6th Proceedings of the Seminar on Veterinary Sciences, 11 – 14 January 2011: 91-98

Prevalence of Noninfectious Respiratory Disease in Thoroughbred Racehorses

Siti Zurida Jusoh, [1]Bashir Ahmad, [2]Mohamed Ariff Omar & [3]Alistair Ivon King Murdoch

[1]Department of Veterinary Clinical Studies
[2]Department of Veterinary Preclinical Sciences
Faculty of Veterinary Medicine, Universiti Putra Malaysia
[3]Perak Turf Club Equine Hospital, Ipoh, Perak

Abstract

The objective of the study was to identify the most common noninfectious respiratory disease in Thoroughbred racehorses and to determine effect on their performance. One hundred and thirty randomly selected records of Thoroughbred racehorses at the Perak Turf Club, Ipoh, Perak, Malaysia diagnosed with noninfectious respiratory disease and with complaints of poor athletic performance accompanied by coughing, exercise intolerance and abnormal respiratory noises were obtained. Among the data recorded and analysed were surgery and racing performance records, which were used to determine the most prevalent noninfectious respiratory disease in the Thoroughbred racehorses. The result showed that the most common noninfectious respiratory disease in Thoroughbred racehorses is exercise-induced pulmonary haemorrhage (EIPH) (49.2%), recurrent laryngeal neuropathy (28.2%), respiratory allergy (10%), epiglottic entrapment (EE) (7.7%), displacement of the soft palate (DDSP) (3.8%) and subepiglottic cysts (0.8%). The study also showed that surgical correction for recurrent laryngeal neuropathy (RLN) (Grade IV and Grade V), epiglottic entrapment, dorsal displacement of soft palate (Persistent) and subepiglottic cysts (SEC)gave good resolution and good prognosis for recovery. Thus surgical treatments of Thoroughbred racehorses with noninfectious respiratory disease can improve their athletic performance.

Keyword: Exercise Induced Pulmonary Haemorrhage (EIPH), Recurrent Laryngeal Neuropathy (RLN), Respiratory Allergy, Epiglottic Entrapment (EE), Dorsal Displacement of the Soft Palate (DDSP) and Subepiglottic Cysts (SEC), upper respiratory disease, surgical treatment and racing performance

Introduction

Respiratory diseases are common in racehorses in training and an important cause of economic loss in the racehorse industry. Respiratory diseases can be categorised into infectious respiratory disease and noninfectious respiratory disease, both of which cause poor performance and this is a serious economic concern to the horse-racing industry worldwide (Rossdale *et al*., 1985). Noninfectious respiratory diseases that usually occur in racehorses in Malaysia are exercise-induced pulmonary haemorrhage (EIPH), recurrent laryngeal neuropathy, respiratory allergy due to environmental factors, epiglottic entrapment (EE), persistent dorsal displacement of the soft palate (DDSP), arytenoid chondritis (AC) and subepiglottic cysts (SEC). Respiratory problems are generally diagnosed by endoscopy, which involves the use of a flexible fiber optic or video endoscope to visualize the pharynx, larynx, trachea and bronchiols. Diagnosis of respiratory disease may be difficult without help of standard flexible endoscope because these diseases have similarities in clinical signs such as coughing, nasal discharge, fever, anorexia, depression, inspiratory and or expiratory noises and poor performance. Thus this study was conducted to determine the common noninfectious respiratory diseases in Thoroughbred racehorses and to evaluate their performance after treatment.

Materials and Methods

Selections of horses and location

The study involved 130 randomly selected records of Thoroughbred race horses diagnosed with noninfectious respiratory disease. These horses were recorded with a complaint of poor athletic performance accompanied by coughing, exercise intolerance and abnormal respiratory noises. Endoscopic examination was used for diagnosis and to view and determine the abnormalities of the upper respiratory tract.

Record keeping

Individual records of each racehorse with information on identification, signalment, clinical signs, diagnosis of noninfectious respiratory disease, treatment and vaccination status were retrieved. Racing performance records after treatment for each selected horse were accessed for reference from the Singapore Turf Club website.

Data Collection

Data was collected from individual records of horses presented with history of poor performance and diagnosed with noninfectious respiratory disease. Racing performance data was evaluated and categorised in separate evaluation forms. The

data was analysed to determine the prevalence of each noninfectious respiratory disease in Thoroughbred racehorses and to identify the most common noninfectious respiratory disease in this population. This study also assessed the prognosis of the disease condition, performance of horses with respiratory diseases before and after treatment and corrective surgery.

