ZOO PATHOLOGY SLIDE CONFERENCE
Orlando, Florida
October 19, 2014

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IDENTIFICATION: D10-038214
CONTRIBUTOR/INSTITUTION:

Dr. Aníbal G. Armién
Department of Veterinary Population Medicine
College of Veterinary Medicine
University of Minnesota
1333 Gortner Ave
Saint Paul, MN 55108
USA
Phone: 612-625 8270
Fax: 612 624 8707
Email: armie001@umn.edu

SIGNALMENT: Goitered Gazelle (*Gazella subgutturosa*)

HISTORY: A 15-mo-old male gazelle presented a non-raised, 1 cm solitary lesion dorsal to the left nostril on August 12, 2010. On August 17 the lesion had progressed to a raised and crusty proliferation. Punch biopsies were obtained on August 19. A poxvirus infection was suspected and fresh and formalin-fixed tissue was submitted to the Minnesota Veterinary Diagnostic Laboratory (MVDL) for parapoxvirus-poxvirus investigation.

GROSS FINDINGS: 1 cm in diameter focal, raised and crusty lesion located dorsal to the left nostril.

HISTOPATHOLOGIC FINDINGS:

Haired skin: The necrotic epidermis was elevated by a thick layer of exudates. The exudate was composed of proteinaceous material, erythrocytes, intact and degenerated leukocytes, cell debris, bacteria and hair. At some segment the necrotic epidermis was disrupted. The hair follicle and adnexal glands were obscured by necrosis and a large numbers of histiocytes and moderate number of neutrophils and lymphocytes infiltration. Epidermal cells showed degeneration. Small round eosinophilic inclusion bodies were occasionally found in few remaining degenerated epidermal cell. The epidermis at the lesion interface showed orthokeratoytic hyperkeratosis, hyperplasia, hypergranulosis, and spongiosis. There was a mild lymphocytic transepidermal infiltration.

SPECIAL STAINS: Steiner stain demonstrated myriad intralesional mixed bacteria colonies. Acid Fast, GMS and PAS stains failed to demonstrate any fungal microorganism.

ELECTRON MICROSCOPY: Fresh skin sample was processed and stained with Phosphotungstic Acid for a negative visualization of viral particle on transmission electron microscope (TEM). The virions found in the skin preparation were similar in morphology and symmetry to the virions from the family of Poxviridae, most likely within the subfamily Chordopoxvirinae based on host species. These virions were cuboid or brick-shaped with diameters from 225 to 325 nm. Virions present "M" (or "mulberry") form (surface is covered with short and whorled filaments). Higher numbers of virions were observed in the sample. Several viral particles seemed to be enveloped. Due to a high likelihood of an unusual poxvirus infection, tissue homogenate from the original sample was immediately submitted to FADDL, Animal Plant and Health Inspection Service (APHIS), United States Department of Agriculture (USDA), for confirmatory diagnosis of a poxvirus infection and foreign animal disease rule-out.

Formalin fixed tissue was postfixed in glutharaldehyd, embedded plastic and stained with lead citrate/ uranyl acetate. TEM examination demonstrated virions free and in necrotic and/or cornified epthelial cells.

MOLECULAR DIAGNOSTICS: PCR for Parapoxvirus and Capripoxvirus were negative (FADDL/APHIS/USDA).

