Strangles – management, prevention and treatment

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ABSTRACT

Strangles is an acute infection of the upper respiratory tract and regional lymph nodes of horses caused by *Streptococcus equi* subspecies *equi*. Once a definitive diagnosis has been made in a horse with clinical signs suggestive of the disease, strict biosecurity measures should be put in place to minimise spread to other animals in the yard and adjacent premises.

Prevention of the disease relies on the identification and treatment of carrier animals that asymptptomatically harbour the causative bacteria in their guttural pouches, resulting in intermittent nasal shedding. New animals being introduced into a premise should be screened for carrier status and isolated/treated as necessary. Treatment depends on the stage of the disease and the presence of complications, but relies primarily on antimicrobial, anti-inflammatory and supportive therapy.

Strangles is an acute infection of the upper respiratory tract and regional lymph nodes of horses caused by *Streptococcus equi* subspecies *equi*. 
Unlike other Streptococcus species – particularly *S. equi* subspecies *zooepidemicus* – this Gram-positive agent is not considered a normal commensal of the equine respiratory tract and is usually associated with disease. The disease is commonly characterised by pyrexia, bilateral purulent nasal discharge (Figure 1) and lymphadenopathy (Figure 2), which progresses to lymph node abscessation.

Strangles was first described in 1251 and the causative agent was identified in 1888. Analysis of the genomes of a large collection of *S. equi* strains recovered from horses throughout the world over 55 years revealed they share a common ancestor that dates to the 19th or early 20th century, corresponding to a time when horses were a major mode of transport and played important roles in a number of global conflicts, such as the First World War.

The mixing of these horses, and their replacement with young animals on an unprecedented scale, would have provided ideal conditions for the emergence and spread of the fittest strain of *S. equi*, from which today’s global population has evolved.

**Outbreak management**

About 600 outbreaks of strangles are reported each year in the UK alone. While no legal notification requirements exist for strangles in the UK, it is advisable to inform the national breeders’ associations if infection occurs.
In addition, under the Rules of Racing (Section C30 Duty to report communicable diseases), racehorse trainers are obliged to report likely or confirmed strangles to the British Horseracing Authority, when it occurs among horses in training.

When a horse develops clinical signs suggestive of strangles, it is essential appropriate samples are obtained from that animal to make a definitive diagnosis.

A nasopharyngeal swab/wash, guttural pouch (GP) wash or a swab from a ruptured abscess should be obtained (Figure 3). These should be tested by PCR and culture.

It should be noted, test sensitivity is reportedly better for fluid samples obtained by nasopharyngeal or GP lavage than that for nasal or nasopharyngeal swab specimens; for example, one study reported that detection rates of \( S \text{ equi} \) in acutely ill horses were highest in nasopharyngeal wash.
PCR samples (84%) when compared to swabbing the nasopharynx for culture (37%) or nasopharynx for PCR (72%).

Some researchers recommend a blood sample for serology is obtained at the same time, so if the PCR test and culture prove negative, this blood sample, taken in the acute phase, can be paired with a second sample taken two weeks later to see if there is a rising antibody response, confirming the infection.

The infection is contagious and, once strangles has been diagnosed in a horse, intensive biosecurity measures must be implemented immediately to prevent rapid spread of the disease to other horses, both within the premises and in neighbouring yards.

All horses should remain on the premises and, if possible, three colour-coded groups should be created:

- Red – presumed infected horses showing clinical signs consistent with strangles.
- Amber – horses that have had direct or indirect contact with horses in the red group and, as such, are believed to have been at risk of exposure to S equi, but have not themselves shown clinical signs.
- Green – horses that remained detached from those in red and amber groups without known direct or indirect contact and do not demonstrate clinical signs.

Ideally, the red isolation facility should be in a separate building or a separate field at least 10m, but preferably 25m, away from any other horses. If this is not possible, simple steps – such as boarding up any grills between stables, fitting door grills so horses cannot touch other horses over the door, and similar measures – will help contain infection, although this is less than ideal.

