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GRASS SICKNESS

Equine grass sickness

Equine grass sickness (EGS), also known as equine dysautonomia, is a severe neurodegenerative disease affecting neurons of the autonomous and enteric nervous system of horses that have had exposure to grazing pasture. The disease is manifest by a variety of signs – some typical; but the overall presentation is dominated by signs involving gastrointestinal dysfunction.

The presentation of signs and the clinical course of the condition, will, in general, classify the form of equine grass sickness (EGS) as acute, subacute or chronic. This is also associated with prognosis. Acute and subacute presentations are invariably fatal; while chronic cases may be managed successfully over time. Recent observations have implicated neuro-toxicosis from *Clostridium botulinum,* type C as a possible cause and vaccine trials against this bacterium are now in the process of being analysed.

Aetiology and risk factors

Although EGS has been well described since the early 1900s, the actual cause is still unknown. Histologically, the condition is characterised by neural degeneration, which is most evident in the prevertebral and paravertebral ganglia of the autonomic nervous system and enteric neurons (myenteric and submucous plexuses).

The disease appears primarily to affect younger horses exposed to grazing or freshly cut grass. The highest incidence of EGS cases are horses in the two to seven years age range; although cases in younger and older individuals have been reported. The condition tends to be more prevalent in certain areas – or even specific pastures – making an environmental factor, or interplay with such, a more likely cause.

Weather and season also have an impact, because, although the disease can be seen at any time of year, a peak prevalence is present during the spring months and early summer. Periods of cool dry weather, with overnight frosts and recent disturbance of soil (harrowing), are also reported as risk factors. More recently the soil bacterium, *Clostridium botulinum* type C, has been implicated as a possible cause as the neurotoxin of the bacterium appears present in increased concentration in the intestinal contents of horses affected with EGS when compared to controls.

> "The disease is manifest by a variety of signs – some typical; but the overall presentation is dominated by signs involving gastrointestinal dysfunction"

Also, natural elevated serum levels of antibodies against the bacterium and neurotoxin may be protective. The organism is present in the normal gut flora and it is thought that – under certain dietary stress factors – production of neurotoxin within the intestine will result in damage to autonomic nervous system and enteric neurons.

Clinical signs and diagnostic work-up

Equine grass sickness can present in different forms and, as such, is classified as acute (1-2 days), subacute (2-7 days) or chronic (>7days). There is, however, considerable overlap in signs at presentation and over the course of the disease.

Severity of signs and clinical progression determine the form of disease – and usually horses with EGS present with signs of colic and a tachycardia. Colic pain can be mild (quiet and dull) to moderate and the heart rate may appear higher than would be expected in relation to the degree of pain or the appearance of the oral mucosal membranes.

In addition, horses with EGS may have patchy sweating over the body (**Figure 1**) and present with muscle tremors

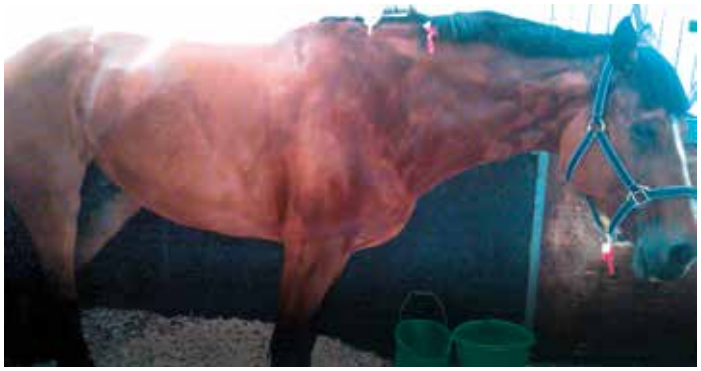

Figure 1. *A depressed horse, affected with chronic EGS, displaying weight loss and patchy sweating.*

