In This Issue:
The Summer 2014 issue of the NVL Newsletter will discuss Bartonella diseases of the respiratory tract of cats, dogs, and people. Bartonella associated respiratory diseases in cats are common, whereas they are infrequent in dogs and humans. As with most of the Bartonella diseases we have described in cats, respiratory Bartonella induced diseases were first described in humans. 

Introduction:
Bartonella Pathogenesis:
Bartonella are Gram-negative bacilli that possess pili which are hair-like structures found on the bacteria’s surface. Bartonella have a strong tendency to stick or clump together in tissues and in culture and to stick to, and penetrate, RBCs and endothelial cells. The ability to adhere to each other, and to the membranes of RBCs and endothelial cells, leads to the wide and varied tissue pathogenesis observed in cats, dogs and people. Pili and a protein called deformin are probably responsible for the sticky properties. The wide tissue tropism of Bartonella is due to the adhesion to endothelial cells which are the constituents of capillaries. Thus, Bartonella induce chronic lymphocytic plasmacytic granulomatous inflammatory reactions in tissues throughout the infected animal’s body. Since capillaries are found in all tissues, all tissues are susceptible to the inflammatory effects of Bartonella.

Respiratory Disease:
Humans with “cat scratch disease- CSD” or bartonellosis have served as the “animal model” for veterinarians investigating Bartonella diseases in cats and dogs. Respiratory diseases were occasionally observed in people with CSD in publications from the 1950s to the present. Respiratory diseases are very common in cats, especially cats from multicat households, shelters, rescue groups or feral cat colonies. Chronic URI, sinusitis and rhinitis are difficult cases for veterinarians to manage because there are many possible etiologies. The addition of Bartonella to the differential diagnosis has made this situation easier because there are tests for Bartonella infection, therapy is easy and a test to evaluate therapy is available.

Respiratory diseases (infections) are divided into upper (URI) and lower (LRI) sites:
Upper Respiratory Diseases are confined to:
Nose
Nasal cavity- and turbinates
Sinuses
Nasal & oral pharynx
Larynx

Lower Respiratory Diseases are confined to:
Trachea
Bronchi and lower airways
Lung parenchyma

Human:
Bartonella respiratory diseases in humans have usually been associated with CSD and occur in both immunocompetent and immunosuppressed people. Most have occurred in the lower respiratory tract in the lungs (pulmonary nodules and pneumonia) and pleura (pleuritis).  

Figure 1

Dogs:
Bartonella induced respiratory diseases are among the most common clinical entities in Bartonella seropositive dogs with lameness, arthritis, epistaxis, splenomegaly, and nasal discharge found most often. However, other studies did not find such an association. In general, dogs are infected with Bartonella much less often than cats, the natural reservoir host for 6 of the most common Bartonella species.

Cats:
Fleas transmit Bartonella to the dermis where the local infection then spreads to various tissues- commonly to the mucosa of the mouth, eye and respiratory tract. Bartonella respiratory diseases often occur as coinfections with common feline viral or bacterial respiratory pathogens. Cats have more respiratory pathogens and diseases than dogs due to the crowding of cats in multicat households, shelters and feral cat colonies. This crowding also leads to the higher incidence of Bartonella infected cats.

Respiratory Pathogens in Cats:
Viruses:
Feline Herpesvirus-1 (FHV-1), cause of feline viral rhinotracheitis (FVR) C  
Feline Calicivirus (FCV) C  
Cowpox Virus  
Avian Influenza Virus A (H5N1)  
Swine Influenza A Virus (H1N1)
Bacteria:
Chlamydia felis (formerly, Chlamydia psittaci) C  
Bordetella bronchiseptica C  
Bartonella spp. C
Mycoplasma felis
Pasteurella spp.  
Streptococcus spp. 
Escherichia coli
Salmonella spp.
Yesinia pestis
Neisseria spp.- Eugonic Fermenter
Mycobacterium spp.
Rhodococcus equi

Fungi:
Cryptococcus spp.
Histoplasma capsulatum
Aspergillus spp.
Sporothrix schenckii
Mucor spp.
Candida spp.
Coccidioides immitis
Blastomyces dermatitidis

Parasites:
Toxoplasma gondii
Cytuxxxzoon felis
Dirofilaria immitis
Aelurostrongylus abstrusus
Eucocles aerophilus
Paragonimus spp.

