Brucella canis in Dogs

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6. Obstructive icterus—hyperbilirubinemia with 80% direct (conjugated) reading bilirubin caused by cholestasis.

7. Insignificant rise in SGPT and SAP. This is an unusual finding in an apparent cholestatic disease.

8. Hyponatremia—low total body sodium and lack of adequate dietary intake. Hyponatremia with normal potassium suggests causes other than adrenal insufficiency.

Paracentesis Abdominis August 14
Yellow, cloudy fluid with a pH of 7, less than 100 mg/dl protein, and low cell count. Interpretation—Transudate.

Liver Biopsy August 18
Diagnosis—Chronic Cholangiohepatitis.

Necropsy following euthanasia August 19
Diagnosis—Diffuse chronic active cholangiohepatitis; gastric and duodenal ulcers with intestinal hemorrhage.

Discussion
According to Strombeck, in most cases of chronic active hepatitis SGPT and SAP activities are elevated. However, the increase may not be marked.

Biopsy and necropsy findings in this case corroborated the clinical diagnosis of hepatitis and the laboratory diagnosis of obstructive icterus, blood loss anemia and pre-renal azotemia.

The unusual aspects of this case are the normal or near normal SGPT and SAP levels with a greatly increased serum bilirubin, the young age (2 years old) and relatively short duration (2 weeks) of clinical illness.

REFERENCE

Brucella canis in Dogs
by Nancy Creek*

Brucella canis is a gram negative coc-cobacillus that was first isolated in 1966. It was first recognized in large breeding colonies of beagles, but subsequent independent investigators found many other breeds and mixed-breed dogs to be infected with the organism.3

Characteristics of the new Brucella species were determined by the usual biochemical tests and by analysis by gas chromatography of the metabolites excreted during growth. Cultural studies, agglutination tests, and pathogenicity tests were also done. The new Brucella species was found to be similar to B. suis morphologically and biochemically but similar to B. ovis antigenically.4

B. canis grows well in tryptose broth at 37°C but even better on Brucella broth (Albimi). Initially it is a uniform growth; after 48 to 72 hours of incubation a viscous, ropey sediment occurs. No pellicle is formed. Growth is inhibited by ten percent CO2 and no growth occurs under strict anaerobic conditions.3,13 Table I lists the biochemical characteristics of B. canis.4,8

TABLE I: Biochemical Characteristics of Brucella canis

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Brucella canis</th>
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<tbody>
<tr>
<td>Hemolysis</td>
<td>–</td>
</tr>
<tr>
<td>Motility</td>
<td>–</td>
</tr>
<tr>
<td>Citrate</td>
<td>–</td>
</tr>
<tr>
<td>Urease</td>
<td>+ slow</td>
</tr>
<tr>
<td>H2S</td>
<td>+</td>
</tr>
<tr>
<td>Indol</td>
<td>–</td>
</tr>
<tr>
<td>Gas</td>
<td>–</td>
</tr>
<tr>
<td>Lactose</td>
<td>–</td>
</tr>
<tr>
<td>Dextrose</td>
<td>–</td>
</tr>
<tr>
<td>MacConkey</td>
<td>–</td>
</tr>
<tr>
<td>MR-VP</td>
<td>–</td>
</tr>
<tr>
<td>Catalase</td>
<td>+</td>
</tr>
<tr>
<td>Litmus Milk</td>
<td>alk</td>
</tr>
<tr>
<td>Gelatin</td>
<td>–</td>
</tr>
<tr>
<td>Oxidase</td>
<td>–</td>
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<tr>
<td>Nitrate</td>
<td>+</td>
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The surface antigens of B. canis are very similar to B. ovis. It also cross-reacts significantly with other bacteria such as B. suis, Actinobacillus equuli, and a Moraxella-like bacterium. B. canis antiserum react very slightly with Bordetella bronchiseptica, B. abortus, and B. melitensis.

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B. canis seems to have an affinity for lymph nodes and the genital tract. Generally, the only sign of canine brucellosis in the female dog is spontaneous abortion or the failure to conceive after one or more matings. In the non-pregnant female, subtle signs of disturbed lymph node function and fever may be observed. Approximately 85 percent of the abortions occur between day 45 and 63 of gestation. Many of the failures to conceive after mating have been found to be early, undetected embryonic deaths. Most of these deaths occur 10 to 20 days after mating. A tarry, colored, viscous vaginal discharge is frequently seen for several days following abortion. 5,11,13

Male dogs develop dermatitis, hyperemia, and swelling of the scrotum, epididymitis, prostatitis, lymph node infection; and later, unilateral or bilateral testicular atrophy. Head-to-head agglutination of spermatozoa is seen in the ejaculate. This is the result of migrating macrophages containing phagocytized sperm heads liberating sperm antigen into the extratubular epididymis. 3,5,11,13,14