A separate water supply must be available for horses in the red group, which should be cleaned regularly (ideally daily, with thorough rinsing to remove detergent) and any mucopurulent nasal discharge removed to minimise the infectious dose given to in-contact horses. This will reduce the severity of clinical signs and increase recovery speed.
Buckets and other equipment should be colour-coded to ensure mixing of these between groups does not occur and, wherever possible, dedicated staff used for each colour-coded group. If separate staff are not an option, staff should always move from the lowest risk to highest risk groups, such as green to amber to red groups in that order and not back again.

Used bedding, uneaten food and water from the red group must be disposed of carefully; bedding and uneaten food should be disposed of, for example, on a muck heap greater than 30 metres away from grazing/exercise areas, and water should be discharged to the sewer or septic tank to avoid cross-contamination.

Protective clothing – such as disposable boiler suits, separate boots and disposable gloves – must be available at the entrance to the red group isolation facility and be disposed of properly by being double-bagged and taped shut. The outside of the bag should be disinfected before disposal.

The rectal temperature of all horses in the amber and green groups should be taken daily and any horse showing an increase in temperature should be moved to the red group and examined by a veterinarian. Horses in the red group should not be released from isolation until three consecutive nasopharyngeal swabs/washes have been taken over a two-week period or one GP wash test negative.

If performing a GP wash, it is important to sample both left and right pouches, as, potentially, only one may be infected. Samples should be tested for the bacterium by both culture and PCR to maximise test sensitivity. Animals still testing positive for *S equi* will need to remain in isolation until they test negative; this may require treatment appropriate for persistent infection of the GPs.

Screening of horses in the amber and green group using the strangles blood test should be performed to identify other horses exposed before or during the outbreak that could be carriers of strangles, which, if left untreated, could trigger subsequent outbreaks.
Figure 4. If it is not possible to blood test animals prior to arrival then they should be quarantined and monitored closely.

Animals testing positive by the blood test should be placed in isolation and investigated by nasopharyngeal swabbing and/or GP endoscopy to establish if they are positive for \textit{S equi}. Any carriers identified in this way will be required to remain in isolation until they are shown to be negative; this may require treatment appropriate for persistent infection of the GPs.

After the institution of appropriate biosecurity precautions, identification of new cases will likely continue for about two to three weeks. The yard should not open to normal activities until all horses are confirmed to be uninfected. Once all horses are confirmed to be uninfected, all movable equipment and utensils for feeding, grooming and cleansing in the isolation facility must be disinfected and the isolation area must be cleaned and washed down with an approved disinfectant.

**Prevention**

**Detection of carrier animals**

Strangles is maintained in a population by carrier horses that are subclinically infected with and intermittently shed \textit{S equi}. In published studies, the prevalence of carriers in the studies’ population varies between 0.3% and 40%.

Bacterial culture and PCR of nasopharyngeal and GP washes are used to detect carrier animals. Intermittent shedding of \textit{S equi} into the nasopharynx from the GP makes the nasopharyngeal swab a less reliable sample, despite its ease of access clinically. If a nasopharyngeal swab is chosen then three consecutive swabs are required to increase the sensitivity to an acceptable value. Once identified, carrier animals must be appropriately treated.

**Vaccination**
A live attenuated strangles vaccine, first licensed in the UK in 2005 and withdrawn in 2007, has been returning to the market in Europe since 2010.

Two vaccines are administered by submucosal injection four weeks apart and this provided immunity for three months, which significantly reduced the clinical signs of strangles and occurrence of lymph node abscesses in horses at risk of infection.

**Isolation of new arrivals to a premise**

The strangles blood test can be used to identify horses that have increased antibody responses to *S. equi* and have been exposed to this pathogen in the recent past, enabling the identification of potentially infectious animals before movement. Thus, ideally, all horses entering any stud or stable premises should be blood tested prior to arrival.