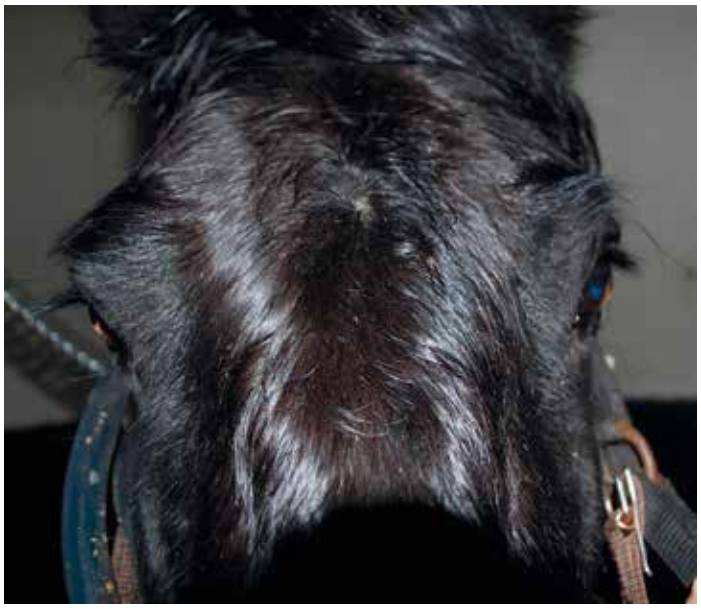

Figure 2. *A horse presenting with EGS. Topical application of 0.5% phenylephrine in the right eye of the horse results in a less droopy eyelid and less steep angle of the eyelash within 30 minutes.*

Figure 3. *Horses with chronic EGS that show interest and have some degree of swallowing ability should be tempted and managed with a variety of highly palatable choices of food on an ad lib and hand-fed basis.*

that are most noticeable on the triceps and quadriceps musculature. Drooling of saliva will be present and, on closer observation, ptosis of the eyelids and dysphagia may be detected.

In general, intestinal sounds on abdominal auscultation will be diminished. Acute cases of EGS may have a distended small intestine, palpable on rectal examination, but will produce copious amounts of reflux upon nasogastric intubation early in the disease presentation. Sometimes, spontaneous reflux can already be noted from the nostrils or become obvious after inducing a lower head carriage after sedation.

Rectal examination of horses with the subacute form of EGS is often characterised by firm corrugated secondary colon and caecal impactions. Small amounts of dry, mucus-covered faeces in the rectum are present in all forms of EGS and may be the only rectal examination abnormality in chronic cases.

Chronic cases additionally will lose weight rapidly over time and develop a nasal stridor associated with the drying of the nasal mucosa and additional crust formation (rhinitis sicca).

Clinical differential diagnosis and additional diagnostics

Acute forms of EGS, with reflux, may be hard to differentiate from strangulating and non-strangulating (anterior enteritis) causes of ileus affecting the small intestine. Similarly, the less 'painful' horse with tremors and dysphagia may resemble botulism – or, in association with marked weight loss and weakness, mimic equine motor neuron disease (EMND).

The usual additional diagnostics – as part of a colic work-up – are rather non-specific for EGS and may include trans-abdominal ultrasound showing distended loops of small intestine in acute forms of EGS and impacted corrugated large bowel in subacute forms. The total protein content in abdominal fluid collected by means of abdomino-centesis may be elevated in acute and subacute forms.

Haematology and biochemistry may show changes consistent with dehydration, while fibrinogen and serum amyloid A concentration may be higher compared to strangulating and non-strangulating small intestinal lesions. Bilateral ptosis of the upper eyelid is a common feature of EGS. In the un-sedated horse suffering from EGS, the temporary reversal of the ptosis 30 minutes after topical application of 0.5% phenylephrine solution on the cornea of one eye compared to the untreated eye may help support a diagnosis (**Figure 2**). False positives are possible on non-EGS cases and, hence, the test should be interpreted in relation to history and clinical signs.

The only reliable ante-mortem test is histopathology on a formalin-fixed intestinal biopsy of the ileum. Recently, a renewed interest in rectal mucosal biopsies as an ante-mortem test may show some promise with the use of immunolabelling for b-amyloid precursor protein (b-APP) in multiple biopsies. However, larger clinical studies are needed.

Course of the disease

The prognosis for acute and subacute cases is hopeless. Short-term measures, such as intravenous fluid administration, analgesics, sedation and, in cases of reflux, regular gastric decompression may be used until a tentative diagnosis is reached and euthanasia elected.

