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Pituitary Abscesses in Four Free-ranging White-tailed Deer (*Odocoileus virginianus*)

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ABSTRACT: Although intracranial abscesses are a well-recognized cause of morbidity and mortality in free-ranging white-tailed deer (*Odocoileus virginianus*), reports of pituitary abscesses in this species are scarce. Pituitary abscesses were the cause of neurologic disease in four adult white-tailed deer from the southeastern US in 2013–15.

Intracranial abscesses (IAs) are relatively common in white-tailed deer (WTD; *Odocoileus virginianus*) and may account for 1.8–4% of annual mortality in some populations (Davidson et al. 1990; Baumann et al. 2001; Cohen et al. 2015). Although numerous cases of IAs have been described, reports of IAs limited to the pituitary gland are limited to a single description in a WTD that had elevated hepatic selenium levels (Al Dissi et al. 2011). We describe the clinical and pathologic features of pituitary abscesses in four WTD from the southeastern US.

All four deer were found alive. Clinical signs included lack of fear of humans, hypersalivation, blindness, ataxia, lethargy, and recumbency. The deer were humanely euthanized and submitted to the Southeastern Cooperative Wildlife Disease Study in Athens, Georgia, for necropsy. Salient demographic features and results of ancillary testing are summarized in Table 1.

Affected deer were in poor body condition and had a circumscribed area of purulent material expanding the pituitary gland, elevating the overlying dura, and compressing the adjacent cerebrum (Fig. 1). Other gross findings within the cranial vault included suppurative inflammation extending through foramina around the cranial nerves (two of four deer), cloudy cerebrospinal fluid (one of four), and a single adult *Parelaphostrongyus tenuis* present on the dorsal meninges (one of four). Additional findings included skin lacerations or abscesses (three of four deer), bilateral corneal ulceration and retrobulbar abscesses (two of four), multifocal pulmonary abscesses (two of four), intramuscular abscesses (two of four), salivary gland abscess (one of four), and a single case that had fibrinous peritonitis and multifocal visceral abscesses involving the liver, kidney, and omentum.

Histologically, the pituitary gland was variably infiltrated to fully replaced by neutrophils admixed with fibrin, necrotic debris, and smaller numbers of mononuclear cells and eosinophils. Reactive fibrosis surrounded inflammatory infiltrates that compressed the remaining intact pituitary gland. Fibrinoid and neutrophilic vasculitis with thrombosis was noted in some of the evaluated pituitary glands. In two cases, bacteria were identified within inflammatory infiltrates. Reactive vascular endothelial cells and small numbers of perivascular lymphocytes and plasma cells were noted throughout the cerebrum in one case. Splenic and lymphoid depletion were noted in two affected deer, and neutrophilic lymphadenitis was noted in the other two deer.

Aerobic bacterial culture was performed on swabs or pituitary tissue in all cases, and the results are summarized in Table 1. Orbiviruses, including epizootic hemorrhagic disease virus and bluetongue virus, chronic wasting disease prion, and rabies virus were not detected in any of the deer by virus isolation, enzyme-linked immunosorbent assay, and fluorescent antibody testing, respectively.

TABLE 1. Demographic information of four white-tailed deer (*Odocoileus virginianus*) euthanized after being found alive with pituitary abscesses in the southeastern USA in 2013–15 and results of aerobic cultures of the abscesses.

Case	Month and year euthanized	Age	Sex	Weight (kg)	State	Aerobic culture results
1	October 2013	Yearling	Female	26	South Carolina	α-Hemolytic *Streptococcus* sp., *Escherichia coli*, and a Gram-negative bacillus
2	October 2014	Adult	Male	44	Georgia	Coagulase-negative *Staphylococcus* sp. and a Gram-negative bacillus
3	December 2014	Adult	Male	63	Georgia	*Trueperella pyogenes*
4	July 2015	Adult	Female	35	Georgia	*T. pyogenes*

The clinical signs and lesions in WTD with pituitary abscesses are similar to those reported in domestic ruminants (Fernandes et al. 2000; Stewart et al. 2017). Hypersalivation, dysphagia, dropped jaw, tongue prolapse, ptosis, and exposure-related keratoconjunctivitis have been reported in cattle with pituitary abscesses (Fernandes et al. 2000; Braun et al. 2017). These signs are presumed secondary to damage to the oculomotor and trigeminal nerves, which exit the cranial cavity near the hypophyseal fossa. The lesions previously described in IAs of WTD are characterized by diffuse suppurative meningi-

