PARVOVIRUS INFECTION IN PIGS WITH VESICULAR-LIKE LESIONS

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Within 5 weeks, specimens from 6 swine herds in 4 midwestern states were submitted to our laboratory for suspected vesicular disease. Porcine parvovirus (PPV) was isolated from submitted tissues. This is believed to be the first report of PPV infection associated with vesicular-like lesions in swine. We hope that this report will lead diagnosticians to consider PPV infection in the differential diagnosis of porcine vesicular diseases.

Herd History: Lesions included slit-like lingual and cutaneous erosions, extensive lingual denudation, palatine erosions, and necrotic lip and snout lesions resembling the remnants of ruptured vesicles. Other signs included lameness attributed to joint disease, erosive lesions on the coronary band and interdigital spaces, separation of the hoof wall and sloughing of the hooves. Anorexia, diarrhea, conjunctivitis and sneezing were noted. Not all of these signs were present on any one farm. Pigs 1 to 2 weeks old were more severely affected; some affected pigs were 4 weeks old. All pigs were kept outside, but some had access to A-frame shelters.

A unique outbreak involved 3 farms in Indiana owned by a father and son. In the initial outbreak, morbidity exceeded 90 percent and mortality was 58 percent. Two weeks later, the disease spread to their other farms. The owners moved freely among the 3 farms and feed and bedding were from a common source. On the two farms last affected, morbidity was 100 percent and mortality rates were 5.8 and 0 percent. On these farms antibiotic therapy was initiated at the onset of disease. In the initial outbreak, treatment was delayed several days. In other midwestern states the disease was confined to individual herds.

Materials and Methods: Cell Culture - Primary and secondary fetal porcine kidney and swine testicle cell cultures were used to isolate and identify the virus. (1)

Fluorescent Antibody Tissue Section - Skin adjacent to coronary band lesions of 2 pigs of different origin was sectioned in a cryostat and stained by the direct immunofluorescence technique with PPV conjugate.

Animal Inoculations - Twelve littermates, delivered by hysterectomy and deprived of colostrum, were paired in 6 cages. Pigs in each cage were designated A or B. The A pigs were inoculated intradermally on the snout, lips, tongue, and the coronary band and interdigital spaces. The B pigs were inoculated orally and intranasally. The inoculum for each pig in Cages 1 through 5 was 2 ml of the second cell culture passage of the field isolate. The viral titer was 10^7 plaque forming units/0.1 ml. Pig A in Cage 6 was inoculated intradermally with 2 ml of a suspension of foot lesion tissue while Pig B received the same inoculum (2 ml) orally and intranasally. When inoculated, all pigs were 9 days old except those in Cage 6 which were 16 days old. Pre-inoculation serums were negative for PPV antibodies.

Results: PPV was isolated from visceral organs, brain and skin of affected field pigs. Two isolates produced cytopathic effects in primary fetal porcine kidney cell cultures. Fluorescence was detected with anti-PPV conjugate only in hair follicles near skin lesions of 2 pigs from Indiana and Iowa.

All of the clinical signs observed in the field were detected in the 10 pigs experimentally inoculated with cell culture virus. However none of the pigs had all of the signs observed in the field.

By 24 days postinoculation (DPI), all but one pig in the first 5 cages had recovered. Clinical signs began during 7 to 11 DPI. Blood taken at 21 DPI had hemagglutination-inhibition (HI) titers of 1:512 to >1:16384. A moribund pig, euthanatized 21 DPI, had a HI titer of >1:16384. PPV was isolated from its kidney, tongue and a composite of tonsil and lymph nodes.

Two pigs in Cage 6 reacted more severely. Clinical signs resembled those seen in the field. A tongue erosion in Pig A and diarrhea in Pig B developed at 3 DPI. Serum from Pig B (killed at 17 DPI) had a HI titer of >1:1024. PPV was isolated from pooled lymph nodes. Blood collected at 19 DPI from Pig A had a HI titer of >1:1024. PPV was isolated from a tendon sheath, both rear foot pads, a foot lesion, caseous joint exudate and from swabs of a snout lesion from Pig A at necropsy.

At necropsy, the 2 experimentally inoculated pigs from Cage 6 seemed to be in the chronic stage of the disease with no vesicular-like lesions. Both had lingual lesions and swollen joints. Pig A had an erythematous ear, firm dermal swellings with crusty exudate on the snout and maxilla, and intestinal congestion with swollen regional lymph nodes. Pig B had fibrinous pericarditis. Microscopic vesicles were on the ear, nose and an unidentified cutaneous site of Pig A. At multiple cutaneous sites granulation was accompanied by acute necrotizing or ulcerative dermatitis. Lingual ulcers were healing. Joints of Pig A had pyogranulomatous inflammation and proliferative synovitis accompanied by ulcerative pododermatitis, periarticular microabcessation and proliferative tendonitis with acute osteomyelitis and chondritis. Pig B had diffuse chronic bacterial epicarditis. Bacteria were common in superficial necrotic tissues, but septic abscesses were noted only in the deep lingual interstices and the mandibular lymph node of Pig B. Acute inflammation or necrosis was observed in Peyer's patches of Pig A and in the mandibular, inguinal and mesenteric lymph nodes of Pig B. Pig B had interstitial pneumonia.

Discussion: Morbidity in 6 herds varied from 13 to 100 percent with a mortality range of 3.5 to 58 percent. The low morbidity in 3 herds was attributed to prompt antibiotic treatment. However, treatment did not always reduce the morbidity.

It was speculated that the disease observed stemmed from a mixed viral and bacterial infection for several reasons. Though the initial Indiana outbreak had a very high mortality rate, mortality was greatly reduced on the other 2 farms where therapy was begun promptly. The 10 pigs experimentally inoculated with cell culture virus had a 7 to 11 day incubation period and relatively mild disease. In all but one pig clinical signs ceased by 24 DPI. In contrast, 2 pigs experimentally inoculated with a crude skin suspension had a rapid onset (3 DPI) of severe disease and their condition progressively deteriorated. Their disease more nearly modeled that seen in the field. They were moribund at 17 and 19 DPI.

It must be stressed that intact vesicles or lesions indistinguishable from vesicles were rarely reported. Lingual and dermal lesions which looked like remnants of ruptured vesicles were abundant.

Reference: (1) Stewart WC, et al., 18th Ann Proc Am Assn Vet Lab Diag, 1975.