How to Eliminate Strangles Infections Caused by Silent Carriers

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1. Introduction

Strangles is a worldwide infectious disease of horses, donkeys, and mules. It is considered one of the most significant respiratory diseases of horses, and its distribution is made possible by a highly contagious mode of transmission and an increasingly mobile horse population. Transmission occurs through oral and nasal routes directly and through contact with contaminated surfaces indirectly. In the absence of clinical disease, persistence of Streptococcus equi may be caused by asymptomatic or “silent” carriers. The standard site of prolonged carriage of the bacteria in these horses is the guttural pouches. Recognition and detection of this category of transmission is imperative to successful elimination of the disease from a farm.

Traditionally, bacterial culture has been used to confirm a diagnosis of strangles; however, repeated culture of the guttural pouches of silent carriers may produce negative results for up to 3 mo, at which time bacterial shedding can resume. The use of three consecutive negative cultures, therefore, may allow for silent carriers to go undetected. Polymerase chain reaction (PCR) has been recently recognized as an adjunctive test for detecting asymptomatic carriers of S. equi. This paper describes a protocol used to detect asymptomatic carriers of S. equi and subsequently, to eliminate persistent strangles infections on three farms. The procedures described can readily be performed on the farm with standard veterinary equipment.

2. Materials and Methods

Similar steps were used on three separate farms housing a total of 275 horses. Strangles outbreaks had occurred annually on Farms 1 and 3 for many years but only twice on Farm 2 in 2 yr. Farm 1 housed 150 Arabian horses, 37 of which were broodmares. For economic reasons, these were the only horses tested on Farm 1. Strangles vaccinations were administered IM annually on this farm.

Farm 2 housed 39 Warmblood horses on ~100 acres. IM strangles vaccinations were administered annually to all horses ≥1 yr of age. All 39 horses were tested as described for Farm 1.

Farm 3 housed 90 Quarter Horses on 100 acres. Vaccination records were incomplete with respect to strangles. Historically, several yearlings had developed strangles in the early spring of the last 10–12 yr, and at least 8 of those horses required hospitalization for respiratory distress, internal abscesses, or other complications. All horses (and one
burro) were tested on Farm 3 16 wk after resolution of all clinical signs of strangles.

Procedures were performed on site at each of the three farms. Ten to twelve wk after the last clinical signs of strangles resolved, all horses on Farms 2 and 3 and selected horses on Farm 1 underwent lavage of the guttural pouches. Horses were sedated, and a 103-cm fiberoptic endoscope was passed through one nostril while a Chambers catheter was passed through the other. The scope was used solely for confirmation of catheter placement into the guttural pouch and then removed. Sterile water (30 ml) was infused through the Chambers catheter and into the guttural pouch. An assistant collected lavage fluid in a sterile cup as it drained from the nares. The opposite guttural pouch was lavaged by the same method. Strict hygiene measures were followed to minimize contamination of samples, personnel, and facilities. Gloves were changed after each lavage, and clothing (scrubs) was changed if any gross contamination was observed. Disinfectant footbaths were used at the entrance and exit of the test site. Between animals, the endoscope was cleaned thoroughly with alcohol, chlorhexidine, and saline. In total, 6 Chambers catheters were used, allowing for soaking of each catheter in chlorhexidine for ≥30 min between uses. Transportation of horses to and from the farm was prohibited during the testing and treatment period.

Lavage samples were submitted to a commercial laboratory for S. equi PCR testing. This test detects the presence of SeM, the gene for the anti-phagocytic M protein of S. equi. Results were available within 48 h of submission. Horses with positive test results underwent direct endoscopic examination of the guttural pouches. Horses were sedated, and the endoscope was passed sequentially into each of the guttural pouches. Two liters of saline were lavaged through each pouch, and 20 ml of penicillin gel was instilled. A systemic antibiotic regimen was initiated and continued for 4 wk. During the treatment period, all PCR positive horses were housed separately from other horses, and standard quarantine measures were observed. Lavages and PCR testings were repeated on guttural pouch samples from the positive horses 4 wk after initiating treatment. A small number of horses tested PCR positive a second time, and these animals repeated the original treatment for a second 4-wk period. No horses tested positive at the third test period.

