▪ Essex County Veterinary Referral Hospital ▪ Massachusetts Veterinary Referral Hospital ▪ Port City Veterinary Referral Hospital ▪

InTown Veterinary Group Newsletter

Volume 9, Issue 1
January 2009

InTown Veterinary Group is dedicated to providing referring veterinarians and their clients with an unparalleled range of emergency & specialty services.

Services:

Acupuncture:
Essex Referral, N. Andover, MA
Mass, Woburn, MA

Cardiology:
Mass, Woburn, MA

Dermatology:
Mass, Woburn, MA

Emergency/Critical Care:
Essex Referral, N. Andover, MA
Mass Vet, Woburn, MA
Port City, Portsmouth, NH

Internal Medicine:
Mass Vet, Woburn, MA
Port City, Portsmouth, NH

Neurology:
Mass Vet, Woburn, MA

Ophthalmology:
Essex Referral, N. Andover, MA
Mass Vet, Woburn, MA
Port City, Portsmouth, NH

Physical Therapy & Rehabilitation:
Mass Vet, Woburn, MA
Port City, Portsmouth, NH

Radiology:
Mass Vet, Woburn, MA
Port City, Portsmouth, NH

Surgery:
Essex Referral, N. Andover, MA
Mass Vet, Woburn, MA
Port City, Portsmouth, NH

In This Edition:

Article:

Notes :

Upcoming Doctor Continuing Education Lectures:
For an always current list of upcoming CE, go to www.InTownVet.com & click on CE Lectures under "veterinarians".

Upcoming Lectures:
Tues. Jan. 20 - Immunosuppressive Therapies, at Port City, Portsmouth, NH.
Tues. Feb. 17 - Dermatology Case Studies, at Mass Vet, Woburn, MA.
Wed. Feb. 25 - Becoming One with the Abdomen, Port City, NH

Register with Sommer at ReferringVets@InTownVet.com, or by calling (781)305-2240.

Upcoming Technician Continuing Education Lectures:
There will be a lecture on cardiology in February 2009. Dates and locations to follow. For more information, contact Betsy at bhensley@intownvet.com.

Hospital Information:

- Essex County Veterinary Referral Hospital
  247 Chickering Road, N. Andover, MA 01845
  Tel:(978) 725-5544 Fax: (978) 975-0133
  www.InTownEssexVet.com
- Massachusetts Veterinary Referral Hospital
  20 Cabot Road, Woburn, MA 01801
  Tel: (781) 932-5802, Fax: (781) 932-5837
  www.InTownMassVet.com
- Port City Veterinary Referral Hospital
  215 Commerce Way, Suite 100,
  Portsmouth, NH 03801
  Tel: (603) 433-0056, Fax: (603) 433-0029
  www.InTownPortCityVet.com

Dr. Jill Abraham practices at
Massachusetts Veterinary Referral Hospital in Woburn, MA

Methicillin-resistant Staphylococcal Pyoderma

Jill Abraham, VMD, DACVD

Staphylococcal pyoderma is the most common skin disease in dogs. In recent years in both human and veterinary medicine, the incidence of methicillin-resistant staphylococcal pyoderma has been increasing. Methicillin-resistant staphylococcal infections are not only a health concern to the patient, but are potentially public health concerns, as transfer of methicillin-resistant staphylococci from humans to animals and from animals to humans has been documented.

Staphylococcal species associated with pyoderma

Staphylococcus intermedius is the most common bacteria isolated from skin infections in dogs. Other staphylococcal species, such as *S. aureus* and *S. schleiferi*, can also cause pyoderma in dogs. There are two subspecies of *S. schleiferi, S. schleiferi coagulans* and *S. schleiferi schleiferi*. In humans, *S. aureus* is the most common cause of staphylococcal skin infection, but *S. schleiferi* infections occur as well.

Methicillin resistance

Within a few years of the introduction of penicillin, staphylococci resistant to penicillin emerged. Penicillin-resistant strains of *S. aureus* produce enzymes called penicillinases, which inactivate penicillin. Methicillin is a semi-synthetic penicillinase-resistant penicillin antibiotic that was developed to overcome this resistance. It was first used in clinical practice in humans in 1959.

Just two years later, the first case of methicillin-resistant *S. aureus* (MRSA) was reported in a person. In 1972, the first case of MRSA in animals was documented, in a dairy cow with mastitis. In 1999, the first MRSA infections in dogs were reported. By the middle of this decade, there were already multiple reports of methicillin-resistant *S. intermedius* (MRSI) and *S. schleiferi* infections in dogs.

Staphylococci that are methicillin-resistant have acquired a gene called *mecA*. This gene codes for a protein called penicillin-binding protein 2a (PBP2a), which confers resistance to all beta-lactam antibiotics. So, if a staphylococcus bacterium is methicillin-resistant, it will be resistant to amoxicillin, penicillin, Clavamox®, cephalexin and other cephalosporins, and imipenem. Methicillin-resistant bacteria may also be resistant to other classes of antibiotics, such as macrolides, aminoglycosides, and fluoroquinolones. Resistance to other classes of antibiotics occurs by mechanisms other than the *mecA* gene.

