STRANGLES
(STREPTOCOCCUS EQUI SUBSPECIES EQUI)

Definition

The upper respiratory disease commonly referred to as strangles is caused by *Streptococcus equi* or taxonomically more correct, *Streptococcus equi subsp equi*. Less commonly, the bacteria may affect lymph nodes in the thorax and/or abdomen, causing a syndrome known as metastatic or bastard strangles.

Comprehensive information is available in the ACVIM Consensus statement, '*Streptococcus equi* Infections in Horses: Guidelines for Treatment, Control and Prevention of Strangles', Corrine R. Sweeney, John F. Timoney, J. Richard Newton, and Melissa T. Hines, *J Vet Intern Med* 2005;19:123-134. See ACVIM statement

Clinical Signs

- Fever, usually preceding other clinical signs by 24–48 hours
- Pharyngitis leading to reluctance to eat and drink. Palpation of the larynx will often elicit pain
- Soft non-productive cough that is often associated with eating
- Mucopurulent nasal discharge that can be unilateral or bilateral
- Lymphadenopathy +/- abscessation (retropharyngeal and submandibular lymph nodes are most commonly involved), but any lymph node may be involved
- Upper airway stridor secondary to pharyngeal compression by the lymph nodes or neuropraxia causing laryngeal hemiplegia
- Guttural pouch empyema is a frequent sequela to previous lymph node abscessation
- Metastatic infection including: Abdominal abscessation, meningitis, Lymphangitis, Purpura hemorrhagica, myositis, and immune mediated myopathies

Clinical signs are age and immune status related, with older horses typically exhibiting milder signs of shorter duration. However, every horse is at risk if the dose and frequency of the challenge is significant.

Incubation Period

Translocation to the mandibular and retropharyngeal lymph nodes occurs within hours of exposure with clinical signs beginning 3–14 days after exposure. Nasal shedding usually begins 2 to 3 days after the onset of pyrexia.

Risk Factors

Commingling with many horses of unknown origin and medical history.

Transmission

Direct: horse-to-horse contact

Indirect: contaminated fomites which may include water troughs, veterinary equipment, twitches, blankets, grooming tools, buckets, handlers, tack, etc.

Transmission can occur from horses with no clinical signs who are incubating the disease or have developed a persistent subclinical shedder status.

Diagnostic Sampling, Testing and Handling

Strangles

Sample	Test	Shipping	Handling
Pharyngeal swab. Avoid rostral nasal swabbing	PCR and/or culture	Swab should be placed in plain red top tube for PCR testing; bacterial transport media for culture	Chilled overnight
Aspirate of abscess, discharge from abscess or nasal area	PCR and / culture	Swab should be placed in plain red top tube for PCr	Chilled overnight
Serum	Serology SeM Antibody Titer - ELISA	Leak proof tube or vial	Chilled overnight
Nasopharyngeal wash	PCR or culture	Fluid can be sent in leak proof container such as a plain red top tube or	Chilled overnight

Given the low numbers shed in the nasal secretion early in the course of the disease, PCR may be the best test in horses that are pyrexic but not yet draining an infected abscess. For practicality an endoscope-directed guttural pouch lavage may provide the best sample for PCR **and** allow visualization of the pharyngeal inflammation and examination of the guttural pouches for chondroids or purulent material.

PCR in combination with culture is the test of choice to determine the status of exposed and recovered animals. It is more sensitive than culture in detecting small amounts of bacterial DNA but does not differentiate live bacteria from

