



EQUINE HERPESVIRUS TYPE 1 (EHV-1)

INTRODUCTION

Equine herpesvirus type 1 (EHV-1) is one of the most common viral agents responsible for causing disease in equids (i.e., horses, ponies, donkeys, and mules). Because this virus can affect at least three separate organ systems (e.g., respiratory, reproductive, and central nervous systems), it has proven to be one of the most economically important pathogens in the equine industry. Over the past year, the costly and often devastating effects of EHV-1 have re-emerged as a cause for concern as evidenced by sporadic outbreaks of the neurologic form of EHV-1 at racetracks throughout the country, a large equestrian show in Florida, and at least one veterinary teaching hospital.

This virus is found in equine populations worldwide. Most horses are exposed to EHV-1 during the first year of life, but may not show signs of clinical disease for a prolonged period of time. Indeed, the virus can lie dormant in the body for years, but it can re-activate to cause signs of disease or induce the horse to shed the virus to infect other horses. These inapparent or latent infections create “silent carriers” of the virus and are responsible for the continual propagation of the virus in most equine populations. Although not a reportable disease in most states (including California), EHV-1 infections are a significant cause of morbidity and, to a much lesser extent, mortality in equids throughout the world.

CLINICAL SIGNS

As stated above, EHV-1 can cause disease in at least three organ systems, including the respiratory, reproductive, and central nervous systems. Concurrent infection of separate body systems is not uncommon, and infection of one system does not preclude infection of another body system. In other words, infection with EHV-1 can cause both respiratory and neurologic disease in the same horse at the same time.

Clinical signs of respiratory disease resulting from EHV-1 infection usually occur 1-3 days following infection and can vary based upon age, immunologic status, and severity of disease. Signs of disease are those commonly associated with an upper respiratory tract infection, and they include fever, nasal discharge, cough, inappetence, and lethargy. Equids infected with EHV-1 will often spike a relatively high fever (e.g., 103-105 °F) and develop a clear (serous) nasal discharge that progresses to thick and white- or yellow-colored (mucopurulent) if

a secondary bacterial infection occurs. Inflammation of the nasal passage (rhinitis), pharynx (pharyngitis), and trachea (tracheitis) are responsible for the observed clinical signs. Oftentimes, these signs are inapparent or mild, and they will usually abate with minimal supportive therapy. However, because of the relatively high virulence (i.e., ability to transmit and cause disease) of EHV-1, precautions should be implemented to prevent further spread of disease to other equids in the nearby vicinity.

The primary clinical sign associated with EHV-1 infection of the reproductive tract is that of mid- to late-term abortions in pregnant mares. Mares often show no impending signs of clinical disease or abortion. Abortion usually occurs within the last eight months of gestation, but they can occur early in pregnancy. The fetus often contains high concentrations of virus and should thus be collected immediately and handled appropriately to prevent contact with other horses. The reproductive potential of the mare is usually not affected or compromised after she aborts, but she may require medical management for retained fetal membranes or a uterine infection (endometritis/metritis).

Neurologic signs of EHV-1 infection usually occur 6-10 days after infection. Ataxia and paresis (weakness) of the limbs are the most common signs, followed by poor tail and anal sphincter tone. Urinary incontinence (urine dribbling) or straining to urinate are also fairly common clinical signs in horses affected with the neurologic form of EHV-1. Neurologic signs usually occur earlier and more severely in the hindlimbs relative to the forelimbs.

The onset of neurologic signs can be preceded or accompanied by upper respiratory disease, fever, inappetance, lethargy, or hindlimb edema and swelling. However, and in many cases, neurologic dysfunction are the first and only signs observed in horses affected with the neurologic form of EHV-1. Progression of neurologic disease is highly variable among individual horses. Some will stabilize rapidly over a few days and then recover over a period of several weeks. Others may show rapid advancement of disease within 24 hours after the onset of clinical signs as evidenced by recumbancy and loss of motor control. These signs can then progress over the course of a few days to paralysis of the hindlimbs (paraplegia), dog-sitting, paralysis of both the hindlimbs and forelimbs (tetraplegia), coma, convulsions, and death.

TRANSMISSION

Transmission of the virus occurs when a horse inhales or ingests the respiratory aerosol of another horse shedding EHV-1. This mode of transmission most commonly occurs when horses are in close contact with one another. On average, a horse will shed the virus for 7 days following the onset of clinical signs. However, some may shed the virus for up to 28 days. Moreover, due to the latent feature of the virus, recrudescence may occur months to years after the initial infection, thereby causing the horse to shed virus again or develop clinical signs associated with EHV-1 infection.

