Feline Vestibular Disease

The components of the vestibular system are housed in two areas: the vestibular apparatus, which is located deep within the inner ear and the brainstem (medulla). These two compartments are interconnected, and signals from the fluid-filled vestibular apparatus are sent to the medulla to register the position of the head relative to gravity. The vestibular apparatus tells the animal whether its head is motionless or moving, and if the head is moving, in which direction it is moving. If the animal turns one way or another, a signal is automatically sent to the muscles on one side of its body to adjust for the change in position, thus preventing the cat from falling over.

Clinical Signs
The most common clinical signs of vestibular disease may include assisted falling and a side, a head tilt and nystagmus, the rapid and involuntary “jerky” movement of the eyeballs. Facial drooping or paralysis may occur if there is a tumor or inflammatory disease of the inner or middle ear because the facial nerves are closely associated with the middle ear, which is next to the inner ear.

Causes
Disorders that cause vestibular system malfunction can range dramatically in severity. They can include bacterial infections, inflammatory disease, adverse reactions to certain drugs (including some antibiotics) and a variety of growths such as polyps, cysts and cancer. In some cases, however, the cause of vestibular dysfunction will remain unknown and may be referred to, therefore, as idiopathic vestibular syndrome.

Diagnosis
Diagnosis of vestibular dysfunction requires a thorough medical history and physical examination of the patient, including an exam and a neurologist exam and an ear exam that explores the cat’s ears for signs of infection, inflammation or tumors. In some cases, advanced imaging (CT or MRI) might be used to test for problems deeper within the ear or skull.

Treatment and Prognosis
Treatment and prognosis of vestibular disease depends on the cause. If the condition is secondary to infection, tumor or toxicity, the primary disease must be treated. In the case of idiopathic vestibular disease, there is no specific treatment. Animals must be kept confined in a safe place where they will not injure themselves. Supportive care may include assisted feeding and fluid administration if the cat cannot eat and drink. Anti-nausea medication may be used if the cat is vomiting. In most cases, the signs of idiopathic vestibular syndrome will vanish within a short time and will not reappear.

References are available in the website version of the article.

Canine Influenza Again:
WHAT WE KNOW

History
The presence of an influenza virus capable of transmission from dog to dog was first identified in January 2004 in a population of racing greyhounds afflicted with respiratory disease at a racetrack in Florida. Eight of the 22 infected dogs died from pulmonary hemorrhage. An H3N2 influenza virus was subsequently identified as the cause.

More recently an outbreak of canine influenza has been reported primarily in the Chicago region, but it has now spread far more broadly in the United States. This time a different strain of influenza virus (H3N2) has been identified as the cause. It is believed this virus was introduced by dogs from Asia.

The virus
The influenza virus is an RNA virus belonging to the orthomyxovirus family. External antigens (responsible for the HA and NA classification) are specific to each particular subtype of the virus. The H3N2 influenza virus, unlike the H3N8 virus, can also cause respiratory illness in cats. Neither virus has been shown to be contagious to humans.

Shedding of the virus by an infected dog begins before clinical signs are noted and, on average, will last 5 days. The virus is spread by aerosol transmission of respiratory secretions via sneezing or coughing. Direct contact with respiratory secretions or contact with freshly contaminated surfaces will also serve as a source of exposure. The virus invades and kills the epithelial cells of the respiratory tract. Damage to the epithelial cells causes inflammation. The loss of ciliary function reduces the clearance of irritants, secretions, and secondary infections can exacerbate the severity of the illness. Severe pneumonia, pulmonary hemorrhage, and even death, though uncommon, may occur. Signs can persist for weeks.

Diagnosis
PCR testing specific for the H3N2 virus from nasal swabs performed early in the disease is presently the only method available to diagnose the new condition. Antibody testing is not yet available.

Treatment
Treatment is supportive in nature and should include antibiotics to control secondary bacterial infections.

Prevention
It is unknown whether the present influenza vaccine, which is specific for the H3N8 virus is effective against the H3N2 strain.

Prevention
Avoidance of exposure to potentially infected dogs is the best means of prevention at the present time. This means avoiding dog shows or kennels where dogs from regions of active disease may also be present. Presently, there is one reported case of H3N2 in Massachusetts from a dog who recently traveled to the Chicago area. This is the first reported case since May of 2014 when there was a cluster of confirmed cases in Essex County.