	dead. Samples collected early in the course of clinical disease (within 48 hours of onset of fever) may yield negative results on culture. If signs are consistent with *Strep equi* infection, repeat testing at weekly intervals. If several animals are affected, submit single samples from as many animals as possible. The SeM Antibody ELISA cannot differentiate antibodies due to natural infection from those induced by vaccination, and is therefore of limited use in managing disease outbreaks. Its value is limited to screening animals that may react to vaccination, (>1:3200) to support a diagnosis of purpura hemorrhagica or metastatic disease (>1:12,800). It is not a measure of protection from disease or an indication of an active infection.
Post-mortem	Strangles is rarely fatal. If a horse dies in acute phase of the disease necropsy findings likely would relate to upper airway compression due to retropharyngeal or peritracheal abscess formation. Complication of strangles can result in severe disease that may lead to euthanasia. Internal abscesses can form in the lung, liver, spleen, kidney, brain, mediastinum, and/or mesentery. These abscesses would be visible on gross necropsy and culture of the abscess material could lead to a definitive diagnosis. Immune-mediated complications include purpura hemorrhagica, myositis, glomerulonephritis, and myocarditis. Purpura hemorrhagic leads to petechial or ecchymotic hemorrhages on mucous membranes, sclera, and visceral surfaces such as of the lung. Purpura hemorrhagica can result in subcutaneous edema most commonly involving the head, limbs and trunk. Severe edema may result in oozing from the skin surfaces and sloughing of skin in the affected areas. Myositis results in muscle infarcts that can be associated with purpura hemorrhagica. Significant rhabdomyolysis with progressive atrophy has been identified in Quarter Horses. *Practitioners performing necropsies in the field are encouraged to contact a veterinary diagnostic laboratory to which they plan to submit samples for further testing such as histopathology and pathogen identification in order to be certain they collect the appropriate samples and handle the samples in a manner that will optimize making a definitive diagnosis. For some situations such as neurologic cases submission of the entire carcass to the diagnostic laboratory for post-mortem examination is recommended due to the time and labor required to perform a complete exam and collection of samples from the equine CNS.*
Shedding of Virus Following Resolution of Clinical Signs	Typically, 2–3 weeks post-recovery but intermittent shedding may occur for months to years when bacteria persist in guttural pouches or paranasal sinuses. In the absence of diagnostic testing to detect chronic shedders, horses should be considered infective for up to 6 weeks post resolution of all clinical signs. Endoscopic examination and sampling (for culture and PCR) of the guttural pouches is warranted for detection of persistently infected horses. The only way to determine if a horse is still shedding is to test it.

Environmental Persistence	*S equi* was shown to survive less than 24 hours when cultured onto surfaces exposed to direct sunlight. After aggressive cleaning and disinfection, surfaces should be allowed to dry thoroughly. Special attention should be paid to community surfaces such as water, hay, and feed containers. Disinfectants There is no evidence for prolonged survival of *S equi* on pastures. However, it is frequently recommended to allow the pastures enough "rest" time to allow for the bacteria to denature. That interval is likely dependent on the environmental moisture, heat, and sunlight.
Specific Control Measures	Biosecurity Guidelines In the face of an outbreak, the risk of personnel contamination must be balanced against the value of tracking rectal temperatures. Twice daily monitoring is recommended and any horse showing pyrexia should be isolated immediately. There is a lag between the initial pyrexia and nasal shedding of bacteria. Leaving hand sanitizer at each stall is useful to encourage staff to disinfect their hands and be cognizant of the contagious nature of *S equi*. Making certain that caretakers are also not contaminating water hose handles when filling buckets is important. A detailed protocol for establishing a tiered risk system of handling horses during an outbreak is available in the ACVIM proceedings.
Biosecurity Issues for Receiving Animals	Limiting exposure is the best method of prevention of an outbreak on a farm. Quarantine of new arrivals for should also include screening for *S equi*. Isolation with monitoring of rectal temp and endoscopy of the guttural pouch may help to identify infected and sub-clinical shedding individuals. On a farm currently managing an outbreak. Incoming animals should be quarantined in a "clean" area and screened for infection and sub-clinical status. If the farm is not instituting risk-based tier management, turning "clean" horses out into infected herds or pastures is likely to perpetuate the outbreak. **Vaccination** - Currently considered to be a risk-based vaccine according to the AAEP Guidelines for Vaccination of Horses While it may be advisable to *recommend* vaccination, specific vaccination decisions should remain in the purview of the attending veterinarian. Titers can be measured before vaccination with the goal to identify individuals at risk of developing complications from vaccination. Titers against SeM do not indicate protection. Vaccinating with modified live bacteria can lead to confusion when instituting testing to clear horses. Testing by PCR may cause false positives up to 30 days after vaccinating. Positive vaccine cultures may occur for up to 36 hours post IN vaccine. *(Note: Veterinarians should determine risk factors associated with this vaccination.)*

Zoonotic Potential	Human cases have been reported, but are uncommon. Immuno-compromised individuals should take precautions to avoid exposure.