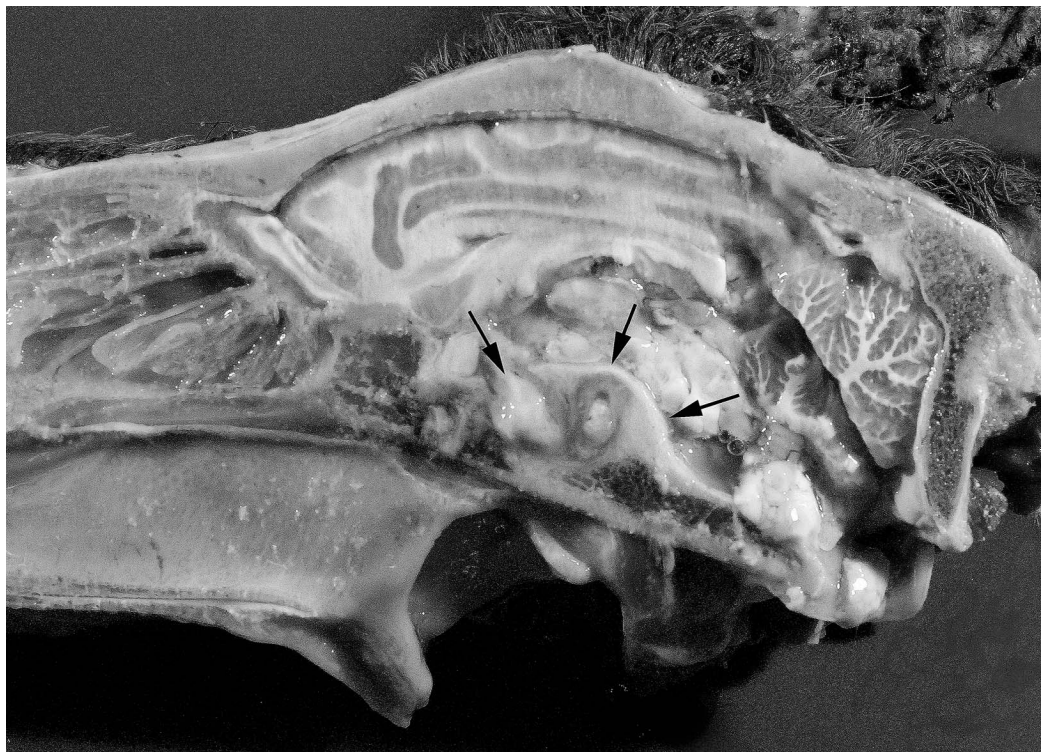

FIGURE 1. Longitudinal section through the skull of an adult male white-tailed deer (*Odocoileus virginianus*) with a pituitary abscess. The animal was one of four white-tailed deer euthanized after being found alive with pituitary abscesses in the southeastern USA in 2013–15. Note that the dura above the pituitary gland is elevated (arrows) and that the pituitary gland is replaced by multifocal to coalescing purulent exudates.

tis or discrete abscesses that are most prominent on the temporal lobes of the brain subjacent to antler pedicles (Davidson et al. 1990), whereas the lesions we described were primarily localized to the pituitary gland.

Trueperella pyogenes was isolated from half of our cases. It was the most frequently isolated bacterium in cases of IAs of WTD (Davidson et al. 1990; Bauman et al. 2001; Cohen et al. 2015). This common commensal organism of cattle and WTD (Jost and Billington 2005; Belser et al. 2015) is an important opportunistic pathogen in cases of mucosal or skin damage and can be isolated from a variety of purulent lesions in domestic and exotic bovids and cervids (Zulty and Montali 1988).

Although IAs have been reported in female WTD (Davidson et al. 1990), the majority of cases have occurred in older antlered bucks during the rut (Davidson et al. 1990; Cohen et al. 2015). Although the sample size is small, both sexes were equally represented with pituitary abscesses described here. Sparring behavior and subsequent trauma to the antler pedicle are presumed to be the most significant risk factors for IAs in WTD, although other hypothesized contributing factors include otitis, skin abrasions, subcutaneous abscess, rhinitis, and mucosal damage secondary to chronic epizootic hemorrhagic disease infections (Davidson et al. 1990).

