GETTING A DIAGNOSIS IN AN ABORTION STORM

Mary Lynne Vickers
Diagnostic Virologist
Livestock Disease Diagnostic Center
University of Kentucky
Lexington, Kentucky

© Copyright American Association of Bovine Practitioners; open access distribution.

Introduction

Determining the cause of abortions presents many problems. This is reflected in the fact that the diagnostic success of laboratories in bovine abortion is only 30-40% (1,2). The reasons for this relatively low diagnostic success are numerous. Abortion results from an event that frequently occurred weeks or months earlier. The cause, therefore, may be undetectable in the fetus at the time of abortion. The fetus is often retained in the uterus hours to days after death, and autolysis obscures lesions that are present. The placenta is often affected first and most consistently but is frequently unavailable for examination (1).

The lack of relevant history, clinical signs and frequent negative necropsy findings force the diagnostician to look for every infectious agent that might be involved. Therefore, the laboratory tests for all the etiological agents frequently associated with abortion. The techniques used will vary somewhat between laboratories but will include what can be tested for within a reasonable amount of time and some degree of accuracy.

Bovine Viral Diarrhea Virus

Bovine viral diarrhea virus (BVDV) infection during pregancy is associated with abortion, stillbirth, and congential anomalies in both spontaneous and experimentally induced infections (3,4). Infection early in gestation is more important than third trimester when the fetus may respond immunologically to clear the infection.

Infection early in gestation may result in embryonic death and resorption. Infection of the fetus with BVDV in the 2nd through the 4th months of gestation may result in fetal death followed by abortion, stillbirth or mummification (5). Stillborn calves, born at term, are normally developed but may exhibit evidence of intrauterine growth retardation. Infection during the second trimester may result in a live or stillborn calf with congenital abnormalities. Cerebellar hypoplasia and blindness or cataracts are frequently reported. Tremors may be present in some calves. Gross lesions reported following BVDV infection also include microencephaly, hydrocephalus, microphthalmia, opacity of the lens, thymic hypoplasia and alopecia (5).

Expulsion of the fetus may be delayed for months, making diagnosis of the infection difficult. The fetus may be fresh, mummified or anywhere in between. There are no gross lesions of BVDV infection other than the congenital abnormalities. BVDV antigen may be detectable on fluorescent antibody test of sections of fetal tissues and virus may be isolated from the placenta or tissues of the fetus. The noncytopathic biotype of BVDV is most frequently isolated from bovine abortions. Specific microscopic lesions attributable to BVDV infection are seldom present (1). BVDV may be found in fetuses along with other infectious organisms i.e. Bacillus sp., A. pyogenes, or a fungus (1). The lesions present in the fetus are those of bacterial or mycotic infection.

Congenital BVDV infection in early gestation can also result in the birth of a apparently normal persistently infected calf that will shed virus for the duration of its lifespan. This carrier animal acts as a reservoir of the virus, maintaining the infection in the herd until it is identified and eliminated.

The overall incidence of BVDV abortion does not appear to be high but in nonimmune herds the toll can be considerable. There may also be differences between

BVDV strains in their ability to cause abortion or congenital defects (1).

The presence of BVDV in aborted calves, the birth of calves with congenital anomalies suggestive of BVDV infection, and calves born with preclostral antibodies are evidence of an outbreak of BVDV abortion. Clinical signs of infection in the cows may not be apparent. Because of the long retention time of the fetus in the uterus, acute and convalescent sera from the dam will not aid in the diagnosis.

Infectious Bovine Rhinotracheitis

Infectious bovine rhinotracheitis (IBR) abortion occurs rarely in some parts of the U.S. but has caused epidemic abortions in susceptible herds in other areas (6). Some of these abortion epidemics resulted from the inoculation of pregnant cows with a modified, live intramuscular IBR vaccine.

Like many herpesviruses, IBR virus becomes latent in naturally infected animals and those that have been vaccinated with some modified live vaccines. Some abortion outbreaks with no obvious source of infection may result from recrudescence of the virus from these latent infections. IBR abortion outbreaks have occurred in isolated herds with no history of live virus vaccine use or newly introduced animals (1).

Clinical signs of IBR infection are seldom present in the herd before or after abortions occur. Aborted fetuses are four months gestation or older and are retained 2 or more days after death (6). Autolysis of the fetal tissue is present.