Appropriate environmental hygiene and the immediate quarantine of patients with respiratory signs are imperative to controlling the spread of infection. Most disinfectants will kill the virus. The virus can survive only for a short time on external surfaces.
When is the best time to take a bacterial culture if the patient is already receiving antibiotics?

If antibiotic therapy has already been started, samples should be collected just before the next scheduled dose when blood levels are likely to be lowest. Some laboratories utilize culture and/or growth media that incorporate additives to reduce the antimicrobial activity of various antibiotics that might otherwise inhibit the growth of the desired pathogen. Call your local laboratory to determine how they would prefer to have such samples handled.

How is antibiotic susceptibility determined?

Historically, disk diffusion techniques — also known as the Kirby-Bauer method — have been used to determine antibiotic susceptibility. In this technique antibiotic-impregnated disks are applied to the surface of an agar plate to which a known concentration of the bacteria to be tested has been applied. The diameter of the zone of inhibited bacterial growth around each disk is measured. The diameter of the zone is compared to a standard table of predetermined zone widths representing antibiotic concentrations in the agar that correlate with the concentration of the antibiotic achievable in the plasma of the patient using the manufacturer’s recommended dose. Results are reported as resistant, sensitive or intermediate.

More recently you may have noted antibiotic susceptibility results to be reported in the form of minimum inhibitory concentrations (MIC). In this method a standard concentration of the inciting bacteria is added to wells containing increasing concentrations of the antibiotic to be tested. The MIC is the lowest concentration of the antibiotic being tested that inhibits the growth of the bacteria. To determine whether the bacteria is sensitive, intermediate or resistant, the MIC for that particular bacteria is compared to the concentration of the antibiotic that can be expected in the plasma of a patient using the manufacturer’s recommended dose. Ideally the laboratory will also report the antibiotic dosage used to make the interpretation of susceptibility. The lower the MIC compared with the expected antibiotic plasma concentration, the more likely the therapy is to be effective.

Applying lab results to the clinical setting

Clinicians should always choose a drug to which the identified bacteria are sensitive and should avoid agents to which they are considered intermediate or resistant. However, because the interpretation of susceptibility is based on the manufacturer’s recommended dose, it may be possible to achieve a higher antibiotic concentration that can kill the bacteria by using a higher-than-recommended dose or more frequent dosing.

On the other hand, just because the bacteria is sensitive to the antibiotic in a laboratory setting does not mean the antibiotic will prove effective in the patient. Variables such as the ability of the antibiotic to be absorbed by the body or reach the site of infection usually causes infection at the particular site and which antibiotic typically has worked in previous patients with this type of infection.

At times clinicians are faced with infections that are or may become serious or life-threatening. Other infections may prove to be non-responsive to the chosen antibiotic or recur after treatment has been completed. Faced with such circumstances, it is important for the clinician to identify the responsible pathogen and determine the antibiotic most likely to prove efficacious for inhibiting or killing the bacteria. Bacterial culture and antibiotic susceptibility testing should be performed to confirm the presence of bacterial infection, identify the responsible pathogen, and direct the antibiotic choice.

Identifying the appropriate antibiotic therapy has advantages. It can reduce the overall expense and client frustration associated with empirical antibiotic therapy, minimize the risk of patient-related antibiotic resistance, and improve the chance and speed of a patient’s recovery.

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Methicillin-Resistant Staphylococcus: What Do We Do?

METHICILLIN RESISTANCE IN CANINE SKIN

Infections are becoming much more common. It is critical to make the diagnosis early and institute aggressive topical therapy to get this disease under control, as we don’t always have oral antibiotic options. It is also very important to determine the Staphylococcus species involved and to use the correct terminology with regard to these infections. Most dogs and cats with resistant infections do not have MRSA (methicillin-resistant Staphylococcus aureus). Rather, they have MRSP (methicillin-resistant Staphylococcus pseudintermedius) or MRSS (methicillin-resistant Staphylococcus schleiferi). These Staphylococcus species are less likely to be contagious to humans than MRSA. If an animal truly has MRSA, he or she most likely contracted the infection from interaction with humans. Fortunately, this has been rare.

What are methicillin-resistant staphylococci (MRS)?