Chronic cases may, however, respond to treatment. Case selection should be based on the degree of anorexia and dysphagia in the absence of signs of severe colic and/or severe weakness and/or severe rhinitis sicca. In some of these cases initially, short-term intermittent or continuous liquid food, fed via an indwelling small bore nasogastric tube may be pursued. Care should be taken not to overfeed with carbohydrates in order to

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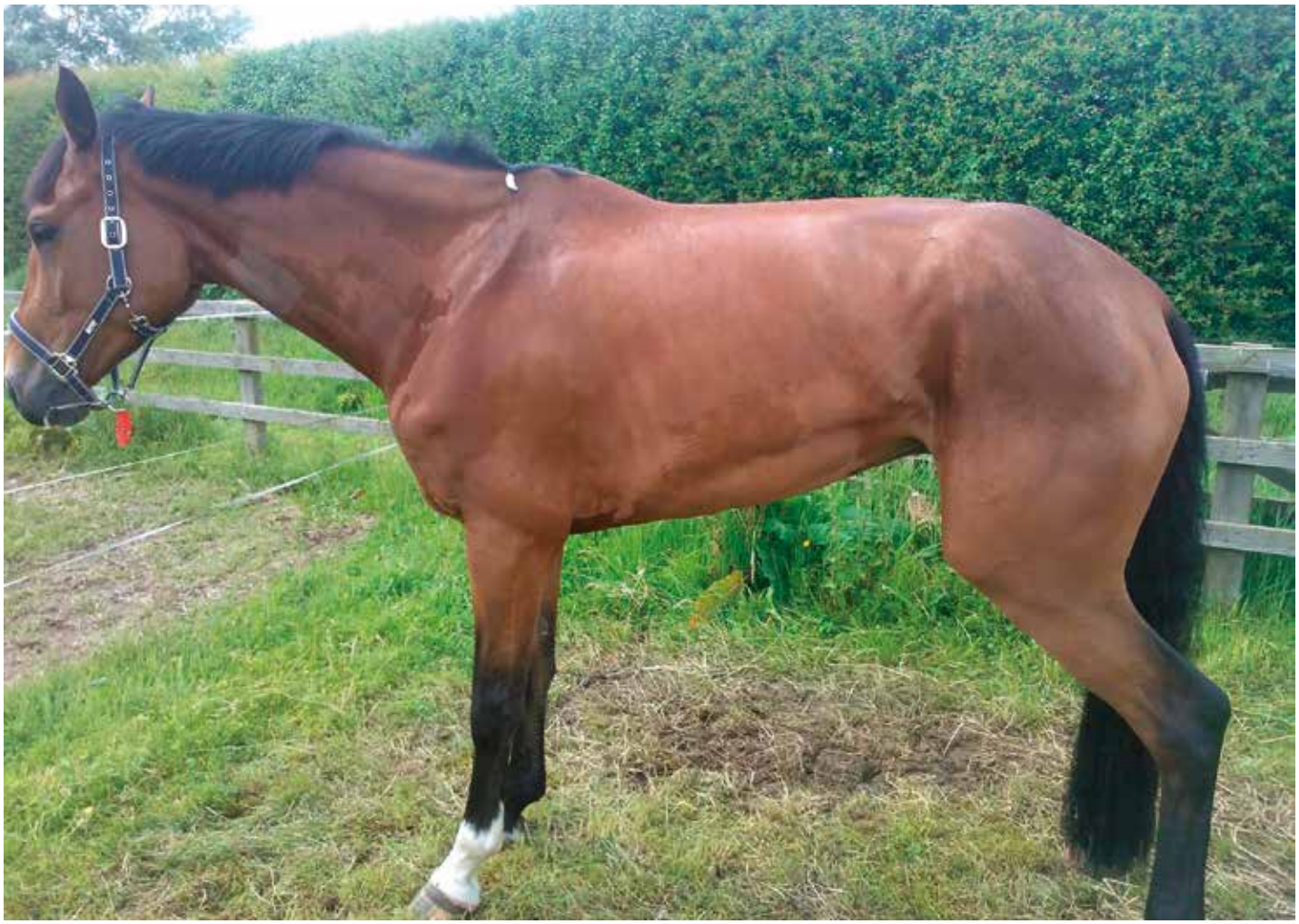

Figure 4. *Horses with chronic EGS will experience severe weight loss and display a 'tucked up' abdomen.*

minimise the risk of colonic bacterial overgrowth and colitis. As an alternative, partial or total parental nutrition can be started.