3. Results

Farm 1

Six of thirty-seven broodmares had positive S. equi PCR results, whereas only one had visible debris in the guttural pouches. In addition to saline lavage and penicillin-gel infusion into the guttural pouches, the positive horses were treated with ceftiofur (4.4 mg/kg, q 24 h, IV) for 5 days followed by trimethoprim/sulfa (30 mg/kg, q 12 h, PO) for 25 days. Five of six positives were retested 4 wk after initiation of treatment, yielding negative PCR results. The sixth was not retested because of temperament. In the 24 mo since treating the PCR-positive horses, no cases of strangles have been documented on Farm 1.

Farm 2

Four horses yielded positive PCR results. One of the four horses had been administered an intranasal strangles vaccine before his arrival at the farm (6 wk before testing). Two yearlings, who had resolved all clinical signs of strangles 3 mo earlier, also tested positive, but no debris was visualized in the guttural pouches. The fourth positive horse was an asymptomatic 16-yr-old broodmare who was found to have mild mucopurulent debris in the guttural pouches. Guttural pouches were lavaged and instilled with penicillin gel as on Farm 1 horses. Systemic treatment for all four horses consisted of procaine penicillin (22,000 IU/kg, q 12 h, IM) for 7 days followed by trimethoprim/sulfa (30 mg/kg, q 12 h, PO) for 21 days. Guttural pouch lavage for PCR testing was repeated 4 wk after the initial test. Three horses had negative results. The horse that tested positive a second time was one of the two prior clinical cases. Guttural pouch and systemic treatment was repeated for this horse. The third and fourth PCR tests on this horse, performed 3 wk apart, yielded negative results, and no further cases of strangles have occurred in the 18 mo since the testing.

Farm 3

Four horses tested positive, including three 3-yr-olds who had returned to the farm from a training facility 4 wk before testing. The fourth positive was a recipient mare that had only been on the farm for 1 yr. This recipient had mild mucopurulent guttural-pouch debris on endoscopy, whereas all of the 3-yr-olds had normal guttural pouches. Treatment for the four positive horses was identical to that of the positives on Farm 2. At the second test period, all four horses tested negative. Strangles cases have not been recognized in the 2 yr since testing and treatment occurred.

4. Discussion

The combined use of bacterial culture and PCR of pharyngeal and guttural-pouch lavage samples would theoretically improve the specificity of the protocol, because PCR detects dead as well as live S. equi organisms. Using PCR alone may result in unnecessary treatment of horses; however, the cost of combined bacterial culture and PCR testing exceeded that of treatment administered by farm personnel to positive horses. Testing dates were scheduled a minimum of 10 wk after the last clinical signs of strangles had resolved on each farm to minimize the chance of detecting dead S. equi organisms in guttural pouches. Although asymptomatic carriers were discovered on each farm, additional likely sources of infection were identified through exami-
nation of traffic and housing patterns related to the positive horses. Recommendations for more rigorous hygiene measures, vaccination programs, and screenings of new horses were then tailored specifically to each farm. Farm 3 now screens recipients by *S. equi* PCR testing before adding them to the herd. Farm 2 has a dedicated quarantine barn for newcomers and a thorough vaccination program. Control of the disease requires isolation and fastidious hygiene of horses with active infection, detection and treatment of asymptomatic carriers, vaccination, and screening of horses before commingling.2

The economic losses and negative publicity sustained by farms with strangles outbreaks can be significant. This protocol for detection and treatment of silent carriers was cost effective on all three farms given the morbidity rates experienced in years past. Approximate cost of testing was $100/horse, whereas treatment, including lavage of the guttural pouches, was $225/horse. The time spent on each farm provided an opportunity for the veterinarian to review and update vaccination programs, quarantine and isolation procedures, and other herd-health practices.

References and Footnotes


*Olympus GIF, Model XQ10, Olympus America, Melville, NY 11747.*
*TekTrol, Bio-Tek Industries, Atlanta, GA 30318.*
*2% Chlorhexidine gluconate, First Priority Inc., Elgin, IL 60123.*
*Naxcel, Pharmacia & Upjohn Company, Kalamazoo, MI 49001.*
*Agri-cillin, Agri Laboratories, Ltd., St. Joseph, MO 64503.*