Risk factors for the development of methicillin-resistant staphylococci

One risk factor for the development of methicillin-resistant strains is repeated use of antimicrobials, especially at sub-therapeutic doses or courses that are too short to completely clear the infection. Poor owner or patient compliance can play a significant role. Geography may be a factor, as enhanced environmental antimicrobial pressure may select for resistant strains. Animals that live in areas where there are a lot of hospitals and biomedical research facilities (such as the greater Boston area) may be exposed to more antimicrobials than animals from other locales, and be at an increased risk. Inappropriate antimicrobial treatment is another important risk factor (i.e. prescribing antibiotics for what is really yeast dermatitis because skin cytology was not performed).

Clinical presentations of methicillin-resistant staphylococcal pyoderma

Clinically, there is no way to distinguish a methicillin-susceptible staphylococcal pyoderma from a methicillin-resistant staphylococcal pyoderma; both look the same. Clinical presentations of superficial pyoderma include papules, pustules, and epidermal collarettes; patchy alopecia along the trunk of dogs with short hair coats (a "moth-eaten" appearance); and superficial spreading pyoderma in dogs with long hair coats (patches of alopecia in which the hairs at the periphery of the lesions epilate easily). Deep pyoderma may present as furuncles, nodules, or draining tracts. Deep pyoderma often occurs on interdigital skin, acral lick granulomas, or may develop secondary to demodicosis in dogs.

When to suspect a methicillin-resistant staphylococcal infection

Antibiotic resistance should be suspected when a patient fails to respond to empirical therapy, or in any case of recurrent pyoderma where a patient has received multiple courses of antibiotics, especially if antibiotic courses have been less than three weeks in length or if sub-therapeutic doses have been prescribed or administered. Methicillin-resistant staphylococcal infections may be seen in animals whose owners have had MRSA, or whose owners have been hospitalized or work in the health care field. In cases of suspected antibiotic resistance, bacterial culture and susceptibility testing (C&S) is indicated.

Diagnosis of methicillin-resistant staphylococcal infections

Skin cytology (glass slide impressions, acetate tape impressions, etc.) is used to confirm pyoderma. Bacterial C&S is used to identify methicillin-resistant staphylococci and to identify which antibiotics can be used. Oxacillin is an antibiotic closely related to methicillin. It is used as a substitute for methicillin in laboratory susceptibility tests, but lab reports may still list methicillin. Oxacillin-resistant staphylococci are the same as methicillin-resistant staphylococci. When a staphylococcus is cultured, check the report for methicillin or oxacillin susceptibility first in order to determine if the bacteria is methicillin-resistant.

Since cases of deep pyoderma require lengthy courses of antibiotic therapy, C&S is indicated even if antibiotic resistance is not suspected. The rationale for early C&S is to ensure that the correct antibiotic is used from the start. This will increase the chances of successful treatment and may be more economically beneficial for the owner in the long run (perform C&S early to avoid switching antibiotics over and over). Early selection of the appropriate antibiotic will reduce the risk for development of antibiotic-resistant staphylococci.

Fig 1: Antibiotics used to treat Staphylococcal Pyoderma

Drug	Dose
Amoxicillin-clavulanic acid	15-22 mg/kg q 12 hr
Cephalexin	22-30 mg/kg q 12 hr
Cefpodoxime	5-10 mg/kg q 24 hr
Clindamycin	5-11 mg/kg q 12 hr
Trimethoprim-sulfonamide	15-30 mg/kg q 12 hr
Ormetoprim sulfadimethoxine (Primor®)	27.5 mg/kg q 24 hr
Enrofloxacin	10-20 mg/kg q 24 hr (do not use above 5 mg/kg q 24 hr in cats)
Marboflaxacin	2.75-5.5 mg/kg q 24 hr
Orbifloxacin	7.5 mg/kg q 24 hr
Ciprofloxacin	15-20 mg/kg q 12 hr
Chloramphenicol (only based upon C&S when other antibiotics are not an option)	45 mg/kg q 8 hr

Treatment:

Empirical antibiotic selection for any staphylococcal pyoderma

Because most staphylococci produce penicillinases (the enzymes that inactivate penicillins), amoxicillin and penicillin are poor choices for the treatment of staphylococcal infections. Antibiotics for empirical selection include cephalexin, cefpodoxime, clindamycin, Clavamox®, and sulfa antibiotics (TMS or Primor®). Tetracycline and doxycycline are often not effective for staphylococcal pyoderma in dogs and cats. Avoid using sub-therapeutic doses to decrease the cost for owners.