C denotes occurring commonly

Clinically, FHV-1 and FCV have been reported as the most common infectious agents associated with feline respiratory disease. However, our findings of the prevalence of Bartonella associated with almost half of the feline respiratory diseases, with and without concurrent coinfection with these viruses, suggest a more prominent etiologic role for Bartonella. Some bacteria found in respiratory diseases of cats appear to be opportunistic rather than etiologic.
Bartonella and Feline Respiratory Disease:

We introduced the FeBart® Bartonella western blot serologic test, for Bartonella antibody, in 1999. During the first 14 years, the test has been used to detect Bartonella infected healthy cats and cats with inflammatory diseases. Oral inflammatory disease (gingivitis, stomatitis, etc.) were the most common, followed by cats with respiratory diseases. Cats with respiratory diseases often had chronic inflammation in multiple sites such as the nose (URI) and sinuses (rhinitis/sinusitis) and were often non-responsive to routine antibiotic therapy (Table 1). 46,400 cats with respiratory diseases were tested and 22,170 (48%) were infected with Bartonella. Some of the cats were reported to also have FHV-1 or FCV co-infections.

Therapy Results:

2,229 of the 2,729 (82%) treated cats had a 50% or greater clinical improvement and 94% had a resultant titer decrease indicating Bartonella was the partial or complete cause of their disease (Table 2). Bartonella was not the cause of the disease in the remaining 500 (18%) cat (Table 2).

Some cats with respiratory diseases should be tested for Bartonella with feline respiratory diseases.

Table 1

Bartonella-Associated Respiratory Diseases in Cats*

<table>
<thead>
<tr>
<th>Disease*</th>
<th># Tested</th>
<th># Infected</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>URI</td>
<td>33,726</td>
<td>15,908</td>
<td>47%</td>
</tr>
<tr>
<td>Rhinitis</td>
<td>16,863</td>
<td>8,396</td>
<td>50%</td>
</tr>
<tr>
<td>Sinusitis</td>
<td>11,148</td>
<td>5,670</td>
<td>51%</td>
</tr>
<tr>
<td>Bronchitis</td>
<td>229</td>
<td>99</td>
<td>43%</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>183</td>
<td>76</td>
<td>42%</td>
</tr>
<tr>
<td>Totals</td>
<td>62,149</td>
<td>30,149</td>
<td>48%</td>
</tr>
</tbody>
</table>

*46,400 individual cats- many cats had inflammation in multiple sites; nose, sinuses, lungs, etc. and thus the numbers in this table do not match.

Table 2

Therapy of Bartonella-Associated Respiratory Diseases of Cats

<table>
<thead>
<tr>
<th>% Clinical Improvement</th>
<th>%</th>
<th>#</th>
<th>%</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worsening</td>
<td>24</td>
<td>1</td>
<td>11</td>
<td>46</td>
</tr>
<tr>
<td>None (no change)</td>
<td>476</td>
<td>18</td>
<td>301</td>
<td>63</td>
</tr>
<tr>
<td>Fair (50-59%)</td>
<td>277</td>
<td>10</td>
<td>235</td>
<td>85</td>
</tr>
<tr>
<td>Good (60-79%)</td>
<td>278</td>
<td>10</td>
<td>267</td>
<td>96</td>
</tr>
<tr>
<td>Excellent (80-99%)</td>
<td>96</td>
<td>25</td>
<td>665</td>
<td>95</td>
</tr>
<tr>
<td>Cured 100%</td>
<td>976</td>
<td>36</td>
<td>933</td>
<td>96</td>
</tr>
<tr>
<td>Totals</td>
<td>2,729</td>
<td>2,412</td>
<td>88%</td>
<td></td>
</tr>
</tbody>
</table>

References:


7. Andrew M, Margileth and David F. Baehren Chest Wall Abscess Due to Cat-Scratch Disease (CSD) in an Adult with Antibodies to Bartonella clarridgeiae: Case Report and Review of the Thoracopulmonary Manifestations of CSD CID 1998;27, 353-357.


Bartonella references can be obtained at: www.nlm.nih.gov or navvetlab.com

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