacement crystalloid such as lactated Ringer's solution or 0.9% NaCl is administered rapidly in aliquots of 20-25 mL/kg, IV until endpoints are reached or the maximum dose of 90 mL/kg has been reached. While effective, the duration of volume expansion associated with crystalloid only resuscitation is short (30 minutes); this can be extended by incorporating synthetic colloids into the resuscitation protocol. A ***useful technique*** is to alternate doses of crystalloids with doses of colloids in 5 mL/kg aliquots until endpoints are reached or maximum doses of 90 mL/kg crystalloid and 20 mL/kg colloid are reached. Low volume resuscitation has been utilized for several years and is effective at restoring oxygen delivery while limiting over-resuscitation and associated tissue edema that delays healing. This is accomplished by administering 4-6 mL/kg 7.2% NaCl with 10-20 mL/kg synthetic colloid followed by crystalloids as needed. This approach generally reduces the overall fluid needed to reach endpoints and can be used in any trauma patient that was not severely dehydrated at the time of the traumatic event but is particularly useful in animals with cavitary hemorrhage or brain injury.

Nathan Peterson, DVM, DACVECC
CVC Kansas City, 2017

Gabapentin, for pain and sedation

Most evidence showing efficacy of gabapentin in pain management in animals is anecdotal and not based on controlled studies. The recommended dose is variable, ranging from 10-20 mg/kg, q8-12h in dogs and 3-20 mg/kg, q6-24h in cats. Gabapentin has anecdotally been used in cats as a ***sedative to facilitate veterinary visits*** and

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procedures (e.g., physical examination). Doses of 50 mg/cat and 100 mg/cat have been shown to attenuate fear response in cats treated as part of a trap- neuter-return program. Sedation and ataxia are the most common adverse effects and usually observed with doses at the higher end of the dose range or when combined with other drugs that cause sedation. Some liquid formulations of gabapentin contain xylitol, which is toxic in dogs; other formulations are xylitol free.

Bruno H. Pypendop, DrMedVet, DrVetSci, DACVAA
NAVC Clin Brf, Oct 2017

Epidermal barrier repair

The biggest "hot topic" in topical treatment of allergies is epidermal barrier repair. We know that a part of the pathogenesis of allergy in humans and dogs is defective epidermal barrier function. Studies in humans clearly demonstrate the benefit of applying occlusive moisturizers in allergic skin disease. This has led to development of shampoos, sprays, and spot-on products containing ingredients such as phytosphingosine, ceramides, lipids, and oils. However, studies in animals are very limited. It is not clear how beneficial these barrier repair products are in dogs and cats. It seems clear that these ***products provide only slight benefit*** (which still may be useful!) and the benefit occurs only after a month or two of use.

Douglas J. DeBoer, DVM, DACVD
SE Vet Conf, 06:16

Using sedatives in the ER

The best laid plans of sedation may yet go awry, and the use of sedative drugs that have specific reversal agents may be useful when the drugs result in unanticipated adverse effects. *Naloxone* (0.02-0.04 mg/kg, IV/IM/SQ) is a specific agent for reversal of opioid drugs. Even though buprenorphine and butorphanol are alleged to be difficult to reverse using naloxone, clinically, in the author's hands, treating animals that have become too sedate with these drugs***, naloxone has been effective*** to result in improvement in respiratory rate and blood pressure. *Flumazenil* (0.01-0.02 mg/kg, IV/IM) may be used to reverse the effects of benzodiazepines. *Atipamezole* (0.05-0.2 mg/kg, IM) is the specific antagonist that may be used to reverse the effects of any alpha-2 agonist drug. It is important to note that IV administration can result in significant hypotension due to its alpha antagonist qualities.

