



Case report

RECURRENT AIRWAY OBSTRUCTION IN HORSES – CLINICAL AND DIAGNOSTIC ASPECTS

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ABSTRACT

In this study are presented clinical and diagnostic approaches in horses with recurrent airway obstruction (RAO). Seven horses from different breeds and age were included in the investigation. Normal body temperature with increase of heart rate and respiratory frequency were documented. Signs of respiratory distress including tachypnea, flared nostrils, expiratory effort, nasal discharges and coughing were observed in each horse. Changes in CBC (morphology) were not present. Ultrasound and percussion of the lung revealed a caudal displacement of the abdominal border. Thoracic radiography showed some changes in the bronchial tree.

Key words: equine, recurrent airway obstruction, heaves, clinic, ultrasound, radiology

INTRODUCTION

Recurrent Airway Obstruction is a very common naturally occurring disease of the low respiratory tract in horses. The pathology is recognized more often in older competitive and working individuals and is characterized by periods of reversible obstruction of bronchi caused by smooth muscle contraction and accumulation of mucus and neutrophils. The condition was previously named *Chronic Obstructive Pulmonary Disease (COPD)*, *Chronic Pulmonary Disease*, *Lung Emphysema*, *Broken Wind*, *Hay Sickness* and *Heaves*. The term Recurrent Airway Obstruction (RAO) was introduced after the International Workshop of Equine Chronic Airway Disease in 2000. COPD in humans shows different pathophysiologic and morphologic aspects to RAO in equines (1).

The ailment occurs mostly when horses are kept in stables on dusty bedding materials and fed with poorly cured hay or straw (2). The dust in stables contains more than 50 species of molds, a lot of forage mites and a variety of allergens

which might induce an allergic obstruction of low airways in the lung of a susceptible horse. According to some authors (3) the most common isolated molds are *Aspergillus fumigatus* and *Micropolyspora faeni*.

In some cases heaves has been observed after the horses have been moved to a pasture and is named *summer pasture associated obstructive disease* (4).

The average age of affected horses is announced to be 12 years (5) while others (6) established an age of 7 years.

A genetic predisposition in developing of this condition has been found (7). Not all horses stabled and fed hay develop heaves. From another side RAO - prone horses need small amount of light dusty hay to trigger the onset of bronchospasm, mucus secretion and neutrophil influx.

Despite the clinical signs of the disease have been recognized more than 2000 years ago the exact mechanism of the pathology process is still an enigma (8).

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MATERIALS AND METHODS

Seven horses with signs of respiratory discomfort were included in the present study.

The average age of the patients was 11 years. The individual characteristics are enclosed in **Table 1**.

Table 1. Breed, gender, age, body weight and purpose of investigated horses;
*- severely affected

Number of horse	Breed	Gender	Age (yrs)	Body weight (kg)	Purpose
1	Arabian*	Gelding	12	430	endurance
2	Shagya Arabian*	Gelding	15	465	work
3	Pony*	Gelding	14	285	pleasure
4	Szech Warm blood	Mare	14	540	sport
5	Süddeutsche Kaltblüter	Stallion	8	750	work
6	Bulgarian draft horse* (BDH)	Gelding	9	680	work
7	Standardbred*	Stallion	7	490	sport

Clinical investigation of each horse consisted of measurement of body temperature, heart rate, respiratory frequency, presence of expiratory effort, coughing and nasal discharges. Percussion and auscultation of the chest were performed as well as the inspection of the body wall for the presence of “heaves line”. The caudal borders of the lung at the end of expiration were established by percussion and ultrasonography. The parenchyma of the lung was also checked by ultrasound (SonoScape S6V, micro convex transducer C 311, 2 MHz – 4 MHz frequency). Thoracic radiography was accomplished using digitalized roentgen equipment (H-Ray GIERTH HF 80 ML).

Blood for morphological assay, incl. erythrocytes, hemoglobin, hematocrit, platelets, neutrophils, lymphocytes, monocytes,

eosinophil, basophils, was taken from jugular vein and assessed with Hematology Analyzer Diatron Abacus (USA).

RESULTS

All horses included in this study showed a respiratory distress and increased breathing frequency (**Table 2**). The tachypnea was more obviously in the severely affected animals* who demonstrated accentuated expiratory suffocation, markedly flared nostrils and forced recruitment of abdominal muscles - “heaves line” (**Figure 1**). The head and the neck were extended. Chronic spontaneous coughing with scanty bilateral mucopurulent nasal discharge was noted in five of cases. One horse (BDH) exhibits lavish amount of purulent yellow-greenish nasal exudates.



