Residual Effects of West Nile Viral Encephalomyelitis in Horses

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Abstract

Forty percent of horses that survived acute illness caused by West Nile virus (WNV) still exhibited residual effects that were attributed to that illness by their owners at 6 mo post-diagnosis. The most common changes were gait and behavioral abnormalities, both of which affected the horse's use for riding and its relationship with its rider. Relapses of neurologic signs occurred in 9% of the cases, most often within the first 2 mo after initial illness.

1. Introduction

Since its introduction into the United States in 1999, West Nile virus (WNV) has caused an overwhelming epidemic of encephalomyelitis in horses in the United States and Canada in 2001 and 2002 [1-3]. As the virus spread to central and western areas of the United States, veterinarians relied heavily on morbidity and mortality data from the Eastern seaboard to counsel horse owners on the risks of the disease and the likelihood of death. Little information was available regarding the quality of horses’ recovery from the illness and return to function. Outcome assessment of equine cases in Florida suggested 15% of survivors did not completely regain neurologic soundness and that pathologic changes could be found in central nervous system tissues in these horses. Preliminary observations and follow-up of a number of confirmed cases of West Nile viral encephalomyelitis in Minnesota in 2002 (992 total) suggested that a greater percentage of horses suffered long-term effects from this illness. Additionally, a clinically significant proportion of horses that seemed to have recovered subsequently again developed neurologic signs weeks to months later, often associated with stress, return to work, or weather change. This study was devised to better characterize the prognosis of horses that develop clinical illness caused by West Nile virus.

2. Materials and Methods

Through collaboration with the Minnesota Department of Health and the State of Minnesota Board of Animal Health, data were obtained on surviving horses with a confirmed diagnosis of West Nile virus infection. The diagnosis was based on identification of anti-WNV immunoglobulin M (IgM) on capture enzyme-linked immunosorbent assay (ELISA) of serum and/or cerebrospinal fluid. In the first 2 mo of 2003, veterinarians who had submitted positive samples were contacted by phone for permission to mail a simple one-page questionnaire to the owner with a stamped returned envelope. The questionnaire was developed following interviews with a number of area veterinarians that had experienced numerous WNV cases. The horse's owner was asked to characterize the horse's use pre- and post-infection, current neurologic status, length of recovery, observations of relapse, or recurrence of clinical signs, to check off any of 11 abnormalities that were currently observable, as well as to comment on any additional concerns regarding their horse. The results were analyzed on the basis of absence or presence of observable abnormalities.

3. Results

To date, 131 questionnaires have been returned from 200 mailed out to WNV case owners. Six questionnaires were discarded because the horse had either died or been euthanatized during the acute illness. The length of time of follow-up ranged from 138 to 232 days, with an average of 182 days (median, 184 days). The majority of the horses were pleasure horses, with breeding ranking as the second most common use. Ninety-two of 125 horses (73.6%) were considered by the owner to have fully recovered, but only 13 had been re-evaluated by a veterinarian. Despite the owner's opinion that a horse had fully recovered, only 74 of these (59.2%) had no currently observable neurologic or behavioral abnormalities [recovered (FR)]. Within this group of 74 fully recovered horses, the
average duration of clinical abnormalities was 35 days, with a range of 1 - 180 days (median, 21 days). Thirty-two horses were currently being ridden or driven out of 53 that were eligible for those uses. A number of the non-ridden horses (12) will resume their usual work function in late spring when the weather improves. The remaining recovered horses are used for breeding or other non-mounted activities or are too young to be ridden.

Residual deficits that were described in horses that owners deemed to have fully recovered (FRD) included predominately gait and behavioral abnormalities (n = 28). Sixteen horses were described as having a single abnormality: behavioral change (8), loss of muscle mass (2), more frequent stumbling (2), diminished energy level (2), weak hind limb(s) (1), or abnormal gait (1). Two abnormalities were observed for eight horses, of which six had behavior changes. One of these had a combination of vision loss as well as loss of muscle mass. The other four horses in this category all had behavioral changes as well as gait abnormalities. Fewer of the horses in this category had returned to work under saddle: 4 of 12, of which 4 will likely return to work later this spring.