If no clinical signs or suspicion of ongoing strangles exists on the premises where the animal presently resides, or the animal has been isolated at the premise for two weeks prior to sampling, a negative blood test (less than or equal to 0.2) to both antigen A and C means the animal is not a carrier of, and had not been exposed to, *S. equi* 10 days prior to the sample being taken so the animal is considered safe to move.

A positive result (greater than or equal to 0.5) to antigen A and/or C indicates further testing is recommended and either a nasopharyngeal or GP washes, or three nasopharyngeal swabs each taken one week apart, should be submitted for PCR and culture. A result of 0.3/0.4 to either antigen A and/or C lies in the grey area of the test. This may indicate the animal has recently been exposed to *S. equi* and may be incubating the disease, so a second blood sample should be obtained 10 to 21 days later, looking for a rising antibody concentration.

If there is suspicion of infection on the premises where the animal presently lives, but not in the animal concerned, then it should be isolated for two weeks before a blood sample is taken. If there is a suspicion of recent strangles infection in the animal concerned then *S. equi* serology may not be of any help, as antibodies will not rise until two weeks post-infection.

Instead, the animal should be isolated and a nasopharyngeal or GP wash taken for PCR and culture four weeks after resolution of the clinical signs or after four weeks isolation – whichever is the longest.

If it is not possible to blood test animals prior to arrival then they should be quarantined for a period of three to four weeks and monitored closely, particularly in the period immediately after arrival (Figure 4). Any horse that develops a nasal discharge, or other signs consistent with strangles, should be tested for the presence of, or exposure to, *S. equi*.

**Treatment**
Animals in the acute stage

Figure 5. Endoscopic view of the guttural pouch with empyema and a chondroid.

During the acute stage of the disease, prior to lymph node abscess formation, animals can be treated with intramuscular penicillin G to try to prevent abscess formation. However, it should be remembered the animal may well not develop a protective immunity and so may remain very susceptible should it be re-exposed to the infection.

In addition, animals should be treated supportively using NSAIDs – such as flunixin meglumine or phenylbutazone – to relieve pain and pyrexia, fluid therapy if required, soft palatable food and general nursing.

In-contact animals

Animals in contact with those with overt clinical signs can be treated prophylactically with intramuscular penicillin G. However, it should be remembered this will mean the animal will not develop a protective immunity.

Animals with lymph node abscessation

Encouraging the development and maturation of any abscesses present speeds resolution. Hot packing and topical application of a drawing or softening agent have been recommended.

Occasionally, abscesses do not rupture, thus requiring surgical intervention. It is important to wait until the abscess is sufficiently mature and soft so the drainage established is successful.
After drainage has commenced, daily lavage of the abscess with dilute povidone iodine solution should be instituted.

Figure 6. Endoscopic snare removal of a chondroid from a guttural pouch.

Horses that develop respiratory distress because of the severity of lymphadenopathy may require placement of a temporary tracheostomy. Rarely, severe cases may also require intravenous fluids or nasogastric feedings to provide additional support. It is generally recommended cases with lymphadenopathy of this severity should also be treated with antimicrobials.

**Animals with GP empyema/chondroids**

Treatment selection depends on the type of infection found (empyema versus chondroids; Figure 5) and the extent of involvement. Although some evidence-based data exists to guide treatment selection, anecdotal experiences are often used by clinicians to guide therapy.

Simple empyema often responds to repeated GP lavage. Cases with a few chondroids present can be further addressed with endoscopic snare for retrieval (Figure 6), in combination with lavage. After removal of GP empyema and chondroids, topical application of penicillin in gelatin may speed resolution of the bacterial infection.

An alternative approach to emptying the GP is surgical removal via a modified Whitehouse approach. A surgical approach is ideal in cases where non-surgical removal has failed or is expected to fail (because of the amount of chondroids or empyema present).
Surgery can be performed under standing sedation or general anaesthesia. However, risks are involved in the surgical approach because of the large and sensitive neurovascular structures found in the GP.

Further Reading