Weak/wobbly/weird: when endocrinology masquerades as neurology

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Endocrine diseases can have direct or indirect effects on the neuromuscular system that can be easily confused with primary neurological disorders. Awareness of these presentations is necessary to allow for accurate diagnosis and management of affected animals, and to prevent unnecessary testing.

Multiple clinical signs have been reported in dogs with hypothyroidism; however, the diagnosis in many cases is uncertain because of the effects of non-thyroidal illness on many commonly used tests. Subclinical myopathy is suspected based upon electromyographic and histopathological evidence. Although subclinical, changes may contribute to exercise intolerance and weakness in affected dogs. Peripheral neuropathies have also been reported, leading to exercise intolerance, paresis, proprioceptive deficits and decreased spinal reflexes. Electromyographic changes are consistent with a demyelinating and axonal pattern of polyneuropathy, which only partially improves following supplementation despite good clinical response. A link between central vestibular disease and hypothyroidism has also been described. Infarction has been identified in some dogs. In other cases, progressive central vestibular dysfunction can rapidly improve with levothyroxine therapy. Associations between hypothyroidism and laryngeal paralysis, megaesophagus, seizures and cranial neuropathies have been reported, but are unproven in most cases.

Neuromuscular signs may develop in dogs with hyperadrenocorticism for a variety of reasons. Approximately 80–85% of naturally occurring hyperadrenocorticism cases are due to pituitary neoplasia. Macroadenomas (>10 mm in diameter) are seen in approximately 10–15% of these cases at the time of diagnosis and can result in neurological signs due to compression or invasion of the overlying neural tissue or increased intracranial pressure. Clinical signs include dullness, disorientation, circling, behavioural changes, head pressing, pacing ataxia, blindness and seizures. Such signs are rare at the time of diagnosis, but more commonly occur following commencement of medical treatment, presumably due to rapid tumour expansion because of loss of both the inhibitory feedback and anti-inflammatory effects of cortisol (Nelson's phenomenon). Cerebrovascular accidents

are also recognized in dogs with hyperadrenocorticism. Hypercoagulability is suspected, but no consistent laboratory haemostatic abnormalities have been identified.

Although muscle wastage is common in dogs with hyperadrenocorticism, a more specific muscle pathology known as pseudomyotonia can be rarely seen. Signs include weakness, stilted gait (particularly in the pelvic limbs), muscle wastage in the distal limbs and occasionally muscle enlargement in the proximal limbs. Treatment of hyperadrenocorticism often results in partial improvement, but signs do not usually completely resolve.

Additional endocrine-associated neurological abnormalities include peripheral neuropathies common in cats with diabetes mellitus. Peripheral neuropathies have also been reported in dogs with insulinoma, as have central nervous system signs (e.g. seizures, altered behaviour, ataxia) due to reversible neuroglycopenia or irreversible brain injury. Hypokalaemia and hypertension are also features of several endocrine diseases that can have direct effects on the neuromuscular system.

KEY LEARNING OBJECTIVES

- Be aware of neurological signs associated with selected endocrine diseases
- Understand how investigation of endocrine disease is incorporated into the diagnostic investigation of neurological cases
- Be familiar with treatment of neurological features of selected endocrine diseases

MULTIPLE CHOICE QUESTIONS

1. Which of the following endocrine diseases is not a cause of peripheral neuropathy?
(A) Insulinoma
(B) Hyperadrenocorticism
(C) Hypothyroidism
(D) Diabetes mellitus
2. What is the most effective initial treatment of seizures due to hypoglycaemia?
(A) Intravenous diazepam
(B) Intravenous levetiracetam
(C) Intravenous glucagon
(D) Intravenous glucose
3. What is the most effective long-term treatment for the management of neurological signs associated with a large pituitary macrotumour?
(A) Radiation therapy
(B) Mitotane
(C) Trilostane
(D) Prednisolone