Protozoal encephalomyelitis in horses: 82 cases (1972–1986)

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Summary: *Medical records of 82 horses with clinical signs of neurologic disease and histologic lesions suggestive of protozoal encephalomyelitis were reviewed. The presence of a protozoan parasite in the CNS was not influenced by prior treatment of the horse with corticosteroids. Prior treatment of horses with trimethoprim-sulfonamide alone or in combination with pyrimethamine resulted in a decreased number of horses in which a protozoan parasite was detected in the CNS at necropsy. The mean age of affected horses was 3.62 ± 2.78 years, with male and Standardbred horses being overrepresented, compared with that of the hospital population of horses that were studied at the same time.*

Protozoal encephalomyelitis (PE), a neurologic disease most frequently affecting young adult Thoroughbreds and Standardbreds, is a progressive disease often causing asymmetric and abnormal neurologic signs. The protozoan parasite causing PE may be a *Sarcocystis*-like organism, but attempts to induce PE in horses with known *Sarcocystis* spp have failed.[1,2] More than one protozoan species may cause PE. Antemortem diagnostic tests are not specific for PE. Definitive diagnosis requires postmortem microscopic examination of CNS tissue and identification of a diffuse and/or multifocal, necrotizing, nonsuppurative encephalomyelitis,[3,4] with or without identification of a protozoan parasite.[5]

Trimethoprim-sulfonamide and pyrimethamine have antiprotozoal activity and are commonly used in treatment of horses with PE. The use of corticosteroids, useful in the treatment of some neurologic diseases, has been avoided in the treatment of PE in horses because their use may exacerbate the disease progression.[6] Corticosteroids also have been incriminated in the reactivation of *Toxoplasma* infections in human beings and animals.[7,8] Treatment efficacy is based on clinical diagnosis and subjective evaluation of response. The purpose of the study reported here was to evaluate effect of treatment in horses with a confirmed diagnosis of PE based on the presence or absence of a protozoan parasite in CNS tissue.

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Materials and methods

Case selection—Eighty three horses with abnormal neurologic signs and histologic lesions indicitave of PE, were examined at the George D. Widener Hospital for Large Animals, University of Pennsylvania, between January 1972 and March 1986. Information regarding antiprotozoal and corticosteroid treatment before and/or during hospitalization was obtained from medical records for 82 of the 83 horses. Horses had been treated with trimethoprim-sulfonamide (sulfamethoxazole or sulfadiazine, n = 12); trimethoprim-sulfonamide and corticosteroids (n = 13); trimethoprim-sulfonamide and pyrimethamine (n = 11); trimethoprim-sulfonamide, pyrimethamine, and corticosteroids (n = 4); corticosteroids (n = 13); no antiprotozoal or corticosteroid medication (nontreated, n = 29).

Statistical analysis—The Fisher exact test was used for all tests of indepenence because of the small groups of horses (cell size <5).[9] Differences ($P = 1.000$) were not detected between horses given cortiocosteroid only and nontreated horses in the finding of a protozoan parasite in the CNS at necropsy. Therefore, these horses were grouped for the purpose of analysis. Horses were grouped and subgrouped for analyses as follows: Group I—trimethoprim-sulfonamide with and without corticosteroid (n = 25); group Ia—trimethoprim-sulfonamide alone (n = 12); group II—timethoprim-sulfonamide and pyrimethamine with and without corticosteroid (n = 15); group IIa—trimethoprim-sulfonamide and pyrimethamine alone (n = 11). These 4 groups were compared with group III—no antiprotozoal (trimethoprim-sulfonamide or pyrimethamine) therapy. This group also includes horses given corticosteroids alone (n = 42).

The number of CNS tissue sections examined microscopically was uniform for horses in which a protozoan parasite was found or not found. A mean number of 18.3 ± 7.3 and 18.82 ± 8 sections from horses without and with a protozoan parasite, respectively, were examined.

Results

Of 82 medical records reviewed, 75 had breed information available, and of these horses, 38 (50.7%) were Standardbreds and 30 (40%) were Thoroughbreds. Remaining horses (Quarter Horse [4, 5.3%]; American Saddlebred [1, 1.3%]; Tennessee Walker [1, 1.3%]; and mixed breed [1, 1.3%]) were analyzed together and represented 9.3% of the horses. For the same period, the hospital population (n = 36,815) comprised 46.8% Thoroughbred (17,249), 30.1% Standardbred (11,075), and 23.1% other breeds (8,491).

