Equine Viral Arteritis: Essential Facts About the Disease

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Although outbreaks are uncommon, equine viral arteritis is an important disease because of the potential risk of abortion in mares and establishment of the carrier state in a relatively high percentage of infected stallions. Equine arteritis virus carrier stallions constitute an important reservoir of infection, and appropriate precautions have to be taken when nonimmunized mares are inseminated with virus-infective semen. Equine viral arteritis is a manageable infection and prevention programs have been developed that have proven successful in controlling this disease. Authors' address: Maxwell H. Gluck Equine Research Center, Dept. of Veterinary Science, University of Kentucky, Lexington, KY 40546-0099. © 1997 AAEP.

1. Introduction

Equine viral arteritis (EVA) is a contagious viral infection of members of the horse family that assumed unprecedented national and international significance following the epidemic on Thoroughbred breeding farms in Kentucky in 1984. Contrary to a popularly held belief at the time, that occurrence did not mark the emergence of a newly recognized disease of the horse; EVA has probably afflicted various horse populations throughout the world for a very long time. In fact, EVA was first identified as an etiologically separate disease of horses in 1953 following an extensive outbreak of a respiratory-abortion syndrome on a Standardbred farm near Bucyrus, Ohio.1

2. Distribution and Prevalence

The causal agent of EVA, equine arteritis virus (EAV), is present in horse populations in many countries. In the U.S. it is distributed in a wide range of breeds, more in some than in others. Whereas the prevalence of infection in certain breeds, e.g. Arabian and Thoroughbreds, can be as low as 1-3%, it can be as high as 70-80% among adult Standardbreds. It is very important not to confuse serological evidence of this infection with presence of disease. Like so many infectious diseases, clinical disease associated with this infection occurs relatively infrequently. By comparison with other respiratory borne diseases in the horse, there have been relatively few confirmed outbreaks of EVA in the past 40-45 years, most of which have been reported since the 1984 epidemic in Kentucky. Undoubtedly, this is in part reflective of an increased awareness of the disease as well as improved diagnostic capability in the laboratory.

3. Significance

One may well question the significance attributed to EVA if the disease occurs only infrequently. Much of the disease's claim to fame is due to the fact that certain strains of EAV can cause abortion in suscep-
tible mares and establish the carrier state in a significant percentage of infected stallions.

Although the virus is uncommonly associated with abortion in the field, there have been outbreaks in which the abortion rate has exceeded 50%. Precautions should always be taken to ensure that nonimmunized, pregnant mares are not exposed to the risk of EAV infection during pregnancy.

It is readily apparent from field investigative studies and research conducted over the past 13 years that the persistent infection of stallions with EAV is much more widespread among various breeds of horses than was previously recognized. This has had considerable economic implications with respect to the commercial use of such stallions for breeding purposes. Carrier stallions can transmit EAV very efficiently, either by natural breeding or through the use of artificial insemination. They have been shown to be the source of virus for outbreaks of abortion and deaths in neonatal foals on breeding farms.

4. Clinical Signs
Cases of EVA can present with a combination or all of the following clinical signs: fever, dependent edema (especially of the limbs), anorexia, depression, edema of the male external genitalia and the mammary glands in the mare, conjunctivitis, nasal discharge, skin rash (which may be localized around the head or neck or generalized) and abortion in pregnant mares. Infection of very young foals can give rise to a fulminant, interstitial pneumonia or pneumoenteritis. With the exception of isolated cases of EAV infection in young foals, horses affected with EVA invariably make uneventful, clinical recoveries, even without any medical intervention. It should be emphasized that the vast majority of cases of EAV infection are subclinical and are not associated with the development of clinical signs of disease. Furthermore, in light of the clinical similarity between EVA and other respiratory infections of the horse, a diagnosis of EVA cannot be confirmed on clinical grounds alone without appropriate laboratory testing.

There is still considerable confusion over when in gestation and under what circumstances EAV can cause abortion in pregnant mares. Abortion, if it is to occur, will supervene late in the acute phase or early in the convalescent phase of the infection, i.e., within 1–3 weeks following exposure to the virus. It does not occur many weeks or months after infection with EAV, unlike abortion caused by other viral or bacterial pathogens. Furthermore, abortion may occur with or without preceding clinical signs of EVA in the mare, and some pregnant mares severely affected with the disease may not even abort. In contrast to equine herpesvirus 1 infection, the stage of pregnancy at which exposure to EAV occurs does not appear to be critical to the outcome; fetuses from 2–3 months to term are susceptible to the abortigenic effects of the virus. There is no evidence that mares can abort more than once due to EAV infection.