Laboratory diagnosis of this infection is relatively easy. There are no characteristic gross lesions, but fluorescent antibody test usually detects IBR antigen in sections of fetal kidney. IBR virus can be isolated from some the aborted fetuses, more frequently from the placenta. However, focal necrosis of the liver is characteristic of IBR abortion. This lesion may also be present in the lung, spleen and kidney. Serology using paired sera is usually not useful.

Leptospira

Leptospira infection in cattle results in abortion, premature birth of live calves and weak calves with low survival (7,8). Bovine leptospiral abortion most frequently occurs in the last trimester but can occur at any stage of gestation. The fetus may be expelled shortly after death or several days later. The fetus may have mild icterus but gross lesions are rare. Microscopic lesions are not consistent but may include interstitial nephritis, pneumonia and placentitis (7).

Laboratory isolation of the leptospires is difficult. Diagnostic laboratories vary as to whether this is attempted on a routine basis. Isolation does provide evidence of infection and probable cause of abortion. More frequently, demonstration of leptospires in fetal tissue or placenta by special stains or fluorescent antibody techniques is utilized.

Microscopic agglutination test (MAT) is used for serologic determination of antibody to leptospira serovars. Serovars that have been isolated from cattle are pomona, canicola, icterohaemorrhagiae, grippotyphosa, hardjo and szwajizak (7). Vaccination makes interpretation of antibody levels difficult. Cows that abort have probably reached their maximum antibody titer at the time of abortion. Cows that abort due to L. pomona infection may have high antibody levels, greater than 1:1600 at the time of abortion (7). Cows that abort due to hardjo may have much lower antibody titers. The MAT routinely uses 1:100 dilution to screen serum for antibody. Lower dilutions of blood or body fluids are used to screen fetal samples. MAT may detect leptospira antibody in some fetuses (8).

© Copyright American Association of Bovine Practitioners; open access distribution.

References

1. Kirkbride, C.A. Managing an outbreak of livestock abortion. Diagnosis and control of bovine abortion. Vet Med:70-79, May 1985.
2. Jerrett, I.V., McOrist, S., Waddington, J., et al. Diagnostic studies of the fetus, placenta and maternal blood from 265 bovine abortions. Cornell Vet 74:8-20, 1984.
3. Oirschot, J.T. Congenital infections with non-arbotogaviruses. Vet Microbiol 8:321-361, 1983.
4. Done, J.T., Terlecki, S. Bovine virus diarrhea-mucosal disease virus: pathogenicity for the fetal calf following maternal infection. Vet Rec 106:473-479, 1980.
5. Bolin, S.R. Bovine abortion caused by bovine viral diarrhea virus. In: Laboratory Diagnosis of Livestock Abortion. C.A. Kirkbride, Ed. 3rd Ed. Iowa State Univ Press, Ames, Iowa, 1990.
6. Kirkbride, C.A. Infectious bovine rhinotracheitis (Bovine herpesvirus group I) viral abortion. In: Laboratory Diagnosis of Livestock Abortion. C.A. Kirkbride, Ed. 3rd Ed. Iowa State Univ Press, Ames, Iowa, 1990.
7. Kirkbride, K.A. Leptospiral abortion. In: Laboratory Diagnosis of Livestock Abortion, C.A. Kirkbride, Ed. 3rd Ed. Iowa State Univ Press, Ames, Iowa, 1990.
8. Ellis, W.A., O'Brien, J.J., Neill, S.D., Bryson, D.G. Bovine leptospirosis: experimental serovar hardjo infection. Vet Microbiol 11:293-299, 1986.

Summary

Diseases that terminate pregnancy can be very costly to the livestock industry. Control measures can be implemented only after the cause of the disease has been identified. Significant gross lesions occur rarely in fetuses and diagnosis may require submission of specimens to the diagnostic laboratory.

Optimally, the specimens should consist of the fetus and placenta and dam's serum; minimally, lung, liver, spleen, kidney and stomach content, serum and body fluid and brain if the fetus is not severely autolyzed. Diagnostic methods for BVD, IBR and leptospiral abortions are reviewed as infectious agents that may be involved in an abortion storm.

© Copyright American Association of Bovine Practitioners; open access distribution.