ISOLATION AND CHARACTERIZATION OF THE VIRUS:

Isolation and characterization of the virus was performed at the FADDL/APHIS/USDA. The virus was cultured in vero cells. DNA sequence and phylogenetic analysis of each gene fragment from the gazelle isolate showed .97% identity in BLAST searches with two Deerpox virus (DPV) strains (W848-83 and W-1170-84) isolated from North American mule deer (Odocoileus hemionus) in 1983–1984.[1]

MORPHOLOGIC DIAGNOSIS:

Hair skin: Dermatitis, folliculitis, and adenitis necrotizing granulomatous locally extensive with occasional intracytoplasmic inclusion in epithelial cells, pustule formation, crust and secondary mixed bacterial infection

ULTRASTRUCTURAL DIAGNOSIS:

Plastic embedded - Hair skin: Chordopoxvirus dermatitis

ETIOLOGIC DIAGNOSIS: Deerpox viral dermatitis

DISCUSSION:

The histological lesion presented here is from the first diagnostic report with isolation of DPV from a goitered gazelle (Gazella subgutturosa)[1]. Tissue was submitted by a Zoological Garden to the MVDL at the University of Minnesota for poxvirus diagnostic investigation. Poxviral infection was confirmed using electron microscopy at the VDL Ultrastructual Pathology Section. Homogenous tissue was then referred to Plum Island FADDL for confirmation. DNA sequence and phylogenetic analysis of each gene fragment from the gazelle isolate was identified as DPV. The International Committee for the Taxonomy of Viruses (ICTV) has designated Cervidpoxvirus as a ninth genus in the subfamily Chordopoxvirinae with deerpox as the only species listed within the genus. Cervidpoxvirus genus is distantly related to other ruminant poxviruses, such as the Capripoxvirus genus consisting of lumpy skin disease, sheeppox, and goatpox viruses. DPV infections have been described in mule deer and black-tailed deer in California, Oregon, and eastern Canada.[3]

In the goiter gazelle case the only clinical sign observed was a crusty lesion dorsal to the left nostril. Microscopically, this lesion was characterized by a chronic necrotizing and inflammatory process that obscured any epidermal cell transformation due to the viral infection. Inclusion bodies were very rare and seen only in a few cells after an exhausting search of 15 serial sections. Interestingly, on EM-negative stain and plastic embedded preparation, deerpox viruses were present in necrotic debris and cornified epithelial cells. Experimental infection with Deerpoxvirus in black-tailed deer indicted that systemic clinical signs in fawns were confined to mild transient pyrexia, anorexia and depression. Typical cutaneous gross lesions are multifocal erythema, papules, pustules, ulceration, and crusting. Microscopic cutaneous lesions included epithelial cell hyperplasia with hydropic change, intraepithelial pustules, erosions, folliculitis, and dense leukocytic dermal infiltrates. Oral lesions containing intracytoplasmic inclusions on epithelial cells are less common. No internal organ lesions are seen at necropsy.[2]

The transmission of DPV has been experimentally achieved by intracutaneous and intravenous routes, and from animal to animal.[2] In the current case, it was not clear how this gazelle was infected. The goitered gazelle herd at a Zoogical Garden consisted of 12 (3 male and 9 female) animals. Lesions were not seen in any of the other 11 animals although the affected animal had been housed separately from the others since March 21, 2010. The affected gazelle had been born at the zoo and was held in an isolated, solid-walled pen for a number of weeks prior to the appearance of the lesions. There may have been some interaction with other young male gazelles during this time, but the young animals were kept away from the rest of the herd to prevent breeding and aggression issues. There is no recollection of exposure to deer for this animal. The only cervids in the zoo collection are moose and caribou which are in isolated areas. Bactrian camels (Camelus bactrianus) and pronghorn antelope (Antilocapra americana) are housed nearby.

This case exemplifies the importance of the use of Electron Microscopy at the frontline of foreign animal disease diagnosis, emerging disease monitoring and etiology discovery. It illustrates an event of Poxvirus crossing the species barrier. It also demonstrates the usefulness of Zoos and exotic animal facilities, with high biosafety standards, as sentinels for infectious disease events.

REFERENCES:

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ACKNOWLEDGMENTS: We are grateful to Dr. James Rasmussen MNZoo and Dr. Bracht from the FADDL/APHIS /USDA. We also thank Ronda Aho, Don Ariyakumar and Dead Muldoon for the histological and electron microscopy preparation, respectively.