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VISUAL DEFECTS IN WHITE-TAILED DEER FROM MICHIGAN: SIX CASE REPORTS

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Abstract: Six cases of unrelated visual defects in free-ranging white-tailed deer (*Odocoileus virginianus*) from Michigan are described. Two were congenital, two were of infectious etiology, one from central nervous neoplasia, and one from degenerative changes in lenses of both eyes.

INTRODUCTION

Six cases of unrelated blindness in white-tailed deer (*Odocoileus virginianus*) were examined at the Michigan State University Veterinary Clinic over a 7 month period. These animals had ophthalmic diseases similar to small domestic animals. When possible, electroretinographic surveys were performed as well as follow-up histologic examinations of the ocular structures. All deer were submitted by the Michigan Department of Natural Resources.

Case #1 (145399)

An apparently blind yearling doe, about 1.5 years old, was found wandering in a trailer camp in Mecosta County on 17 September 1973. She was healthy and resisted physical restraint, but was not responsive to the movement of a hand before the eyes. The initial examination of this doe was performed on 19 October 1973. She was ataxic and generally depressed. Rectal temperature was 38.5 C. Bilateral pupillary light reflexes were brisk and normal. However, she was blind, deaf and had no olfactory function. She did not respond to either a threatening noise, smell, or visual stimuli. The fundus appeared normal by ophthalmoscopic examination, and no other ocular structures were altered. After sedation an electroretinogram was performed with a neuroleptic drug.[4] Pupils remained dilated from the effects of the drug and utilizing th 40L light stimulus, a definite positive ERG response was noted (Fig. 1).

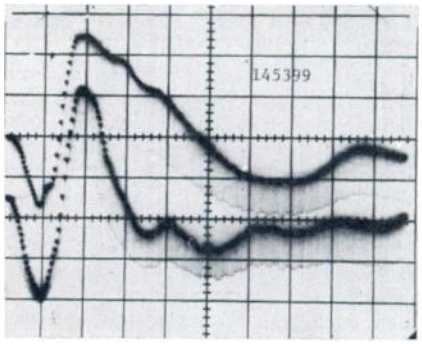

FIGURE 1. ERG of Case #1 (145399) with a 200 mscc sweep averaged 8 times to photostimulation. One large vertical grid equals 100 μvolts amplitude. The top tracing in the recording reflects the right eye and the bottom reflects the left eye response.

The animal refused nourishment and generally became more depressed. Euthanasia was considered the humane thing to do. Following barbiturate induced anesthesia, the whole body was perfused with 10% formalin-saline via the right carotid artery in a similar manner reported for dogs.[1] Ocular tissues were immediately harvested and processed for histologic ex-

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[4] CI-744—Parke-Davis Company, Ann Arbor, Michigan, 48105, USA.

amination. No histopathologic abnormalities were observed in either eye. Gross examination of the carcass was normal. Histologic appearance of the brain was abnormal. The cerebral cortex gray matter was showing a malacia, proliferation of gitter cells, vessels and edema. Lymphocytic infiltrations of the perivascular white matter was scattered and diffuse. No lesions were noted in the cerebellum.

The diagnosis of this particular animal was encephalitis and polioencephalomalacia based upon the histologic examination of the brain.

Case #2 (145594)

A doe fawn, nearly 6 months old, was caught in Oscoda County on 16 October 1973 and was examined on 20 October 1973.

The animal was incoordinated and had difficulty with righting reflexes. Patellar reflexes were considered unreliable as the animal was quite frightened when handled. Ophthalmic examination was negative for any fundic or ocular structure abnormalities. Fecal and urinalysis examinations were not remarkable. Pupillary light reflexes were unreliable as mydriasis was constantly present even when a bright light was directed into the eyes. In a dimly lit room, pupil size, however, was reduced. No ERG was performed.

The animal was anesthetized, the whole body perfused with 10% formalin, and subsequently necropsied, similar to the previous case. No ocular histopathology was performed.

Gross appearance of the carcass revealed many external skin abrasions. The lungs contained worms and the parenchyma was edematous. Both spleen and liver were enlarged and congested. An apparent neoplasm, 5 cm in diameter ventral to the thalmic region and anterior to the optic chiasm later was diagnosed as an astrocytoma. This neoplasm obliterated the lateral ventricles and compressed the roof of the lateral ventricles dorsally.