Benjamin M. Brainard, VMD, DACVAA, DACVECC
22nd Int VECCS Conf, 09:16

Preventing recurrence of atopy

In humans with atopic dermatitis (AD), there is evidence of high benefit, cost effectiveness and low risk of proactive intermittent applications of topical glucocorticoids and tacrolimus to skin areas repeatedly affected during flares of AD. Such intermittent application of potent anti-inflammatory drugs onto healed skin appears to delay or prevent flares of AD skin lesions. Whether or not a similar strategy would be equally effective in dogs with AD has not been established at this time, but because of the possible benefit, low risk and low cost, such interventions are worth considering in dogs with recurrent moderate or severe AD. *New recommendations***:** the application of a topical hydrocortisone aceponate spray (Cortavance) to areas of previous skin lesions, two consecutive days each week, can ***delay the recurrence of lesions*** at these sites without causing visible skin atrophy. The time to recurrence of flares at these sites was nearly four times longer in dogs intermittently-treated with topical glucocorticoids compared to those sprayed with placebo. A similar beneficial effect of proactive topical glucocorticoid therapy is likely to be seen when intermittently using other moderately potent topical glucocorticoids at previously affected skin sites. When using potent topical glucocorticoid formulations, even intermittently, care must be taken to avoid glucocorticoid-induced skin atrophy.

Dr. Amanda Burrows, FANZCVS
Derm Forum for Vets, 10:16

Zonisamide and Keppra

Available drugs to use as maintenance anti-epileptic drug (AED) include the traditional drugs, phenobarbital and potassium bromide; however, this author has started to use some newer AEDs as first-line selections to avoid the side effects seen with phenobarbital and bromide. The two AEDs most commonly used by the author are zonisamide and Keppra. Both drugs are very safe with minimal side effects, and now that there are generic formulations they are quite affordable, even for large dogs. Zonisamide is typically given at 5-10 mg/kg, PO, BID. If a patient is on phenobarbital, the higher dosage should be used due to increased metabolism of zonisamide by phenobarbital-induced changes in the liver. If the drug is well tolerated and the seizures are not well controlled the dosage can be safely increased. A rare side effect is an idiosyncratic hepatopathy that is reversible if the drug is stopped. Keppra is administered at a dose of 20-30 mg/kg, PO, TID but on the higher end if concurrent phenobarbital is used. There is an extended release formulation of Keppra that can be administered BID at a dose of 30 mg/kg. The ER formulation is available in 500 and 750 mg tablets, but these cannot be split for smaller dogs. Both zonisamide and Keppra are efficacious as monotherapy. Routine blood work is generally not done nor are blood levels of these drugs checked.

Peter J. Brofman, DVM, MS, DACVIM
SW Vet Symp, 10:16

Do not mix local anesthetics

Mixing two local anesthetics has become common practice. The main theoretical advantage is to decrease the onset and increase the duration of action by mixing a local anesthetic with short onset and another with long duration. Unfortunately, this is not the case. When two drugs are mixed together, the pKa of the mixture is unknown and the onset and duration are unpredict-

able. In addition, a 50:50 mixture will have half strength concentration of each drug. This may influence the property of both local anesthetics, by decreasing the onset and shortening the duration of action. Due to the lack of evidence showing the advantage of mixing different local anesthetics, it is recommended to choose only one drug per block based on pharmacokinetics and pharmacodynamics of the local anesthetic and the type of block and procedure performed.

Mike Barletta, DVM, MS, PhD, DACVAA
CVC Kansas City, 2017

Core vaccine recommendations

AAHA reminds us that all recommendations should be based on the needs of an individual patient. The guidelines help us in this endeavor by providing a "Lifestyle-Based Vaccine Calculator" to help easily tailor vaccine protocols to patients. Similar to the guidelines in 2011, canine distemper virus (CDV), canine parvovirus (CPV), canine adenovirus-2 (CAV-2) and rabies are core vaccines. The first puppy vaccination for CDV may begin as early as 6 weeks of age and be boostered anywhere from 2-4 weeks later, as long as the final booster is given no earlier than 16 weeks of age. It is important to note that 16-week old dogs receiving their first CDV vaccine must be boostered again in 2-4 weeks to ensure immunity. So whatever protocol your hospital chooses, be sure that you begin no earlier than 6 weeks of age and finish no earlier than 16 weeks. You might consider an additional dose at 18-20 weeks for those pups in a truly high-risk situation. Dogs that are over 5 months of age at the time of their first vaccination for CDV/CPV may have adequate immunity with a single dose but can receive a booster 2-4 weeks after the initial dose. The protocol suggests that the next booster be given within a year of finishing the puppy boosters. And after the first adult yearly booster, the vaccine is expected to provide adequate protection for at least three years. Special concerns: Because these combination vaccines require mixing before administration, it's important that they be considered ***nonviable one hour after reconstitution***; they must be discarded at this point.

