

Small Mammals



FELINE INFECTIOUS PERITONITIS-LIKE CORONAVIRUS IN FERRETS

Background

Coronaviruses that infect ferrets are a severe acute respiratory syndrome (SARS) and an enzootic catarrhal enteritis (ECE). SARS coronavirus has been experimentally transmitted to ferrets, but natural infections have not been reported in this species.

Epizootic catarrhal enteritis causes diarrhea in young and adult ferrets. The infective agent is ferret enteric coronavirus (FECV). No lesions other than those affecting the gastrointestinal tract have been described. FECV is most closely related to feline coronavirus. Recently, a disease has been recognized in ferrets with gross, histologic, and immunohistochemical features that are similar to feline infectious peritonitis (FIP).

Objectives

To report clinicopathologic features of a systemic coronavirus-associated disease resembling FIP in the domestic ferret.

Procedure

Twenty-three ferrets from Europe and the United States diagnosed with systemic pyogranulomatous inflammation resembling FIP were evaluated for clinicopathologic features.

Results

The average age of the ferrets at the time of diagnosis was 11 months, and the average duration of clinical illness was 67 days. The disease was progressive in all cases. Common clinical findings were anorexia, weight loss, diarrhea, and large, palpable intra-abdominal masses. Hind limb paresis, central nervous system signs, vomiting, and dyspnea were less frequent.

Typical hematologic findings were mild anemia, thrombocytopenia, and hypergammaglobulinemia. Whitish nodules were observed in the mesenteric adipose tissue and lymph nodes, visceral peritoneum, liver, kidneys, spleen, and lungs, among other tissues. One ferret had a serous abdominal effusion. Microscopic

findings included pyogranulomatous inflammation involving especially the visceral peritoneum, mesenteric adipose tissue, liver, lungs, kidneys, lymph nodes, spleen, pancreas, adrenal glands, or blood vessels, or a combination of tissues. All cases were immunohistochemically positive for coronavirus antigen using an FIP monoclonal antibody. Electron microscopic examination of inflammatory lesions identified particles with coronavirus morphology in the cytoplasm of macrophages. Partial sequencing of the coronavirus spike gene obtained from frozen tissue indicates that the virus is related to ferret enteric coronavirus.

Author Conclusion

A recent mutation or shift in the ferret coronavirus that causes ECE can cause FIP-like disease in ferrets.

Inclusions

Eleven figures, 1 table, 31 references.

Editor Annotation

Ferret enteric coronavirus is the proposed etiology for ECE, which generally results in mild to severe diarrhea. Younger ferrets typically recover with supportive therapy, while older, immunosuppressed animals often succumb. A number of researchers are now recognizing a systemic disease syndrome linked to a virus related to ferret enteric coronavirus. This disease resembles FIP, and is characterized by anorexia, weight loss, diarrhea, and large palpable intra-abdominal masses. Other less frequent findings reported are hind limb paresis and central nervous system disease. Gross findings include white nodules present in multiple tissues including liver, kidney, spleen, and lungs. Of 23 ferrets with FIP-like lesions submitted for examination from Europe and the United States, all were positive for coronavirus antigen, and particles consistent with coronavirus were identified via electron microscopy of various tissues. The coronavirus initiating the lesions appears to be ferret enteric coronavirus. (AML)

Garner MM, Ramsell K, Morera N, et al. Clinicopathologic features of a systemic coronavirus associated disease resembling feline infectious peritonitis in the domestic ferret (*Mustela putorius*). Vet Pathol 2008;45:236-246.

Journals Monitored

- American Journal of Veterinary Research
 - Australian Veterinary Journal
 - Australian Veterinary Practitioner
 - Avian Diseases
 - British Veterinary Journal
 - Canadian Journal of Veterinary Research
 - Canadian Veterinary Journal
 - Journal of Avian Medicine and Surgery
 - Journal of the American Animal Hospital Association
 - Journal of the American Veterinary Medical Association
 - Journal of Small Animal Practice
 - Journal of Small Exotic Animal Medicine
 - Journal of Veterinary Dentistry
 - Journal of Veterinary Internal Medicine
 - Journal of Veterinary Pharmacology and Therapeutics
 - Journal of Zoo and Wildlife Medicine
 - New Zealand Veterinary Journal
 - Research in Veterinary Science
 - Veterinary and Comparative Orthopaedics and Traumatology
 - Veterinary Dermatology
 - Veterinary Immunology and Immunopathology
 - Veterinary Pathology
 - Veterinary Radiology & Ultrasound
 - Veterinary Record
 - Veterinary Research Communications
 - Veterinary Surgery
- ... and more than 20 others