A diagnosis of astrocytoma was made.

Case #3 (145922 WPL 73-712)

A doe fawn, about 6 months old, was found wandering in a field in Kalkaska County on 9 November 1973. She was quite docile and did not resist handling. Locomotor abnormalities were evident and several ocular abnormalities were obvious. The fawn had a tendency to circle counterclockwise. A bilateral, rapid, right-sided horizontal ocular nystagmus was present. Pupillary light reflexes were absent. The right eye was microophthalmic and both right and left eyes had lens cataracts, precluding any fundic examination. Auditory and olfactory functions appeared normal. The fawn did not perform well in a maze, even in a well-lit room. Atropine induced mydriasis failed to improve vision. Urinalysis was normal. No elevation of BUN was seen. Two hemograms were taken and showed an increased leukocytosis from the initial day to the 19th of November. There was no appreciable shift in the white cell differential, hemoglobin, or packed cell volume. An ERG was performed under halothane-oxygen[5] anesthesia utilizing the 40 L light stimulus (Fig. 2). No retinal response was detected in either eye after several tests over a 30 min period of adaptation to darkness.

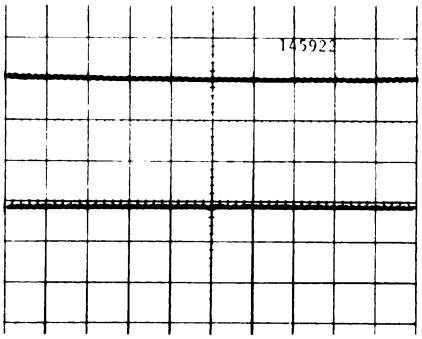

FIGURE 2. ERG recording of Case #3 (145922). Calibration of sweep rate and amplitude values are the same as in Fig. 1. Top recording is from the right eye and the bottom from the left eye.

[5] Fluothane: Ayerst Labs, New York, NY.

Necropsy revealed that she was emaciated. The right eye was about half the size of the left eye. The optic nerves behind the globe and the optic fibers within the optic chiasm could not be located. A small amount of fibrous connective tissue was present in place of the optic fibers. The brain was normal.

Diagnosis based on gross examination was aplastic optic nerves and optic chiasm as well as microophthalmus of the right eye. These were consistent with the clinical signs.

Case #4 (149688)

A male fawn, estimated to be 2 or 3 weeks old, from Otsego County, was presented on 2 July 1974, for evaluation of blindness. Physical examination was unremarkable except for the ocular structures. Dense cataracts were present on both lenses. Pupillary light reflexes were normal. He appeared confused and would circle randomly. Urinalysis and hemogram values were normal. An electroretinogram (Fig. 3) demonstrated that the retinae were responsive to the 40 L light stimulus, indicating functional retinae. Urine and blood samples were examined for lead, arsenic, and mercury, but none were found.

The organs and tissues were unremarkable at necropsy. Histologically, extensive liquefactive degeneration of lens fibers was present with complete loss of fibrillar architecture. The interfibrillar space was occupied by proteinaceous fluid and many of the lens fibers were swollen with fluid forming "bladder cells". Subcapsular epithelial cell migration from the normal anterior capsule to the posterior subcapsular region had occurred. Other occular tissues in both eyes were unremarkable.

Diagnosis was bilateral lens cataracts with functional retinae.

Case #5 (149686)

This 4-6 week old fawn (sex not recorded) was captured in Gladwin County on 1 July 1974 and examined on 3 July 1974. No locomotor difficulties were noted. The ocular structures contained bilateral hypopyon and posterior synechia. No pupillary light reflex was noted and neither retinae could be observed. The hemogram was normal. Electrophoretic blood serum protein patterns were similar to the previous case and were considered normal. This animal was anorectic and maintained a temperature of 40 C. ERG findings were negative for retinal activity (Fig. 4). Euthanasia and necropsy were performed. Heavy metal studies performed on urine and blood samples were below toxic levels.