In cattle, there is an increased incidence of pituitary abscesses in bulls that have nose rings and in calves of both sexes with controlled suckling devices implanted into the nasal septum. Primary rhinitis, sinusitis, and bacterial septicemia are believed to be the inciting causes of pituitary abscesses in cattle and in humans (Fernandes et al. 2000; Agyei et al. 2017). The pathogenesis presumes transport of bacteria through nasal lymphatics, the cavernous sinus, or hematogenously with eventual entrapment of bacteria within the rete mirabile, the complex vascular plexus that surrounds the pituitary gland in ruminants and cervids (Morin 2004; Kieltyka-Kurc 2015). Some of the deer in this case study had visceral or cutaneous abscesses that could have contributed to bacteremia. Evidence for primary rhinitis was not noted in any of the affected deer; however, sinonasal tissues were not examined histologically and underlying sinusitis or rhinitis cannot be excluded.

Causes of neurologic signs in WTD include rabies, arboviruses, orbiviruses, chronic wasting disease, and intracranial abscessation, among others. Subtle pituitary lesions may be easily overlooked, and careful evaluation of the pituitary fossa is recommended in neurologic deer.

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LITERATURE CITED

Agyei JO, Lipinski LJ, Leonardo J. 2017. Case report of a primary pituitary abscess and systemic literature review of pituitary abscess with a focus on patient outcomes. *World Neurosurg* 101:76–92.

Al Dissi AN, Blakely BR, Woodbury MR. 2011. Selenium toxicosis in a white-tailed deer herd. *Can Vet J* 52:70–73.

Baumann CD, Davidson WR, Roscoe DE, Beheler-Amass K. 2001. Intracranial abscessation in white-tailed deer of North America. *J Wildl Dis* 37:661–670.

Belser EH, Cohen BS, Keeler SP, Killmaster CH, Bowers JW, Miller KV. 2015. Epithelial presence of *Trueperella pyogenes* predicts site-level presence of cranial abscess disease in white-tailed deer (*Odocoileus virginianus*). *PLoS One* 10:e0120028.

Braun U, Malbon A, Kochan M, Riond B, Janett F, Iten C, Dennler M. 2017. Computed tomographic findings and treatment of a bull with pituitary gland abscess. *Acta Vet Scand* 59:8.

Cohen BS, Belser EH, Killmaster CH, Bowers JW, Irwin BJ, Yabsley MH, Miller KV. 2015. Epizootiology of cranial abscess disease in white-tailed deer (*Odocoileus virginianus*) of Georgia, USA. *J Wildl Dis* 51: 609–618.

Davidson WR, Nettles VF, Hayes LE, Howerth EW, Couvillion CE. 1990. Epidemiologic features of an intracranial abscessation/suppurative meningoencephalitis complex in white-tailed deer. *J Wildl Dis* 26:460–467.

Fernandes CG, Schild AL, Riet-Correa F, Baialardi CEG, Stigger AL. 2000. Pituitary abscess in young calves associated with the use of a controlled suckling device. *J Vet Diagn Invest* 12:70–71.

Jost BH, Billington SJ. 2005. *Arcanobacterium pyogenes*: molecular pathogenesis of an animal opportunist. *Antonie Van Leeuwenhoek* 88:87–102.

Kieltyka-Kurc A, Frackowiak H, Brudnicki W. 2015. The arteries of brain base in species of the cervid family. *Anat Rec* 298:735–740.

Morin DE. 2004. Brainstem and cranial nerve abnormalities: listeriosis, otitis media/interna, and pituitary abscess syndrome. *Vet Clin North Am Food Anim Pract* 20:243–273.

Stewart JL, Bates MC, Edwards BW, Aldridge BM. 2017. Hyponatremia as the presenting feature of a pituitary abscess in a calf. *Vet Sci* 4:E8.

Zulty JC, Montali RJ. 1988. *Actinomyces pyogenes* infection in exotic Bovidae and Cervidae: 17 cases (1978–1986). *J Zoo Wildl Med* 19:30–32.

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