Kathryn Primm, DVM
DVM News Mag, Nov 2017

Point-of-care urine cultures

The results of this study of a clinical population of dogs suspected to have bacteriuria ***did not support the use*** of the compartmentalized culture and antimicrobial susceptibility testing plate (CCSP) method as a replacement for standard microbiological methods for bacterial culture and antimicrobial susceptibility testing of isolates from canine urine samples. However, for clinical situations in which a quantitative culture is not available, knowledge of the clinical limitations of the CCSP method is important for clinicians considering a point-of-care bacterial culture method.

Anna Uhi, DVM et al.
JAVMA, Oct 15, 2017

Supplying O_2 to the heart failure patient

Oxygen should be administered by facemask or flow-by method initially as the patient becomes sedated, and subsequently transferred to a cage, tent or cage with a nasal catheter. When oxygen cannot be delivered, ***directing airflow from a fan*** towards the patient's face might provide relief (receptors related to dyspnea, located in the face could be beneficially stimulated). If the patient is distressed and requires heavy sedation, the torso should be positioned in sternal recumbency, the forelimbs abducted, the chin supported with a towel or soft pad, neck extended, and nasal oxygen prongs inserted for better oxygenation if needed.

John D. Bonagura, DVM, DACVIM
23rd IVECCS 2017

Supplements facts

The omega-3s in most maintenance diets are not high enough to treat disease states. If an arthritic dog is eating a maintenance diet formulated with omega-3s, the owner will need to administer an omega-3 supplement on top of that to attain therapeutic levels. Joint supplements are a ***waste of the client's money*** if the dog has end-stage bone-on-bone osteoarthritis in every joint. Don't bother. But if just one joint is affected, supplements may be given to protect the other joints.

Matt Brunke, DVM, CCRP, CVPP, CVA
Vetted, Oct 2017

Darbepoetin for CKD anemia in dogs

In this study, initiation of SQ therapy was found to be more effective at 0.8 µg/kg as compared with 0.5 µg/kg; q3wk dosing was found to be the maximal interval that maintained hematocrit after an initial response. Ultimately, 85% of treated dogs attained packed cell volume greater than or equal to 30%, with a median time to response of 29 days. Survival was not significantly different between responders and non-responders. ***Key Points***—Darbepoetin at a starting dose of 0.8 µg/kg, SQ, once per week, tapered to a maximal treatment interval of once every 3 weeks, appeared to raise and maintain stable hematocrit in dogs with chronic kidney disease. Adverse events may include increased blood pressure, seizures, and vomiting and/or diarrhea. Owners should be informed about the potential for development of pure red cell aplasia. Darbepoetin-treated dogs should be monitored for sudden drops in packed cell volume and for evidence of red cell hypoplasia.

Marjory B. Brooks, DVM, DACVIM
NAVC Clin Brf, Oct 23017

Increasing appetite in CKD cats

Perhaps one of the biggest paradigm shifts this author has encountered is the recent evidence that cats with CKD do not appear to have 'uremic gastritis' and neither are they significantly hyperacidic as has been previously thought. This author has published a pathology study

where the authors were unable to document uremic gastritis or ulceration in CKD cats, and recently another researcher demonstrated that hyperacidity is also unlikely to play a role. In light of this research, the author questions the use of acid-suppressant medications and instead thinks more about central effects of uremia in dysregulating appetite. Consequentially, appetite stimulants and anti-emetic or anti-nausea medications may be a more appropriate strategy for management, in addition to identifying and correcting other factors that may affect appetite such as anemia, dehydration, and hypokalemia. A significant amount of time has been spent studying medical management of appetite including mirtazapine and maropitant. The author has demonstrated that both are beneficial for the management of poor appetite and weight in CKD. Additionally, it has been demonstrated that ***transdermal mirtazapine*** is able to reach therapeutic serum concentrations and increased appetite and weight in placebo controlled studies in normal and CKD cats.