Surviving pups, infected in utero, often are bacteremic, have enlarged lymph nodes, and have vertebral spondylitis. 11,12

Some common lesions of aborted fetuses are bronchopneumonia, myocarditis, generalized focal renal hemorrhage, lymphadenitis, and hepatitis. 5

Probably the most important feature of B. canis is the prolonged bacteremia that can persist for months, even years. Or, the bacteremia may be intermittent, localizing in the reproductive tract and lymphoid tissues. The most common mode of dog-to-dog transmission is thought to be by ingestion of infected tissues (such as aborted fetal and placental tissues) or by contact with vaginal discharges. 3,5,13 Transmission may also be venereally, infected male to susceptible female. Intermittent shedding in the semen for periods up to 60 weeks has been observed. B. canis has been isolated from the urine but no conclusive evidence that this is a mode of transmission has been shown. 5,13 Another possible source of infection is the mammary secretions of infected females that have recently aborted. 3,13

Because of the infection of aborted tissues, urine, and milk, humans should be cautious in handling aborted pups and avoid contact with mammary secretions, urine, and vaginal discharge. 5,12 As of 1977, 18 cases of human infection with B. canis have been listed by the Center for Disease Control. 1 Infected pet dogs should be considered potential hazards. 3

Canine brucellosis is widespread in the U.S. but actual incidence rates vary in different areas of the country and with the testing procedure used. Rates usually vary from one to six percent. 3 Most studies report a higher incidence rate in males than females and a higher incidence rate in strays than pets or non-stray dogs. 1,2,6 Canine brucellosis throughout the state of Iowa is being reported. 12

There are several methods used for diagnosis of B. canis, most of which are used in combination. The only method that is 100 percent reliable is to isolate B. canis from the blood or biopsy specimens. However, this is costly and time consuming. Serological tests are rapid but less reliable. The slide agglutination test (SAT), tube agglutination test (TAT) or mercapthenol added tube agglutination test (ME-TAT), and gel diffusion (GD) are the most commonly used diagnostic serological tests. If positive, these serological tests should always be followed by a bacteriological study. 13

There are many problems associated with serological studies of B. canis. The blood sample must be unhemolyzed. Many times blood samples are contaminated or the dog has been heavily treated with antibiotics. A dog may be infected but be bacteremic because of the tendency of the organism to localize in the genital tract and lymph nodes, resulting in a low titer. Other inherent problems are low levels of agglutinins, prozone phenomena, and cross-reacting with agglutinins of other gram negative bacteria with similar surface antigens. 2,3

The SAT is widely used by clinicians because of the ease of use and rapidity of results. Agglutination occurs within two minutes in titers ≥ 1:100. The SAT has been reported to be 99.7% specific and 62.5% sensitive. This means that if a dog tests negative for B. canis, the test is 99% accurate, but if it tests positive, the test is only 62.5% accurate. There is a high rate of false-positives associated with the SAT. A titer ≥ 1:100 is considered positive. It is recommended that if a dog tests positive, further
testing be done before a final diagnosis is given. The TAT or ME-TAT are recognized as more accurate tests than the SAT but there is more time and problems involved. The serum and antigen must be incubated at 52° C for 48 hours. Also, the B. canis antigen must be carefully standardized. The TAT is considered more sensitive than the ME-TAT, while the ME-TAT is considered more specific. One must consider that the sacrifice of sensitivity for more specificity can occasionally result in an infected dog being dismissed as seronegative. A titer of ≥ 1:100 is considered positive, and a titer of ≥ 1:200 is considered actively infected.

Gel diffusion is currently considered the best serologic test. It is more sensitive and specific that SAT, TAT, or ME-TAT. Because of its very similar surface antigens, B. ovis is used as the test antigen in these tests. This is because of the tendency of the B. canis to be mucoid (or ropey) and hard to work with. The recommended diagnostic procedure is to do an SAT and if it is positive, run a TAT or ME-TAT and a GD. Also, a semen exam should be done if the male is from an infected kennel. Thirty to 80 percent of the spermatozoa will have bent tails, swollen midpieces, or distal protoplasmic droplets if the infection is two to five weeks old. If the infection is over 20 weeks old, spermatozoa without tails, head-to-head agglutination, or head-to-inflammatory cell agglutination will be seen.

For treatment of B. canis, the drug of choice seems to be a tetracycline with or without streptomycin for at least 30 days. Bacteremia returned within two months when antibiotic therapy was given for only two weeks. Success rates for this regimen vary. Some authors feel control of the disease rather than its cure is advised. Control may be accomplished by isolation or euthanasia of the infected dog, disinfection of contaminated quarters, stringent management and husbandry practices, and a series of monthly tests.

Attempts toward development of a bacterin have so far been unsuccessful.

REFERENCES