5. Transmission
Two of the most common routes of infection with EAV are via the respiratory tract through contact with acutely infected horses and venereally by carrier stallions that shed the virus in their semen. Spread by the respiratory route is the primary means of virus transmission during outbreaks of EVA at racetracks, horse shows, sales, and veterinary clinics. Venereal transmission, in contrast, has frequently been associated with the primary spread of EAV on breeding farms. Documented outbreaks of EVA have occurred following the use of virus infective, domestic, or imported semen from carrier stallions. Consequently, every effort should be made to determine the carrier status of donor stallions and appropriate precautions taken when using EAV positive semen to ensure that outbreaks of EVA do not ensue.

6. Carrier State
Persistence of EAV or the carrier state can occur in a significant percentage of infected stallions but not in mares, geldings, or sexually immature colts. The virus localizes in certain accessory sex glands in the reproductive tract of the carrier stallion and is released in the secretions of these glands at the time of ejaculation. Carrier stallions shed EAV constantly in the semen but not in respiratory secretions or urine; nor has the virus been detected in the blood stream of such animals. Based on extensive field and experimental studies, there is no confirmed evidence of intermittency of virus shedding in semen nor of the existence of a latent carrier state. No detectable reduction in fertility has been observed in carrier stallions. It is important to realize that the infectivity of EAV is preserved under refrigeration or freezing conditions and that EVA can be readily spread through the use of fresh-cooled or frozen semen. The carrier stallion is widely considered the principal means whereby this virus is maintained in various horse populations from year to year.

7. Prevention and Control
First and foremost, it should be emphasized that EVA is a very manageable disease to control. We now know a great deal about the biological characteristics of the causal virus and the epidemiology of the disease, and we have had a safe and effective modified live virus vaccine against the disease available for a significant number of years. Collectively, these factors have permitted the formulation of effective programs for the prevention and control of EVA. Notwithstanding the potential for EAV to be spread at racetracks, shows, sales, and so on, current prevention programs have been directed primarily at curtail-
the carrier state in the stallion. Available EVA control programs have centered largely around the significance of the carrier stallion in the epidemiology of the disease. Serological testing of all breeding stallions and identification of any carrier animals among those testing serologically positive to EAV is a critical first step in instituting such a program. Carrier stallions should be managed appropriately and used only for breeding to mares seropositive as a result of previous natural infection with EAV or following vaccination against the disease. All breeding stallions should be vaccinated annually to protect against the disease and to prevent establishment of the carrier state. It is very important to realize that not all serologically positive stallions are shedders and carriers of EAV. This includes stallions vaccinated against EVA that have never been shown to become carriers of the virus as a result of vaccination.

In breeds in which EAV infection is endemic, e.g., in Standardbreds, the vaccination of all colts between 6 and 9 months of age is strongly recommended. This would minimize, if not eliminate, the risk of them becoming carriers at a later date. Implementation of such a vaccination strategy would, over a period of several years, lead to a reduction in the reservoir of carrier stallions.

In light of the very real risk of introducing EAV into a susceptible horse population through the use of infective, fresh-cooled or frozen semen, measures have to be adopted to prevent possible outbreaks of EVA resulting from insemination of mares that are seronegative and unprotected against infection with the virus. It is strongly recommended that such mares be vaccinated against EVA at least 3 weeks beforehand. The reasons for this are twofold: first, vaccinated animals need to be provided with adequate opportunity to mount an immune response to the virus; second, first-time vaccinated animals may shed small amounts of vaccine virus for a short interval after vaccination, during which time it is advisable that they be temporarily isolated from other seronegative horses. Furthermore, after breeding first-time vaccinated mares with EAV infective semen, the mares should be isolated from other seronegative or unvaccinated horses for an additional 3-week period to minimize the risk of spread of this infection and the potential of outbreaks of abortion and deaths in neonatal foals.

The question might well be asked why a program of generalized vaccination against EVA is not recommended for all categories and ages of horses. Regrettably, at the present time, such a policy would preclude the export of such animals to a limited number of countries. It is high time that a more rigorous approach be taken to achieve greater control over this infection at a national level. This has been advocated for a number of years by the AAEP, and more recently it has received the vigorous support of the American Horse Council.

References and Footnotes