Horses that show interest in eating and have some degree of swallowing ability should be tempted and managed with a variety of highly palatable choices of food on an ad lib and hand-fed basis (**Figure 3**). The food should be high in fat and protein to minimise the rapid, severe weight loss. However, it is more important that horses start eating – and experimenting with different coarse mixes, nuts, pellets, and succulents may be needed to tempt appetite. Hand walking and grazing, followed by increasing amounts of pasture time should be pursued.

Additional palliative measures, especially in the first weeks, may include regular rectal emptying of faeces when faecal output is reduced, or rectal straining is evident, moisturising the nasal mucosa, treating decubitus associated with weakness, anti-ulcer medication for EGUS and reflux oesophagitis and antibiotic therapy in cases where there is risk of aspiration pneumonia.

The degree of weight loss over the first weeks is severe and recovery is prolonged. As such, owners should be counselled about the emotional and financial commitment. Weight gain may be noticed three to five weeks after onset and will take several months to reverse. Many horses that have recovered from chronic EGS may go back to an active working life. Some may, however, display mild residual signs such as sweating or occasional mild colic. Most horses that survive EGS appear protected from it.

Prevention

As the cause of EGS is still unclear, it is difficult to define specific preventive measures. Some avoidance of known risk factors may help – such as avoiding turnout of new (young) horses onto pastures that have had recent cases of EGS and stabling horses during longer cool and dry weather spells. In addition, if a clinical case is reported, it is probably advisable to remove the remaining horses from the affected pastures until potential risk factors appear decreased.

The finding that *Clostridium botulinum*, type C neurotoxin is present in increased concentration in horses

"*Clostridium botulinum* type C, has been implicated as a possible cause as the neurotoxin of the bacterium appears present in increased concentration in the intestinal contents of horses affected with EGS when compared to controls"

affected with EGS compared to controls, and that elevated serum levels of antibodies against *Clostridium botulinum* type C and the neurotoxin may be protective, has now resulted in trial vaccinations of horses on affected premises.

These studies have been carried out by the Animal Health Trust in collaboration with the Equine Grass Sickness Fund and the Universities of Edinburgh, Liverpool and Surrey. A limited, randomised, blinded pilot study to assess feasibility and safety of vaccination with toxoid against *Clostridium botulinum* type C, was performed, followed by a larger field study that has now been concluded – the results of which are being analysed currently. ■

PPD Questions

1. Acute EGS should be suspected when a:
- A. horse is dull, dysphagic and has tremors
- B. young horse exposed to grazing presents with signs of colic, tachycardia, tremors, patchy sweating and nasogastric reflux
- C. horse displays rapid onset weight loss
- D. horse shows any signs of colic with reflux.

2. Which ante-mortem test is to date the most definitive for a diagnosis of EGS?
- A. topical application of 0.5% phenylephrine on the cornea of one eye will result in reduced ptosis and a less steep eyelash appearance in contrast to the untreated eye
- B. histopathology on biopsy samples from the ileum collected during abdominal surgery
- C. routine histopathology of a single rectal biopsy
- D. negative serology for *Clostridium botulinum*.

3. Which cases of suspected EGS may be selected for treatment?
- A. all suspected to have chronic EGS
- B. those that do not show colic
- C. horses that show interest in food, have or develop some ability to swallow without severe rhinitis sicca and are not extremely emaciated or too weak to stand
- D. horses that have very committed owners.

4. What preventive measures taken by horse owners may be beneficial for horses exposed to pastures known to have had EGS cases?
- A. avoid pasture exposure during prolonged dry weather with cold spells
- B. avoid pasture exposure after recent soil disturbance
- C. remove horses from pasture when a case of EGS is suspected
- D. all of the above.

Answers
1.B
2.B (but 2.A may be supportive when taken in relation with history and clinical signs)
3.C
4.D.

References

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