Grading

Exercise-induced pulmonary hemorrhage

Grading of exercise-induced pulmonary haemorrhage (EIPH) was made through, tracheobronchoscopic examination of horses 30 to 120 min after racing or strenuous exercise. Tracheobronchoscopic assessment of severity of EIPH using a 0-4 grading scale was according to the method previously described (Hinchcliff *et al*., 2004) as follows: Grade 0 - no blood detected in pharynx, larynx, trachea or main-stem bronchi; Grade 1 - presence of stream of blood in the trachea or main-stem bronchi visible from the tracheal bifurcation. The presence of blood at less than one quarter the length of the trachea (<10% of the trachea surface area); Grade 2 - a long stream of blood (more than half the length of the trachea) or greater than 2 short streams occupying less than one-third of the tracheal circumference; Grade 3 - presence of multiple, distinct streams of blood covering more than one-third of the tracheal circumference without blood pooling at the thoracic inlet; Grade 4 - multiple, coalescing streams of blood covering more than 90% of the trachea surface with pooling of blood at the thoracic inlet.

Larygeal Function

The laryngeal function was determined on standing and unsedated horses. The grading system for laryngeal is according to that described earlier (Lane, 1993). There are 5 Grades of recurrent laryngeal neuropathy (RLN) as follows; Grade 1 - normal synchronous movement and full abduction of left and right arytenoids cartilage; Grade 2 - asynchronous abduction of left and right sides, but full abduction achieved and maintained; Grade 3 - slight asymmetry at rest, although full abduction could be achieved by the left arytenoids but not maintained; Grade 4 - obvious asymmetry at rest, with some movement of left arytenoids cartilage and failure to achieve or maintain full abduction; Grade 5 - symmetry left arytenoids cartilage resting on or near midline and without movement of left arytenoids cartilage.

Results

The prevalence of noninfectious respiratory disease in Thoroughbred racehorses is shown in Table 1. Exercise-induced pulmonary haemorrhage has the highest prevalence, which is followed in order by RLN, RA, EE, DDSP and SEC

Table 1. Prevalence of noninfectious respiratory disease in Thoroughbred race horses

Disease	No. of Cases	Prevalence (%)
Exercise Induced Pulmonary Haemorrhage	64	49.2
Recurrent Laryngeal Neuropathy	37	28.5
Respiratory Allergy	13	10
Epiglottic Entrapment	10	7.7
Dorsal Displacement of Soft Palate	5	3.8
Subepiglottic Cyst	1	0.8
Total	130	100

Table 2. Frequency of respiratory disorders in racehorses

Horse	Frequency n (%)				
	EIPH	RLN	RA	EE	DDSP
Gelding	56 (87.5%)	28(96.6)	13(100)	10(100)	5(100)
Stallion	6 (9.4)	1(3.4)	0(0)	0(0)	0(0)
Mare	2 (3.2)	0(0)	0(0)	0(0)	0(0)
Total	64 (100)	29(100)	13(100)	10(100)	5(100)

The numbers are mean values
EIPH = exercise-induced pulmonary hemorrhage; RLN = recurrent laryngeal neuropathy;
RA = Respiratory allergy; EE = epiglottic entrapment; DDSP = dorsal displacement of soft palate

Table 3. Effect of treatment of noninfectious respiratory disease on performance of Thoroughbred racehorses

Disease	Number of cases	Improved Performance		Reduced Performance	
		n	%	n	%
EIPH	64	41	64	23	36
RLN	37	36	97.3	1	27
RA	13	10	76.9	3	23.1
EE	10	8	80	2	20
DDSP	5	4	80	1	20
SEC	1	1	100	0	0

The numbers are mean values
EIPH = exercise-induced pulmonary hemorrhage; RLN = recurrent laryngeal neuropathy; RA = Respiratory allergy; EE = epiglottic entrapment; DDSP = dorsal displacement of soft palate;SEC = subepiglottic cyst

The prevalence of EIPH is highest in gelding followed in order by the stallion and mare (Table 2). The severity of EIPH is shown by 64.1% cases with Grades 1, 2 and 3 and 35.9% with grade 4. For RLN, the highest frequency of EIPH was in geldings followed by the stallions. From the analysis, all the recorded data for RLN were either grade 4 (69%) and grade 5 (31%), which requires surgical correction. There is no record for grades 1, 2 and 3 RLN and the performances of horses with these grades were not affected.

The study showed that RA, EE and DDSP were only observed in the geldings.