Twenty-two horses were classified by their owners as incomplete recoveries (IR) from WNV infection, and one owner was undecided, because this draft horse had not returned to work yet this spring. Only 3 of the 22 horses were re-evaluated by a veterinarian. Gait abnormalities were described for 17 of 22 horses, including abnormal gait, weakness of either the front and/or hind limb(s), and more frequent stumbling. Behavioral changes were also commonly reported (n = 15). Six horses still had loss of muscle mass and four had diminished energy. Vision loss and dysphagia were also reported. Despite ongoing observations of gait abnormalities, three horses in this group were currently working under saddle, only one of which had been re-evaluated by a veterinarian. One owner had ceased riding her horse after it fell on her. Two of the IR horses were euthanatized at 6 and 7 mo post-diagnosis because of the severity and persistence of their gait deficits. The owner of a third horse was strongly considering the same at 5 mo post-diagnosis.

Relapses of clinical signs were reported in all three groups of horses: three among the fully recovered horses (FR), two among the fully recovered horses with residual deficits (FRD), and six in the incomplete recovery group (IR). The relapses occurred from 2 wk to 5 mo after the initial diagnosis of WNV. Most were mild and did not require veterinary intervention, but several did. One horse was described as having four relapses requiring treatment but progressing to full functional recovery; however, the owner described marked memory loss. The horse seemed to frequently forget where it was or where it should go. Another's relapse was characterized by mild colic signs followed by a prolonged period of lip licking and altered awareness of its environment.

The behavioral changes commonly described by the owners were predominately of three types: change in demeanor, change in mental abilities, and abnormal behavior patterns. Five horses were described as becoming very quiet and calm. A similar number became more easily startled or spooked. Three horses became more irritable, and one previously calm horse became very agitated when asked to give even small children a short ride at a walk. Five horses developed what the owners perceived as loss of memory or vision. One horse had a single brief seizure after a trail ride, and two horses had episodes of sudden onset sleepiness suggestive of narcolepsy.

4. Discussion

The results of this survey of horses recovering from infection with West Nile virus suggest that it will be difficult for veterinarians to give clients a very good prognosis for full recovery from this disease. Forty percent of the horses in this dataset still experienced either behavioral changes or gait abnormalities or both at approximately 6 mo post-diagnosis. This is in stark contrast to full recoveries reported in a small outbreak of 14 horses in Italy in 1998 in which 8 survivors had no permanent sequelae [4]. To date, there has not been a strong correlation between the long-term outcome of survivors and the age of the horse or the severity of the acute neurologic deficits. When the Minnesota data set analysis is completed, it is conceivable that associations may be found between vaccination status prior to diagnosis or treatment and outcome.

The majority of the respondents to this questionnaire used their horses for pleasure riding, breeding, or both. More demanding performance venues, such as cutting, barrel racing, eventing, and dressage were not sufficiently represented in this dataset to assess the impact of WNV infection on these horses. This was surprising given the high number of performance horses in Minnesota, particularly in the hardest hit counties on the west side of the metro area. The lack of these types of horses in the data base may be due, in part, to fewer WNV infections caused by lower exposure (indoors at dawn and dusk) or greater adoption of early vaccination recommendations before the virus appeared in this state.

The horse owners' perception of what constituted full recovery was variable, leading to the two categories in the analysis of fully recovered (FR) versus fully recovered with deficits (FRD). Even though a large number of the owners described lingering concerns regarding their horse's health, very few had their veterinarian re-evaluate their horse (16 of 125). This was very surprising, because a number of owners expressed considerable emotional attachment to their horses in letters accompanying the questionnaires, plus concerns about the safety of riding these animals. Greater client education on the value of reassessment might be of value in this regard. WNV cases treated and discharged at the University of Minnesota all had written recommendations to seek their veterinarian's opinion of the horse's neurologic status before any mounted activities were resumed, but compliance was variable, perhaps because of financial constraints.
The behavioral changes noted by horse owners in this study are similar to those observed after Eastern or Western Equine viral encephalomyelitis (EEE, WEE) in horses as well as WNV infections in humans. Among human patients in New York in 1999, 1-yr follow-up by their health department found frequent persistent symptoms: fatigue (67%), memory loss (50%), difficulty walking (49%), muscle weakness (44%), and depression (38%) [5]. As neither of the arboviruses (EEE and WEE) has caused epidemics of the magnitude of the North American WNV epidemic of 2002, it is difficult to make numerical comparisons of viral impact on outcomes. Fortunately for the horse owners, the majority of the behavioral changes only minorly impacted the horse's rideability; however, owners should still be cautioned about these potential effects. Increased spookiness, irritability, seizures, or narcolepsy all can conceivably increase the risk of human injury, including the veterinarian.

References


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