Histologic abnormalities included bilateral retinal detachments, bilateral lens cataracts, and posterior cyclytic membranes. The cyclytic membranes extended

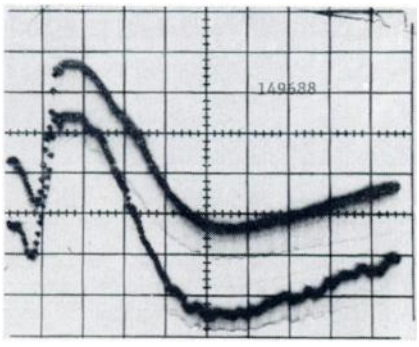

FIGURE 3. ERG recording from Case #4 (149688). Top tracing from right eye; bottom trace from left eye. Time and amplitude values same as in Fig. 1.

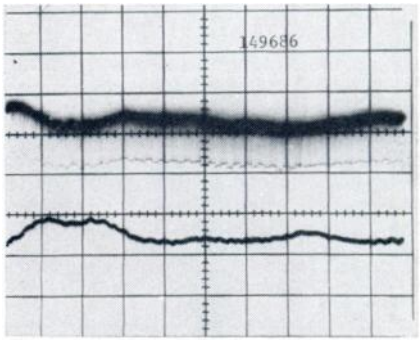

FIGURE 4. ERG recording from Case #5 (149686). Top trace from right eye and the bottom trace from left eye. Time and amplitude values the same as for Fig. 1.

across the globe bridging the ora serrate with inflammatory cellular debris and vitreous material. At the folded areas of retinal detachment, rods and cones were sparse and degenerative. A subretinal exudate of proteinaceous debris was present in the left eye. The gross appearance of the carcass contained a small 3 cm in diameter abscess at the urinary bladder and right umbilical artery junction. It was considered possible the abscess and panophthalmitis were associated.

The diagnosis was bilateral panophthalmitis with cataracts and detached retinae.

Case #6 (150861)

A blind, but otherwise healthy male fawn, weighing about 25 pounds and estimated to be about 4 months old, was caught in Barry County on 13 August 1974. He was examined on 3 September 1974. Grossly, the deer had dense bilateral cataracts and both eyes appeared to bulge from the orbits. He was not responsive to pupillary light reflexes. He was, however, capable of coordinated locomotion and could smell and hear. The hemogram, electrophoresis, blood sugar and blood urea nitrogen tests were all normal. An ERG, performed under a neuroleptic anesthetic,[4] was negative (Fig. 5). The deer was euthanized and the ocular structures removed for histologic examination. Grossly, bilateral colobomas were present in the posterior orbital tissue (Figures 6 and 7). All other organs and tissues were unremarkable.

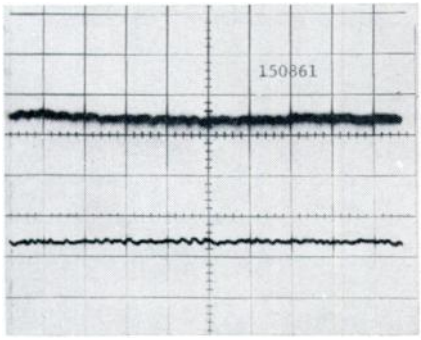

FIGURE 5. ERG recording for Case #6 (150861). Top trace from right eye; bottom trace from left eye. Time and amplitude values the same as for Fig. 1.

FIGURE 6. Enucleated right eye of Case #6 (150861).

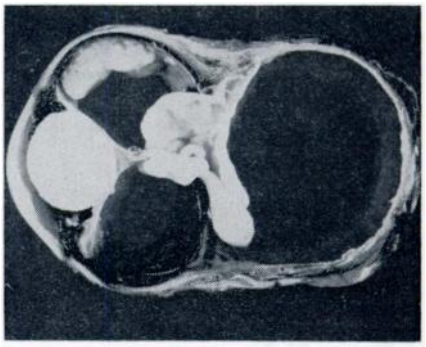

FIGURE 7. Case #6 (150861) right eye.

Histologic examination of the ocular structures revealed large colobomatous defects in the posterior segments of both eyes. Malformation of the choroid and sclera resulted in large ectatic bullae which extended posteriorly causing displacement of the optic nerve. The colobomatous defect in the left eye resulted

in an ectatic bulbus nearly equivalent to the normal globe. The retinae were detached and extensive vaculation of the inner nuclear cell layer had occurred or was present. The outer nuclear cell layer was folded and the rods and cones had undergone degenerative atrophy. Degenerative lens fiber changes were present in both eyes. Diagnosis was bilateral scleral ectasia.

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