Methicillin resistance can occur in any of the Staphylococcus species with which we work. While the incidence of MRSA in dogs has remained low, the number of cases of MRSP have skyrocketed. Methicillin resistance is mediated by a genetic element containing a gene called mecA. This genetic element often carries other antibiotic resistant genes, and it inserts itself into the bacterial genome. All subsequent offspring of this bacterium are resistant. The diabetic feature of this insert is that it will remain within the bacteria as long as antibiotic pressure is maintained. This mecA gene encodes for a mutant penicillin binding protein on the surface of the cocci. If the penicillin and cephalosporin antibiotics cannot bind, they cannot kill the bacteria. By using topical antiseptic therapy instead of systemic or topical antibiotics we may actually be able to get the bacteria to revert to being sensitive to cephalosporins again; although, some dogs will continue to have MRSS.

How do we diagnose methicillin resistance?

Our level of suspicion is raised when a dog’s skin infection has failed to respond to two different classes of antibiotics or if new lesions develop while a dog is taking an antibiotic. If a dog does not respond to cefovecin (Convenia®), then the infection is caused by MRSS, or it is not an infection. For these dogs, a culture and sensitivity is required, first to establish the species of Staphylococcus involved, and second to pick the correct antibiotic. It is not helpful to try to guess which antibiotic to use because some of these bacteria are resistant to all the oral antibiotics we use in skin infections.

How do we treat methicillin resistance?

How we treat these infections will be determined by the pathogen with which we are working and the depth of the infection. For the most part, many of the pyoderma we see are superficial in nature, resulting from folliculitis. If the bacterium is reported as sensitive to tetracyclines, doxycycline or minocycline can be used. If sensitive to erythromycin and clindamycin, clindamycin can be used. But if resistant to erythromycin and not sensitive to clindamycin, it is best to avoid clindamycin. Likely, resistance will develop during use as the bugs may have another resistance gene, called the clindamycin inducible drug resistance gene, which is turned on only in the presence of the drug. We also find that potentiated sulfa drugs, particularly Primor®, can be very helpful if reported as sensitive. If there are no usable oral antibiotics or if the only antibiotics to which the bacteria are sensitive are chloramphenicol, rifampin, or amikacin, aggressive topical therapy for superficial pyoderma can be used to avoid the more toxic antibiotics.

We have taken a series of 10 dogs with MRSP and bathed them daily with 3-4% chlorhexidine shampoos. Each of these dogs resolved their infections within 30 days. This protocol is labor-intensive, but it works and provides a better option for the dog than either chloramphenicol, which has to be given TID and is very nauseating; or amikacin, aggressive topical therapy for superficial pyoderma can be used to avoid the more toxic antibiotics.

Dogs with deep pyoderma will likely require systemic antibiotics, and if their bacteria are sensitive to chloramphenicol or amikacin, these antibiotics will have to be used. Chloramphenicol is given at 50 mg/kg three times a day for at least 30 days. The owners should be cautioned to handle these capsules carefully due to the risk to human health. Many dogs will lose weight because of vomiting and inappetence. It is sometimes helpful in those dogs to give probiotics a few hours after each dose of chloramphenicol. We can also use Cerenia® to help with nausea and vomiting. Alternatively, amikacin can be used. It is given by injection at a dose of 15 mg/kg once daily. This drug is quite well-tolerated by many dogs and cats, but it does have the potential to cause renal problems. We monitor these dogs twice per week with a urinalysis in which we check the sediment for casts, proteinuria or changes in specific gravity. BUN and creatinine are measured before and after 30 days of therapy. Truly though, the urinalysis is the key to picking up early toxicosis with amikacin. It may be necessary to have the tissue levels of amikacin monitored consistently above the MIC for two weeks. Most cases of superficial pyoderma, when initially presented, can be resolved with one injection. Thus we avoid compliance issues and missed doses. It is very important to avoid the use of fluoroquinolones as a first choice for Staphylococcus pyoderma. Fluoroquinolones are best used for gram-negative skin infections. But if indicated as sensitive, we can use them for MRSS. Ideally we would use marbofloxacin at 5.5 mg/kg/day to help avoid the potential severe liver damage. Liver enzymes should be checked before therapy and 10-14 days into therapy. We are looking for elevations in the ALT.

How do we prevent the development of methicillin resistant infections?