Of 82 medical records reviewed, 73 had sex information available and of these 18 (24.7%) were geldings, 23 (31.5%) were mares, and 32 (43.8%) were stallions. In the hospital population (n = 36,631), there were 12,669 geldings (34.6%), 13,679 mares (37.3%), and 10,282 stallions (28.1%). Breed information was available for 36,815 horses and sex information was available for 36,631 horses admitted to this hospital over the study period. Most affected horses were in the 1 to 6 year age range (65 of 74, 87.5%). Information for the age of the hospital population for the study period was not available.

The Standardbred breed was significantly over represented, compared with the hospital population ($P < 0.001$). Occurrence of PE in males (stallions and geldings) was higher, compared with that in mares, which was significantly different when compared with the sexual distribution of the hospital population ($P < 0.004$). The age of the study group may have been skewed because the sex of the young racehorse patient tends to be male in this hospital. The age range for our horses was 8 months to 19 years (mean, 3.62 ± 2.78 years).

A protozoan parasite was detected in the CNS of 30 horses (36%). The presence of a protozoan parasite in the CNS apparently was not influenced by prior corticosteroid treatment, compared with that in the nontreated group. Prior treatment with trimethoprim-sulfonamide alone or with corticosteroid (group I) apparently had a significant effect ($P < 0.0001$) on the number of horses in which the protozoan parasite was detected at necropsy (Table 1). Prior treatment with trimethoprim-sulfonamide and pyrimethamine alone, or with corticosteroid (group II), apparently had a significant effect ($P < 0.003$) on the number of horses in which a protozoan parasite was detected at necropsy. The chance of the protozoan parasite being detected at necropsy in horses treated with trimethoprim-sulfonamide alone or with corticosteroid was reduced 4.96 fold, compared with that in horses given no antiprotozoal therapy or corticosteroids alone (group III). The chance of finding a protozoan parasite at necropsy in horses treated with trimethoprim-sulfonamide and pyrimethamine with or without corticosteroid was reduced 2.14 fold, compared with that in group III horses.

Table 1—Correlation between treatment groups and subgroups and postmortem findings of protozoan parasite in 82 horses with protozoal encephalomyelitis

Group	No. of horses			
	Protozoan			
	Absent	Present	Total	*P*
I—Trimethoprim sulfonamide* with and without corticosteroid	22	3	25	0.0001
Ia—Trimethoprim sulfonamide* alone	11	1	12	0.002
II—Trimethoprim sulfonamide* and pyrimethamine with and without corticosteroid	13	2	15	0.003
IIa—Trimethoprim sulfonamide* and pyrimethamine alone	9	2	11	0.09
III—No trimethoprim sulfonamide and pyrimethamine treatment†	17	25	42	...

*Sulfonamides were sulfamethoxazole or sulfadiazine. †Includes horses given corticosteroids alone.
Underlines represent subgroups.

Discussion

Inability to definitively diagnose PE in horses before death is a major hindrance in assessing treatment efficacy. Failure of horses with suspected cases of PE to respond to treatment may be the result of extensive, irreversible CNS damage, overwhelming infection, or inaccurate diagnosis. An additional problem is the uncertainty of whether currently used therapeutic agents are effective against PE.

Results of the present study indicate that prior treatment with trimethoprim-sulfonamide alone or in combination with pyrimethamine is effective in reducing the chance of finding a protozoan parasite in the CNS of horses with PE at necropsy. To assess treatment efficacy, controlled transmission and treatment studies are needed. These studies cannot be performed until the protozoan parasite is isolated and the disease is induced or until antemortem diagnosis is more reliable. Until then, evidence for treatment efficacy will remain circumstantial.

Seemingly, prior corticosteroid treatment had no effect on the numbers or frequency with which a protozoan parasite was seen in CNS sections. In the present study, there was no statistical difference in observation of a protozoan parasite in CNS tissues among horses given corticosteroids and those not treated. However, the horses had been given various doses of corticosteroids and for differing periods. The effect of corticosteroids may depend on the duration of treatment and dose administered. Doses of corticosteroids used in reactivated toxoplasmosis inducted in cats were high.[8]

Seemingly, PE had a higher occurence in Standardbreds.[6] The hospital population from 1972 to 1985 was 30% Standardbred, but 50% of the horses with PE were Standardbred, indicating a breed predilection for the disease. As reported,[6]

young adult horses were frequently affected, most being 1 to 6 years old.

There appears to be a gender predilection as well, with males (stallions and geldings) being represented more frequently than females in the study population. Because most of our horses were young racehorses, this apparent predisposition may be attributed to males, in general, constituting most horses at the racetrack, perhaps implying an environmental rather than physiologic influence.

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