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RECURRENT LARINGEAL NEUROPATHY IN HORSES – CLINICAL FEATURES AND DIAGNOSTIC APPROACH

Sasho Sabev, Mariyana Nikolova

Trakia Universiy, Faculty of Veterinary Medicine, Stara Zagora Bulgaria
E-mail: s_sab@gbg.bg

ABSTRACT

The present study included 18 horses with respiratory problems expressed in breathless and stridors (wheezing, snoring). Endoscopy of the upper respiratory tract confirmed a left sided laryngeal neuropathy as follow: twelve horses II Grade, four horses III Grade, two horses complete paralysis (IV Grade). Ten horses were diagnosed with the following concomitant abnormalities: dorsal displacement of the soft palate (three horses), entrapment of the epiglottis (two horses), rostral dislocation of the palatopharyngeal arch (two horses), and the presence of blood in the trachea (three horses). The clinical parameters: internal body temperature, heart and respiratory rate, color of visible mucous membranes, capillary time were within normal limits. The blood parameters (erythrocytes, hemoglobin, hematocrit, platelets, leukocytes, DBC, erythrocyte indices, total protein, albumin, total and direct bilirubin, creatinine, urea, GGT, Alkaline Phosphatase) showed no deviations from physiological range.

Key words: horse, laryngeal hemiplegia, endoscopy.

Introduction

Recurrent laringeal neuropathy (laryngeal hemiplegia) is a common and a long time is considered as the most important equine upper airway disease of horses (Pothiappan et al., 2011; Parente, 2018). It usually affects the left side of the larynx and occurs most commonly in larger–breed horses (>160 cm in height) (Cahill and Goulden, 1987). The pathology is described as a failure of abduction of structuraly normal arytenoid cartilage because of decreased or completely absent motility of the main abductor of the cartilage *m. cricoarytenoideus dorsalis*. In most of the cases no cause for this condition is found, thus it has been termed idiopathic laryngeal hemiplegia (ILH). Different theories explain the neuropathy as result of mechanical compression or strech of the left recurrent laryngeal nerve, bacterial or viral infection, vitamin deficiencies (Cahill and Goulden, 1987), perineural injections, neoplasia, trauma of the head (Martin-Giménez T. et al., 2019), neck and paralaryngeal abscessation (Rose et al., 1981; Hillidge, 1986). An assumption for genetic predisposition has been proposed by the same authors. The most significant clinical signs are expressed in exercise intolerance and inspiratory noise with different amplitude and sound like roar and whistle (Dixon et al., 2002). Currently, endoscopy at rest or during exercise is accepted as the gold standard for evaluating laryngeal dysfunction in a horse. This article focuses on the clinical manifestations of laryngeal paralysis, paraclinical changes in the blood, and the applicability of endoscopy at rest for diagnosis.

Materials and methods

This study was conducted within three years and is expressed in endoscopic examination of the nasal cavity, larynx and trachea of 18 horses with clinical manifestation of respiratory problems, incl. shortness of breath during exercise, wheezing and poor physical tolerance. The gender distribution was as follows: six mares, eight stallions (incl. one foal) and four geldings. The horses were

representatives of the following breeds: Pure Arabian (3), Thoroughbred (3), Trotter (7), Warmblood (2) and Draft horse (3). The age of patients varied from 6 months to 14 years. Clinical investigation included determining the body temperature, the color of the conjunctiva, heart rate, capillary refill time and respiratory activity. The hematological examination was performed with venous blood taken from a *jugular vein*. The anticoagulants used for morphological and chemical testing were Ethylenediaminetetraacetic acid (EDTA) and heparin, respectively. The tested morphological parameters were red blood cells (Er), erythrocyte indices (MCV, MCH, MCHC), hemoglobin (Hb), hematocrit (Hct), platelets (Plt), white blood cells (Leu) and differential blood count (DBC). The studied chemical blood parameters included total protein (TP), albumin (Alb), total (TB) and direct bilirubin (DB), creatinine (Cre), urea (Ur), Gamma Glutamyl Transferase and Alkaline Phosphatase. Evaluation of laryngeal hemiplegia was carried out using a 4 grading system, intended for unsedated horses examined at rest and proposed by Hackett et al. (1991) and Ducharme (2003): I Grade – Synchronous and full abduction of the arytenoid cartilages; II Grade – Asynchronous movement (hesitation, flutter, abduction weakness, etc.) of the left arytenoid cartilage during any phase of respiration. Full abduction of the left arytenoid cartilages (when referenced to the right) was provoked by swallowing, nasal occlusion or the use of respiratory stimulants; III Grade – Asynchronous movement (hesitation, flutter, abduction weakness, etc.) of the left arytenoid cartilage during any phase of respiration. Full abduction of the left arytenoid cartilages (when referenced to the right) cannot be induced either by swallowing, nasal occlusion or the use of respiratory stimulants; IV Grade – Midline or paramedian position of the left arytenoid cartilage and no substantial movement of the left arytenoid cartilage can be induced by swallowing, nasal occlusion or the use of respiratory stimulants.

Endoscopy of the larynx (Video Endoscope EICKVIEW 150, Germany) was conducted after a sedation with Xylazine (Bioveta, Czech) in dose of 0.3–0.5 mg/kg, i.v. Stimulation of cartilage abduction was achieved by a slap test in the saddle area and a provocation of swallow by touching the tip of the epiglottis.

Results and Discussion

Clinical examination of the horses from this study showed no abnormal deviation in physiological parameters (Table 1). The blood parameters, presented in Table 2 and Table 3 were within the reference range.

Table 1: Clinical parameters in horses with RLN.