Jessica M. Quimby, DVM, PhD, DACVIM
Vet Pract News, Nov 2017

Shock in the cat

Fluid therapy will improve cardiac preload and subsequently improve stroke volume. Cardiac output is equal to heart rate multiplied by stroke volume. Fluid therapy is an integral part of treatment in all categories of shock except cardiogenic shock resulting in low cardiac output heart failure. ***Fluid therapy should be used with care*** in feline patients. Due to the lungs being the shock organ, cats are very susceptible to pulmonary edema and fluid overload. The shock bolus in cats is 60 mL/kg of isotonic crystalloid fluids or 3-5 mL colloid intravenously. This bolus should be given in small increments of 15-30 mL/kg over 15 to 20 minutes until perfusion parameters are improved or the full 60 mL/kg is reached. The administered crystalloid fluid rapidly distributes into the extracellular fluid compartment so that only approximately 25% of the delivered volume remains in the intravascular space by 30 minutes after infusion and some animals will require additional resuscitation at this point. If perfusion parameters such as pulse quality, heart rate and CRT are not improved with crystalloid fluids then a colloid should be administered. The dose of colloid solutions should be 2-3 ml/kg over 15 to 20 minutes.

Erica Mattox, CVT, VTS
3rd World Fel Vet Conf, 10:15

Tips for the OR

Did you know that human doctors don't scrub anymore? When you scrub with the black brushes, you make microabrasions on your hands that grow bacteria and increase the rate of surgical infection. The WHO recommendation is to stop presurgical scrubbing and instead apply alcohol-based surgical hand disinfectant, such as Sterillium or Avagard, to your hands before going into surgery. Yes, old habits die hard, but these authors say *stop scrubbing.* Use alcohol-based hand disinfectants with the appropriate contact time instead. If you notice fleas crawling into your surgical field, you can give ***nitenpyram rectally***.

Jennifer Wardlaw, DVM and Andrew Claude, DVM
DVM News Mag, Oct 2017

Addressing bladder issues in IVDD

Addressing general supportive care is important with an owner in the management of a dog with severe intervertebral disk herniation (IVDH). One of the most critical components is urinary bladder management. In general, the ability for a dog to voluntarily urinate goes hand in hand with the presence of motor function in the pelvic limbs. There does not have to be enough motor function to ambulate, but at least appreciating forward advancement (truncal movement). If there is questionable to no pelvic limb movement urinary bladder monitoring and expression will be required. It can often be difficult to determine if a paralyzed patient can voluntarily urinate or not. Therefore, any patient that is paralyzed should be treated as though it cannot voluntarily urinate to prevent over distention of the bladder. Despite the spinal cord healing and the return of motor function to the pelvic limbs, if the urinary bladder has not been managed appropriately there is the potential for significant morbidity. The risks associated with bladder dysfunction include damage to the detrusor muscle caused by over-stretching (bladder atony), urinary tract infections, urine scalding, and ureter and kidney damage. The patient's bladder should be checked at regular intervals (every 3-4 hours). Bladder expression may be difficult with any lesion from the brainstem to the L7 spinal cord segment (UMN bladder), so medications may be needed to help relax the urethral sphincters. A ***novel therapy*** that is being investigated is polyethylene glycol (PEG), a surfactant that physiologically and anatomically fuses spinal cord axons.

Andrew Isaacs, DVM, DACVIM
83rd AAHA Conf

Using on-line pharmacies

One way to encourage client adherence to your recommendations is to make things easier and more convenient, especially when it comes to therapeutic diets and preventive care products. An online pharmacy is one of the best ways to do this. Want proof? A 2012 study in human medicine found that patients who used online pharmacies had higher rates of medication adherence compared with patients who did not, meaning that online pharmacy users followed prescription instructions better. Clients don't want the hassle of driving down to the clinic to pick up meds. If we're being honest, we all want convenience. This is the world our clients live in (e.g. Amazon), and we have to get on board or run the risk of the train leaving the station without us. It helps to know that adding online pharmacy convenience adds value to the services we provide our clients, enhances our ability to care for patients, and even grows our practice's financial health.

Vetted, Oct 2017