Figure 1. “Heaves line” on abdominal wall in a pony, marked with black arrows.

The body temperature was within the limits of references (**Table 2**) excluding the BDH where a hyperthermia was present (38.7°C). All horses showed tachycardia and history of physical intolerance. Percussion of the chest revealed

expanding of the limits of the lung (caudal border) in all cases. Auscultation of the lung determined the presence of harsh crackles and wheezes in the whole area.

Table 2. Clinical parameters of horses (references[†])

Horse Parameter	Arabian*	Shagya Arabian*	Pony*	Czech Warm blood	Süddeutsche Kaltblüter	Bulgarian draft horse* (BDH)	Standardbred*
T°C (37.5-38)	37.6	37.8	38	37.7	37.6	38.7	37.6
Heart rate- min ⁻¹ (26-52)	68	64	71	57	59	68	60
Respiratory frequency- min ⁻¹ (8-16)	32	31	58	21	23	45	30

[†]accepted to the horse clinic

Ultrasound of the thorax proved the caudal dislocation of abdominal border of the lung established earlier by percussion. In 6 of cases abnormalities of lung parenchyma were not

shown. One horse (BDH) exhibited pathologic changes consisted by “comet tail”, roughness and hyper echogenicity of the pleura (**Figure 2**).



Figure 2. Firm pleura, marked by white arrow with roughness (double arrows) and “comet tail” (black arrow) into the lung parenchyma of Bulgarian draft horse. The image was obtained from right 5th intercostal space, on the level of shoulder and a 16 cm displayed in depth.

Thoracic radiography established an increase of the bronchial pattern (congestion) throughout the whole lung field (**Figure 3**).

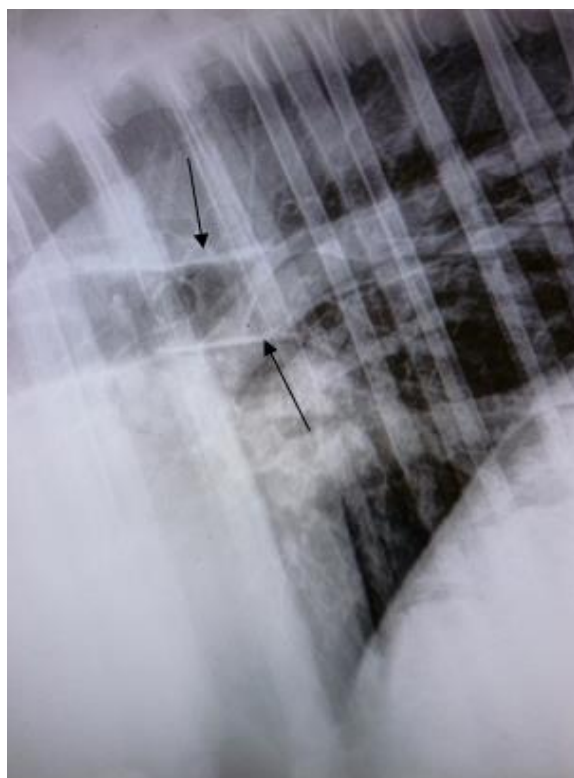


Figure 3. X-ray obtained from a horse with RAO revealed an increase of the bronchial pattern due to accumulation of mucus inside marked with thin arrows.

The results of the blood morphology are presented in **Table 3**. Leukocytosis and pronounced increase of segments and band neutrophils were discovered in the blood of the Bulgarian Draft Horse. This finding was also accompanied by a marked lymphopenia. No abnormalities in blood cells count and differential picture were detected in other patients.

DISCUSSION

The clinical signs displayed by the affected horses in this study are intrinsic for the Recurrent Airway Obstruction disease. The chronic coughing and emphasized expiratory effort accompanied with mucopurulent nasal discharge have been observed in “broken wind” horses (9, 2, 13). Flared nostrils and reduced exercise tolerance are common findings in severely affected cases where a marked respiratory distress is also presented (6). These signs are not observed in horses with inflammatory airway diseases (IAD) and could be used for differential diagnose (13). Hypertrophy of the external oblique abdominal and rectus abdominis muscles caused by continued recruitment provoke a formation of characteristic “heaves line” (2). The absence of deviations in body temperature is quite common in RAO and can be used to distinguishing from inflammatory airway diseases (13).