Unfortunately, there is no good explanation for why some outbreaks of EHV-1 are associated with a higher incidence of neurologic disease relative to

respiratory disease or vice versa. Furthermore, it is unknown why some horses with confirmed infections display severe clinical signs while other horses—also confirmed to be infected with EHV-1—within the same barn or environment demonstrate only mild signs of disease. Numerous factors, such as age, sex, reproductive status, immunologic status, magnitude of infection, viral strain, and route of infection may all play a role in determining the type of disease and the severity thereof.

Infection with EHV-1 often occurs at a young age, usually during the first year of life. Exposure may occur either from a clinically ill horse or a “silent carrier.” The virus can persist in the environment for 14 days and can persist on horse hair for up to 42 days. Although other horses are the primary modes of transmission, the virus can also be spread by grooming equipment or tack, feed buckets, water troughs, nose twitches or lip chains, and humans handling infected horses.

DIAGNOSIS

The clinical signs of both the respiratory and neurologic forms of EHV-1 are fairly non-specific; therefore, laboratory testing is often necessary to make a more accurate diagnosis. A common means of determining if a horse is actively shedding the virus is by performing a nasal or pharyngeal swab to isolate the virus. The virus can also be isolated within the buffy coat of serum or within cerebrospinal fluid to determine the presence of the virus in the blood or central nervous system, respectively. Most clinicians prefer to perform the nasal or pharyngeal swabs due to the relative ease and quick turnaround time of the test. It is worthwhile to mention that these diagnostic tests only indicate the presence or absence of viral shedding at the time the test was performed. They are not completely effective in identifying latent infections or “silent carriers.” As such, a horse may be harboring the virus without shedding a detectable amount of virus.

Paired serum samples collected 7 to 21 days apart can also be used to determine exposure by demonstrating at least a fourfold increase in antibody concentrations between the two samples. This test, when combined with findings from a clinical examination, can be useful in reaching a diagnosis of disease resulting from EHV-1 infection. However, the relatively lengthy testing period is plagued by inefficiency, and the clinical course of disease is often finalized before these test results are obtained.

TREATMENT

Treatment of horses experiencing the respiratory form of EHV-1 often involves minimal supportive care in the form of non-steroidal anti-inflammatory drugs (NSAIDs), minimizing stress, and adequate rest and nutrition. Occasionally, these horses may require more advanced treatment, such as intravenous fluids and broad spectrum antimicrobials to prevent secondary bacterial infections. In other cases, spontaneous resolution occurs without any treatment.

Mares aborting due to EHV-1 may require some form of supportive care. These mares are more likely to retain the placenta, so they are at risk to develop secondary complications of retained fetal membranes, such as endometritis, laminitis, and systemic illness. Consequently, most clinicians will elect to manage these mares fairly aggressively with NSAIDs, uterine lavages, and systemic antimicrobials to help prevent secondary complications.

Treatment for the neurologic form of EHV-1 is both aggressive and intensive. Initial treatment usually involves intravenous fluids, administration of corticosteroids (e.g., dexamethasone), NSAIDs (e.g., Banamine[®]), dimethyl sulfoxide (DMSO), intravenous antibiotics (e.g., penicillin and gentamicin), and Vitamin E. Some clinicians may also administer Mannitol, which is an osmotic diuretic that can help decrease edema or swelling within the central nervous system. The bladder may also be catheterized to allow the horse to void urine, and a feeding tube may be placed if the horse is inappetant or unable to eat due to loss of motor control of the tongue and jaw. Horses that become recumbent require frequent turning and bandaging to prevent pressure sores and muscle stiffness. Manual evacuation of the rectum may also be necessary in horses that are unable to pass manure. Acyclovir, an anti-viral drug used to treat herpesvirus infections in humans, has showed somewhat promising results in treating horses experiencing the neurologic form of EHV-1. Unfortunately, the therapeutic dosage has yet to be firmly established, and it is a fairly costly medication to administer. As such, acyclovir is currently considered an experimental medication that has yet to be considered a truly beneficial medication in treating horses with EHV-1. Another similar medication, penciclovir, has also showed promising activity against EHV-1, but much more research is necessary to determine its clinical efficacy.

