WHAT IS YOUR DIAGNOSIS?

A 3 year old, male entire, Labrador retriever was presented to the R(D)SVS Internal Medicine Service for investigation and treatment of excess salivation, lethargy, a furrowed brow, elevated ear carriage, tight facial muscles and a stiff gait of 24 hours duration.

On clinical examination, the dog was quiet but alert with a body condition score of 5/9 and body weight of 27kg. Mucous membranes were pink and moist with a capillary refill time of < 2 seconds. There was hypersalivation and some stiffness of the jaw. The heart rate was 126 bpm with no arrhythmia or pulse deficits and the respiratory rate was 28 breaths/minute with no adventitious lung sounds. He was generally stiff and stood with all legs mildly extended. The tail could wag but was stiff and held erect. There was marked contraction of the facial muscles resulting in a furrowed brow, narrowed palpebral fissures and erect, closely set ears. Rectal temperature was elevated at 39.8°C.

1) What is the most likely diagnosis in this case?
2) How would you confirm the diagnosis?
3) What is the prognosis and complications of this disease?
4) How would you treat this case?
1) The combination of generalised stiffness with extensor rigidity (the ‘saw-horse stance’) with a stiff, erect tail, facial muscle spasm (resulting in risus sardonicus), jaw stiffness (trismus or ‘lockjaw’) and hypersalivation are all consistent with a diagnosis of Tetanus. Tetanus is caused by the neurotoxin, tetanospasmin, released from the gram-positive anaerobic bacillus Clostridium tetani. This toxin travels in a retrograde fashion up peripheral axons to the central nervous system where it binds irreversibly to inhibitory neurones, preventing the release of inhibitory neurotransmitters (glycine and GABA). This lack of inhibition causes repetitive firing of motor neurones and simultaneous contraction of flexor and extensor muscles, resulting in sustained and painful muscle spasms. To recover, an affected dog must grow new axon terminals.

Clostridium tetani typically gains access to the body via wounds (natural or surgical) or via the oral cavity (such as tooth root abscess formation or during the loss of deciduous teeth. No wound was identified on thorough examination of this patient, which is often the case because wounds can be small and clinical signs occur 3 to 18 days after infection.

2) The diagnosis of tetanus is based on classical clinical signs and there is no commonly used or readily available laboratory test. Electromyography, nerve conduction studies or serum antibodies to tetanospasmin have been measured but are neither readily available or have questionable reliability/specificity. Differential diagnoses to consider include immune-mediated polymyositis, strychnine toxicity, spinal trauma, hypocalcaemia and meningioencephalitis. The presence of a wound prior to the onset of clinical signs is supportive but, as discussed earlier, the absence of a wound does not exclude a diagnosis of tetanus.

3) Survival rates for tetanus in dogs are variable, with reported values ranging from 55-92% of cases. Cases with more severe presentation or with complications are likely to have a poorer outcome. Complications of the disease include aspiration pneumonia, laryngospasm (causing upper respiratory tract obstruction), hyperthermia, cardiac arrhythmias, inadequate ventilation, megaeosophagus, hiatal hernia, dysuria, urinary tract infection (especially if indwelling urinary catheters placed), systemic hypertension and seizures. Muscle spasm can be severe enough to cause hip luxation. Improvement in clinical signs are normally seen between five to twelve days after diagnosis, but full recovery typically takes four to six weeks.

4) There are three main aspects to treatment of a dog with tetanus.
   a) Prevention of further toxin production by debriding wounds and the use of antibiotics. The current antibiotic of choice is metronidazole due to its activity against anaerobic organisms and excellent tissue penetration.
   b) Neutralising circulating tetanospasmin with antitoxin. Bound toxin is not affected. The use of tetanus antitoxin is controversial because its efficacy is unproven, but is more likely to be of benefit early in the course of
disease. Only one administration is necessary due to its long half-life and a test dose should be given intradermally and close monitoring performed during dosing because hypersensitivity reactions are possible since it is a foreign protein derived from horses.
c) Supportive care while new axon terminals grow, which is aimed at controlling muscle spasms, providing fluid and nutritional support, trying to avoid the complications listed above and good nursing care. Excellent nursing care is vital for a successful outcome, especially in recumbent patients. Supportive care is as follows:
   i) Fluid therapy and nutrition. Most animals require intravenous fluid therapy as drinking and eating can be very difficult. Many animals also require the placement of a feeding tube to provide adequate nutrition until the dog recovers. Gastrostomy tubes are preferred to risks of megaoesophagus and subsequent aspiration pneumonia.
   ii) Nursing care with regular turning in the recumbent patient to prevent lung atelectasis and decubital ulcers. Dogs with tetanus should be kept in a quiet and darkened environment with minimal handling because stimulation can worsen muscle spasms.
   iii) Sedation and muscle relaxation. First line treatment tends to be benzodiazepines (diazepam or midazolam) as either boluses or constant rate infusions. Muscle spasms are painful and can be hard to control, with many dogs needing multiple medications need to control symptoms but prevent excessive sedation. Treatments used have included acepromazine, phenobarbitone, butorphanol, propofol and methocarbamol. The use of magnesium sulphate has also been documented, which allowed sedative drugs to be reduced. Close monitoring is required with its use.
   iv) Careful monitoring, especially with recumbent dogs. This will including vital signs, ECG, blood gas analysis, blood pressure measurement, urine output, and electrolytes.

This patient did not become fully recumbent and was still able to eat if assisted. Treatment with benzodiazepines and phenobarbitone controlled most of the clinical signs and metronidazole was used as antibiosis. Dysuria also developed which responded to dantrolene. He was hospitalised for a week and went on to make a full recovery.

References

Adamantos S, Boag A. Thirteen cases of tetanus in dogs. Veterinary Record 2007; 161: 298-303