Parameter	Body temp°C	Heart rate/min	Respir./min	Color of mucosa	Capillary time /s
MV±SD	37.7±0.3	44.6±2.4	14±4	pale/pinky	< 2

Table 2: Blood morphology in horses with RLN.

Parameter	Er T/l	Hb g/l	Hct %	Plt G/l	Leu G/l	MCV fl	MCHpg	MCHC g/l
MV±SD	7.8±1.6	125±21	37.5±2.2	142±32	8.4±	46.5±3.1	14.5±2.1	326±13
DBC %	Neu	Lym	Mon	Eos	Bas			
MV±SD	55±8	39±12	3.4±0.8	1.1±0.5	0.6±0.04			

Neu-neutrophils, Lym-lymphocytes, Mon-monocytes, Eos-eosinophils, Bas-basophils

Table 3: Blood biochemistry in horses with RLN.

Parameter	TP g/l	Alb g/l	TB µmol/l	DB µmol/l	Cre µmol/l	Ur mmol/l	GGT UI	AP UI
MV±SD	68±6	33±3	37±6	13±2	98±12	5.5±2.1	14±3	185±33

All of horses in this survey were diagnosed with a left sided laryngeal neuropathy. In eight of the patients, it was the only pathology. Ten horses showed a concomitant respiratory abnormality. In three horses was fond a presence of blood in the trachea, suggestive of Exercise Induced Pulmonary Hemorrhage (EIPH). Three horses were diagnosed with a dynamic dorsal displacement of the soft palate (DDSP) (Fig. 2). Two horses demonstrated a transient entrapment of the epiglottis and in two cases a rostral displacement of the palatopharyngeal arch (RDPA) was diagnosed (Fig. 3). At this stage, we cannot confirm or reject the relationship between the above–mentioned pathologies and laryngeal neuropathy. An II Grade of paresis was documented in 12 horses, and in 4 horses, there was an III Grade of paresis. Endoscopic examination showed complete paralysis (IV Grade) of the left laryngeal cartilage in two horses (Fig. 1). Endoscopic examination revealed that some levels of paresis (II and III Grade) are inconstant and changes over time. Such a finding is in line with research of Dixon et al. (2002). In our opinion, the use of a low–grade sedation results in a change in the motor activity of the arytenoid cartilages and thus influences the real assessment of their mobility. Valdes-Valquez et al. (1993) also expressed such a conclusion. Unfortunately, the risk of injury to staff and horses, as well as possible technical damage to the equipment, limits the examination of non–sedated animals. This study is indicative that other upper airway abnormalities often accompanied laryngeal neuropathy. In our opinion, they undoubtedly contribute to a more negative effect on physical capabilities. We find the use of the 4-Grading system justified in practice because of the easy distinction between different grades of laryngeal paresis/paralysis, which correlates with the claim of others (Archer et al. 1991; Ducharme et al. 1991). The absence of significant variations in the clinical parameters of horses at rest limits the specificity of the general clinical examination with respect to the diagnosis of laryngeal hemiplegia. In our opinion, hematological tests are not appropriate for diagnostic purposes, but the combination with other clinical parameters is useful to differentiate laryngeal neuropathy from other inflammatory processes in the respiratory system.

Figure 1: Laryngeal hemiplegia IV Grade.

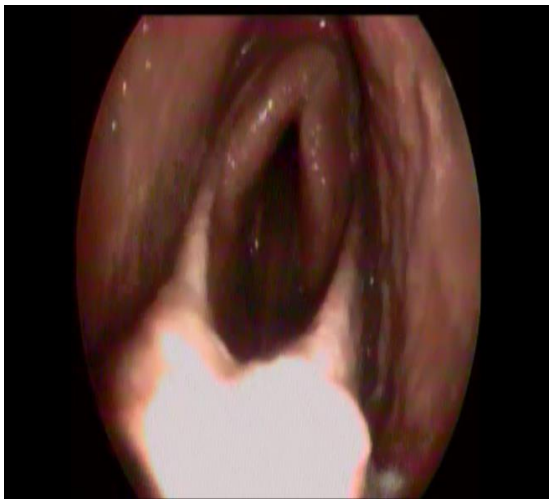

Figure 2: Laryngeal hemiplegia III Grade with DDSP.

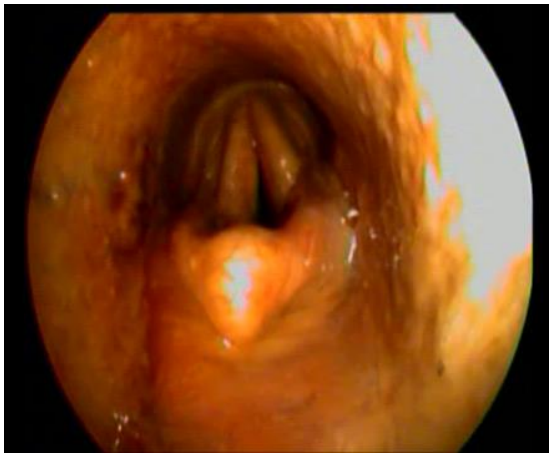

Figure 3: Laryngeal hemiplegia II Grade with rostral displacement of palatopharingeal arch.

Conclusion

Clinical parameters and blood tests are of little diagnostic value for laryngeal neuropathy. The presence of abnormal breath sounds, wheezing and breathlessness caused by exercise in horses should guide the clinician to pathologies in the upper respiratory tract. The results of our study, although with a small number of horses, confirm the exceptional suitability of laryngoscopy even at rest as the only method for a definitive diagnosis of recurrent laryngeal neuropathy. We recommend that this method be used routinely in clinical practice.

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