Convenia® (cefovecin) is a new injectable cephalosporin indicated for the treatment of skin infections in dogs and cats. A single subcutaneous injection provides a 14-day course of therapy. A recheck exam should be performed approximately 14 days after an injection to determine if the infection is resolved or if another injection is needed.

Topical antimicrobial therapy can aid in the treatment of pyoderma. The most common antibacterial shampoo ingredients are chlorhexidine, benzoyl peroxide, and ethyl lactate. Mupiriocin 2% can be used as a topical antibiotic ointment. Avoid using corticosteroids when treating pyoderma unless there is severe pruritus, inflammation, or another disease process that requires the use (i.e. autoimmune disease).

Antibiotic selection for methicillin-resistant infections

The selection of an antibiotic for the treatment of a resistant infection should be based upon C&S results, see fig. 2 for example. Consider starting clindamycin or a sulfa antibiotic while C&S results are pending if antibiotic treatment must be started immediately. Studies demonstrate that fluoroquinolone use may provoke enhanced resistance to methicillin in *S. aureus*. The same may be true for other staphylococcal species. Therefore, the use of fluoroquinolones should be based upon C&S results, and used when clindamycin or sulfa antibiotics are not an option. Overuse or inappropriate use of antibiotics in veterinary medicine may lead to enhanced resistance of staphylococcal species in humans and animals. This may lead to future restrictions imposed upon veterinarians that will limit what antibiotics we can use.

Chloramphenicol should be used only based on C&S results when clindamycin, sulfas, and fluoroquinolones cannot be used. Rifampin and injectable amikacin are other options, but are used only as last resorts given the risks for hepatotoxicity and nephrotoxicity, respectively.

Length of antibiotic treatment

Superficial pyoderma should be treated for a minimum of three weeks, or at least one week past clinical resolution. Deep pyoderma should be treated for a minimum of six weeks, or at least two weeks past complete clinical resolution. Cases of deep interdigital pyoderma or acral lick granulomas may require treatment for three months or longer. If pyoderma recurs within two weeks of the end of antibiotic treatment that often indicates that the treatment course was too short.

Precautions for handling patients infected with methicillin-resistant staphylococcal pyoderma

Current recommendations include wearing gloves and gowns; thorough hand washing; using disposable items when possible; thorough cleaning of exam tables, equipment used, and floors; and isolating infected patients and limiting their movement around the hospital. Antibacterial hand sanitizers can be useful in between patients and for owners at home in addition to hand washing. Owners of infected pets can be directed to their physicians or the CDC website www.cdc.gov for more information.

Ways we can reduce the risks for the development of methicillin-resistant staphylococci

Pyoderma mostly occurs secondary to some other disease process. The most common underlying causes of pyoderma are ectoparasites (fleas, sarcoptic mange, demodicosis), hypersensitivities (flea bite hypersensitivity, atopy, cutaneous adverse reactions to food), and endocrinopathies (hypothyroidism, hyperadrenocorticism). Other primary skin diseases (autoimmune disease such as pemphigus foliaceus) or immunosuppression can also lead to pyoderma. All cases of recurrent pyoderma should be investigated for underlying causes. Diagnosing and managing the underlying cause(s) will reduce the need for repeated courses of antibiotics.

Fig. 2: Staphylococcus Schleiferi Coagulans

This patient was treated with Clindamycin

Drug	MIC	Interpretation
Amox/K Clav	≤ 4/2	R
Ampicillin	4	BLAC
Cefazolin	> 16	R
Chloramphenicol	≤ 18	S
Ciprofloxacin	> 2	R
Clindamycin	≤ 0.25	S
Erythromycin	≤ 0.5	S
Gentamicin	≤ 1	S
Imipenem	≤ 1	R
Oxacillin	> 2	R
Penicillin	8	BLAC
Rifampin	≤ 1	S
Tetracycline	> 8	R
Trimeth/Sulfa	≤ 2/38	S
Vancomycin	≤ 2	S
Enrofloxacin	Kirby-Bauer Tested	S
Marbofloxacin	Kirby-Bauer Tested	S

When treating pyoderma, it is essential to select the most appropriate antibiotic and prescribe appropriate doses for an appropriate length of time, based on the type of infection being treated. It is also important to educate clients to finish the entire course of antibiotics, and not to decrease the dose or stop treatment without consulting with a veterinarian first. Educate clients that the infection will look cleared to them before it really is, and that a recheck exam is important so that a veterinarian can determine whether or not the infection is completely resolved. Perform bacterial C&S testing early on, especially in cases of deep pyoderma or after initial empirical therapy fails.

Early recognition and treatment of methicillin-resistant staphylococcal infections, appropriate antibiotic usage, and identification and management of underlying causes of pyoderma are essential in minimizing the development and spread of multi-drug resistant bacteria.

INTOWN VETERINARY GROUP
247 CHICKERING ROAD, N. ANDOVER, MA 01845