Current thought suggests that we don’t induce resistance in most cases; rather, we select for it. The exception, however, is when fluoroquinolones are used, as they are believed to have the ability to induce mutations. The best way to prevent the development of methicillin-resistant infections in our patient is by using topical therapy whenever we can, and being aggressive with systemic therapy when we must. Most dermatologists advocate cephalosporins as the first choice antibiotic for pyoderma. In my opinion, the use of cefovecin is ideal because it keeps the tissue levels of cefovecin above the MIC for two weeks. Most cases of superficial pyoderma, when initially presented, can be resolved with one injection. Thus we avoid compliance issues and missed doses. It is very important to avoid the use of fluoroquinolones as a first choice for Staphylococcus pyoderma. Fluoroquinolones are best used for gram-negative skin infections. But if indicated as sensitive, we can use them for MRSS. Ideally we would use marbofloxacin at 5.5 mg/kg/day to help avoid the potential severe liver damage. Liver enzymes should be checked before therapy and 10-14 days into therapy. We are looking for elevations in the ALT.

What is the risk of infection to humans?

The good news about MRSP is that the risk to humans is very low. This bacterium is well-adapted to dog skin and cannot adhere well to human skin. Very young people (babies), the elderly, and individuals with diabetes or compromised by disease or medications could be at increased risk. If the dog truly has an infection with MRSA, the risk still remains low to healthy individuals. Still, prudence and common sense should be used, particularly if there are humans in the household with the risk factors listed above. The most important thing that any of us can do to avoid the spread of resistant bacteria is to wash our hands frequently and thoroughly. An excellent source of information about MRSA can be found at Dr. Scott Weese’s “Worms and Germs” blog. He has files, which you can download to share with your clients; we highly recommend a visit to this informative and entertaining site: http://www.wormsandgermsblog.com/promo/services/

We thank our colleague from BluePearl in Texas, Valene A. Fadok, DVM, PhD, DACVD, for allowing us to use this article for Companion.
Lost! The Tip of the Catheter

HAVE YOU EVER LOST a catheter cannula into a vein? How often have you found only the hub of the catheter in the cage of a dog who had been chewing on the catheter? Or, while cutting the catheter bandage, one of your team members suddenly realizes he or she has cut across the cannula. It’s surprising it doesn’t happen more often than it does.

Where is the cannula?

With any luck, the catheter cannula is still protruding from the leg where you can retrieve it, or maybe it is stuck to the tape bandage. More commonly, it has been drawn up into the previously catheterized vessel where it is at risk for working its way up the venous system toward the heart and lungs.

Leaving the catheter cannula within the vein has a number of potential complications. The cannula could:

• cause local obstruction of blood flow from thrombosis of the peripheral vein.
• become a source of thrombi, which break off and flow toward the heart and lungs.
• become lodged in the heart interfering with the heart valves or inducing an arrhythmia.
• lodge in a peripheral pulmonary artery causing local pulmonary thrombosis and inflammation.
• become a nidus for infection or abscessation.

Despite these complications, both the medical literature and experience within the veterinary and human medical fields suggest it is rare for a serious complication to develop. However, if the cannula can be localized to an easily retrievable site, it would be safest to retrieve it.

How do you find the catheter?

Many catheters are radiopaque allowing you to identify their location with radiographs of the limb and upstream venous circulatory system, including the abdomen and chest if necessary. You may have to radiograph another catheter to make certain it is radiopaque. If the catheter is not radiopaque, there is no obvious means of tracing it; although, a contrast study of the catheterized vein could be attempted to highlight the cannula if it is still in the limb. Luckily, veins have valves to prevent backflow of blood upon which the catheter cannula may become stuck impeding its movement proximally along the vessel.

How do you remove it?

If the cannula can be localized to a peripheral vessel then a cutdown over the vessel to retrieve it is recommended. If it has lodged in the heart, then fluoroscopy and a snare may be required to grab it.

Prevention is the best medicine

The best prevention is to remind your staff to think before they cut due to the potential seriousness of inadvertently leaving the catheter cannula in the patient’s vein.

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CE Calendar of Events

BluePearl is strongly committed to the veterinary community. One of the ways we demonstrate this commitment is through our continuing education program, which is subsidized in part by our Partners in Education.

All BluePearl CE lectures are free and open to all area veterinary professionals. Registration is required, please. Programs begin with a light dinner prior to the presentation, which starts at 7:30PM. To RSVP, please call 781.684.8387 or email jodi.melvin@bluepearlvet.com.

For the most current information about BluePearl CE, please click the For Veterinarians tab on our homepage: bluepearlvet.com/massachusetts.

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