CONTROL

When faced with a confirmed case or cases of EHV-1, control measures should be instituted in an attempt to prevent further spread of the organism to remaining horses. Such measures include isolation and quarantining of affected animals for 3-4 weeks so as to prevent aerosol transmission, direct contact, and fomites from exposing other horses. Aborted fetuses should be collected immediately and placed in leak-proof containers, submitted for necropsy, or disposed of properly to prevent other horses from coming into contact with it. Fomites (e.g., grooming equipment, water buckets, mucking equipment, etc.) should be properly sanitized or discarded. Separate equipment should be used on affected animals and then routinely disinfected. Bedding from stalls of affected horses should be burned, and the stalls should be properly disinfected and left vacant for 3-4 weeks. Human and horse traffic should be minimized on affected premises, and caution should be exercised when considering movement of horses to and from that premise. Laboratory tests (e.g., nasal swabs and buffy coat samples) can also be utilized prior to terminating the quarantine period to ensure that none of the horses are viremic or shedding the virus.

Numerous disinfecting agents are available that have activity against EHV-1. These include phenolic compounds (e.g., Tek-Trol[®] and 1 Stroke Environ[®]), hypochlorites (e.g., bleach), quaternary ammonium compounds, and iodophores (e.g., 10% povidone iodine). The phenolic compounds are probably the most suitable for disinfection of equine facilities because, unlike bleach and quaternary ammonium compounds, they are not inactivated by organic material, such as manure. Another important, but often overlooked, means of controlling the spread of disease is proper handwashing. Washing one's hands for ~ 30 seconds should be adequate in removing infectious agents. Various hand sanitizers are also commercially available, but these are only effective if one's hands are already clean. Other biosecurity measures, such as utilizing exam gloves, wearing plastic booties, and gowns, should also be used when handling affected horses. Afterwards, these items should be properly discarded.

PREVENTION

Ideally, all new horses arriving on a new premise should be quarantined for 3 weeks prior to introduction to the resident herd. Ensuring that these new arrivals are current on their vaccinations is also a useful preventive measure. New arrivals should also be kept isolated from pregnant broodmares. Limiting stress by minimizing overcrowding may also prove beneficial in preventing recrudescence of horses with latent EHV-1 infections. Utilizing separate grooming equipment, tack, and mucking equipment can also decrease the chance of transmission of disease to resident horses.

Twice daily monitoring of rectal temperature can be a useful means to identify potential cases of EHV-1 infections. One of the earliest signs of disease is a significant elevation in body temperature (e.g., 103-105° F). Consequently, horses at equestrian events or new arrivals to a barn or farm should have their rectal temperature monitored routinely for an extended period of time to identify potential cases of EHV-1.

The current vaccines available for use in horses are only labeled for immunization against the abortigenic and respiratory forms of EHV-1. In other words, there is currently no vaccine that provides a label claim against preventing the neurologic form of EHV-1. Moreover, the current vaccines are only thought to provide incomplete protection against the abortigenic and respiratory form of EHV-1. As such, these vaccines will *not* prevent infection of virus or eliminate the possibility of creating the carrier state.

Although the effectiveness of the current EHV-1 vaccines is somewhat tenuous, anecdotal or subjective data exists regarding the use of a modified-live virus vaccine, Rhinommune[®] (Pfizer), in limiting viral shedding and lessening of clinical signs of EHV-1 infections. Modified-live virus (MLV) vaccines are thought to be more effective in stimulating a cell-mediated immune response, which, in general, is the most appropriate type of immune response to combat viral infections. Some practitioners are also advocating the use of an immunostimulant (e.g., Zylexis[™], Pfizer) following vaccination with the MLV vaccine. This immunostimulant is administered 7, 9, and 16 days after

vaccination with the MLV vaccine. Various pharmaceutical companies are also attempting to evaluate the effectiveness of other vaccines in stimulating cell-mediated immunity. Your veterinarian will likely be the first to learn of any new developments, so be sure to contact him or her for updated information.

Regardless of what vaccine is administered to your horse, the most effective means of prevention is through diligence and proper hygiene. Isolation of new arrivals and sick animals, proper disposal of muck, thorough disinfection of supplies and equipment, and hand-washing are all beneficial measures in preventing the spread of infectious diseases. As the old adage goes, "An ounce of prevention is worth a pound of cure," which holds doubly true in the control of infectious diseases.

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