Table 3. Parameters of morphological investigation of the blood (references[‡])

Horse Parameter	Arabian*	Shagya Arabian*	Pony*	Czech Warm blood	Süddeutsche Kaltblüter	Bulgarian draft horse* (BDH)	Standardbred*
Erythrocytes T/l (6-12)	8.47	7.64	9.01	7.46	6.86	7.24	9.21
Hemoglobin g/l (100-180)	145	138	125	119	137	142	128
Hematocrit % (32-48)	36	32	38	33	35	39	35
Platelets 10 ⁵ /μl (1-6)	1.65	2.36	3.12	4.02	2.63	3.45	5.03
Leucocytes G/l (6-12)	7.56	8.03	8.65	9.02	7.52	14.89	8.46
Neutrophils band % (0-1)	1	1	0	1	1	6	1
Neutrophils segmented % (30-75)	54	48	61	54	62	79	41
Lymphocytes % (25-60)	38	38	29	34	23	3	48
Monocytes % (1-8)	3	4	2	5	3	7	3
Eosinophil % (1-10)	4	8	7	6	8	3	5
Basophiles % (0-3)	0	1	1	0	3	2	2

[‡] Duncan & Prasse (1986)

The revealed by ultrasound examination dislocation of the caudal lung border is typical for RAO horses and has been documented previously (11). The main reason for such finding is a complete overfill of alveoli with air and increase of the “dead” pulmonary space. The percussion is a useful and reliable method to discover this kind of pathology. In some cases the horses are accepted with RAO together with some concurrent lung ailment with relevant sonographic changes.

The radiological deviations as increased bronchial and interstitial patterns are a consequence of epithelial hyperplasia, goblet cell hyperplasia and inflammatory cell infiltration (12). Observed by us radiographic changes could play a supportive role in diagnostic of RAO together with history, clinic and ultrasound (13). The CBC in heaves horse in this study was within the limits of references and according to some authors (5) it has a limited benefit to the recognition of the pathology. The deviation in the number and the age of Neutrophils revealed in the blood of the Bulgarian draft horse is a consequence of a flowed concurrent ailment (bronchopneumonia). Similar changes in the blood of horses suffering from bacterial or fungal bronchopneumonia and pleuropneumonia have been documented previously (13).

REFERENCES

1. Robinson, N. International workshop on equine chronic airway disease. *Equine Vet J*, 33:5-19, 2001.
2. Ainsworth, D. & R. Hackett, Disorders of the respiratory system. In: *Equine Internal Medicine*, Reed S. et al., 2 ed., Saunders, 333-336, 2004.
3. McPherson, E. & J. Thompson, Chronic obstructive pulmonary disease in the horse.

1. Nature of the disease. *Equine Vet J*, 15:203, 1983.
4. Seahorn, Th. & R. Beadle, Summer Pasture-Associated Obstructive Pulmonary Disease Can Be Managed. *Equine Vet Res Program Newsletter*, Vol 7, 1, 1999.
5. Aviza, G., D. Ainsworth, S. Eicker et al., Outcome of horses diagnosed with and treated for heaves (recurrent airway obstruction). *Equine Vet Educ*, 13: 243, 2001.
6. Camargo, F., B. Coleman et al., Heaves in horses. *www.ca.uky.edu, ASC-172*, 2011.
7. Marti, E., H. Gernber et al., The genetic basis of equine allergic diseases. I. Chronic hypersensitivity bronchitis. *Equine Vet J*, 23:457, 1991.
8. Moran, G. & H. Folch, Recurrent airway obstruction in horses – an allergic inflammation: a review. *Veterinarni Medicina*, 56, (1): 1–13, 2011.
9. Le'guillette, R., Recurrent airway obstruction - heaves. *Vet Clin Equine*, 19, 63–86, 2003.
10. Duncan, J. & K. Prasse, *Veterinary Laboratory Medicine*, 2, Iowa State University Press, 1986.
11. Bakos, Z., K. Vörös et al., Comparison of the caudal lung borders determined by percussion and ultrasonography in horses with recurrent airway obstruction. *Acta Vet Hung.*, 51(3), 249-258, 2003.
12. Kaup, F., W. Drommer, E. Deegen, Ultrastructural findings in horses with chronic obstructive pulmonary disease (COPD). I: Alterations of the larger conducting airways. *Equine Vet J*. Sep; 22(5):343–348, 1990.
13. Laurent, C., H. Andrew et al., Inflammatory Airway Disease of Horses. *J Vet Intern Med*, 21:356–361, 2007.