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Brief Communications

Morphologic Lesions in Brucella abortus Infected Ovine Fetuses

S. L. Gorham, F. M. Enright, T. G. Snider III, and E. D. Roberts

Brucellosis is an infectious bacterial disease of domestic animals and man caused by members of the genus Brucella. In cattle the disease is caused by Brucella abortus and is characterized by abortions, reduction in fertility, and decreased milk production. Sheep are susceptible to both natural and experimental B. abortus infection. In pregnant ewes produces late term abortions and stillbirths. Lesions in B. abortus-infected fetal sheep have been reported; however there are no descriptions of microscopic lesions. This paper describes morphologic lesions in fetal sheep experimentally infected with B. abortus.

Eleven time-dated pregnant cross-bred ewes were negative for antibodies to B. abortus with the card (buffered brucella antigen) and brucella complement fixation test. Surgery was performed on ewes between 116 and 124 days of gestation. A midline abdominal incision was made and physiologic saline or 3.0 x 10^3 to 4.0 x 10^6 B. abortus strain organisms were inoculated through the uterine wall into dorsal fetal neck muscles. All fetuses were collected between 120 to 130 days of gestation. Two fetuses served as uninoculated controls, three as saline-inoculated controls, and 11 were inoculated with B. abortus strain 2308. One saline-inoculated fetus was collected at 4 days and two at 8 days post-inoculation (pi). One infected fetus was collected at days 1 and 2 pi. Three were collected at day 3 pi and two at day 4 pi, and four at day 6 pi. One infected fetus collected at day 3 pi and four infected fetuses collected at day 6 pi were dead at the time of collection. All other fetuses were viable at the time of collection. Each fetus was necropsied and tissues were fixed in 10% buffered formalin, embedded in plastic, cut in 1 to 3 μm sections, and stained with hematoxylin and eosin.

The lung pleura was pale white and pleural blood and lymphatic vessels were prominent and circumscribed by a white opaque fluid (edema) in fetuses collected at days 2, 3, and 4 pi. Multiple 1 to 2 mm randomly distributed white foci that extended into the lung parenchyma were present in one fetus collected at day 4 pi. Two fetuses collected 6 days after infection had marked subcutaneous edema and abdominal organs covered by a white fibrillar material (fibrin). All fetuses collected 6 days after infection had moderately enlarged, edematous lymph nodes.

Prominent microscopic lesions in infected fetuses included mild to severe bronchopneumonia, marked macrophage proliferation in lymph nodes, pulmonary pleural edema and fibrin deposits, and moderately increased numbers of perivascular accumulations of mast cells and eosinophils in the thymus, lungs, and lymph node. In the day 4 pi fetus with pulmonary white foci, alveoli and bronchioles contained large macrophages surrounded by numerous neutrophils (Figs. 1, 2). In other infected fetuses there was mild to moderate alveolar wall thickening, and some alveoli contained a few macrophages. After day 3 pi, lymph node sinusoids were filled with macrophages and with abundant eosinophilic cytoplasm. There were prominent lymphoid follicles in one fetus at day 6 pi (Fig. 3). B. abortus was isolated from all infected fetuses. Lesions were not observed in control fetuses.

Fig. 1. Lung from a B. abortus fetus at day 4 pi. Peribronchiolar bronchioles and alveoli are filled with leukocytes, and alveolar walls are moderately thickened. HE.
Fig. 2. Lung from a *B. abortus* infected fetus at day 4 pi. Alveoli contain large mononuclear cells surrounded by neutrophils. HE.

Fig. 3. Lymph node from a *B. abortus* infected fetus at day 6 pi. Note densely cellular cortex and primary follicle. HE.

The *B. abortus* infected ovine fetuses developed systemic infections similar to those reported in natural and experimental infections in bovine fetuses. These data suggest that the ovine fetus may serve as an acceptable host for experimental *B. abortus* studies. As reasons for the increased exudation and the shorter period between infection and fetal death in the fetal sheep were undetermined, further studies are needed to firmly establish fetal sheep as a definite experimental model for bovine brucellosis.

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Request reprints from Dr. Sammy Gorham, Virginia-Maryland Regional College of Veterinary Medicine, College Park Campus, University of Maryland, College Park, MD 20742 (USA).