Horses with EIPH showed good performance after undergoing medical treatment (Table 3). Usually these horses were categorised as grades 1, 2 or 3 after a first episode of EIPH. After treatment and 3 month rest, 31.3% returned to original performance when raced. The severity of the condition worsened with in grade 3 and 4 after a second episode of EIPH. Only 4.7% of these horses had grave prognosis and died immediately upon completion of the race.

Most of the horses with RLN and that underwent corrective surgery returned to racing with good performance. This suggests that corrective surgery is effective in assisting the affected horse to return to the previous level of performance. However, a small percentage of these horses did not return to original performance level after treatment.

The majority of horses affected with respiratory allergy had good prognoses after undergoing medical treatment. The record showed about 23% of these horses produced reduced performance after treatment.

In most horses with DDSP and EE, surgical treatments had provided good prognoses for return to level of performance before they were affected by the diseases.

Discussion

This study was conducted to determine the most common noninfectious respiratory diseases and the prevalence of each noninfectious respiratory disease in racehorses.

The study suggests that EIPH is the most common noninfectious respiratory disease in racehorses and the frequency of the disorder increased with age. Grade 4 EIPH was the most frequent occurrence. Among 64 horses with EIPH, three died on track after finishing the race.

Treatment and management of horses with EIPH at the first bleeding episode is by resting the horse for 3 months. With second bleeding episode the horse should be rested for 6 months and barred from racing if bleeding occur a third time. The management for EIPH patients include avoiding fast work or racing during bad haze, avoiding racing on hard tracks, placing feed and water at ground level for good lung drainage, dampening dusty feed and bedding, fresh air, providing good ventilation in the stable or open stable with fresh air, antibiotics to prevent secondary bacterial infection, nebulisation therapy, bronchodilators to improve lung airflow, antioxidant, omega 3 and corticosteroids to control the inflammation. Repair of lung tissue may be assisted with glucosamine and anabolic steroids and a reduction in blood pressure with diuretics such as furosemide. The prognosis for EIPH is guarded because of the progressive nature of the disease. Since the etiological factor is unknown, it is very difficult to prevent EIPH in racehorses.

Recurrent laryngeal Neuropathy is the second most common noninfectious respiratory disease in the racehorses at the Perak Turf Club. The condition is associated with abnormal stridor, abnormal vocalization, exercise intolerance and poor athletic performance. It has a high frequency of occurrence among geldings. This disease can be diagnosed by endoscopic examination of the larynx at rest, immediately after cessation of exercise. According to the records, corrective surgeries such as ventriculocordectomy, laryngoplasty and laryngeal prothesis are the current standard surgical treatments. Older horses tolerate and respond better to surgery than young horses (Holcome, 2001). Since the etiological agent is idiopathic, it is hard to prevent this disease. The most commonly used surgical technique to treat RLN is a laryngeal prosthesis. The procedure, significantly improves upper airway flow mechanics in RLN-affected horses and many horses have raced successfully after surgery (Parente, 2004). Most of the horse showed improved performance after corrective treatment.

In Thoroughbred racehorses, the prevalence of RA was low. Specific causes of respiratory allergy is poorly defined, but environmental factors to include a variety

of etiological agents such as dust, noxious gases (ammonia), microorganisms, mite debris, aerosolised allergens and endotoxin from hay and bedding had been implicated. Respiratory allergy usually affects horses above 7-years old, but with no apparent breed or sex predilection. In this study the horses affected by RA were adults and geldings. Systemic corticosteroids are effective for treatment of RA (Couëtil *et al*, 2007). Other drugs may be prescribed such as bronchodilators, mucolytics and antihistamines. Improvement of mucociliary clearance may also help reduce airway obstruction. Prevention strategies such as reduced environmental irritant to airways and improve ventilation in the stable to increase removal of airborne particles and noxious gases is beneficial.

The best method to diagnose DDSP is after strenuous exercise or while the horse is exercising on a treadmill. Only a small percentage of the affected horses in this study showed DDSP. Surgical correction such as staphylectomy may produce good prognosis. The prognoses after surgical correction by sternothyrohyoid myectomy is moderate and the horses may return to racing with good performance (Hinchcliff, 2004). Other treatments that may be instituted include systemic and topical anti-inflammatory medication with glycerin, DMSO and nitrofurazone (Auer and Stick, 2006). The horse need to be stable-rested for 4 weeks after surgical treatment and medical treatment with antibiotic and analgesic.

Epiglottic entrapment seemed to occur in geldings only and that too at low prevalence. The clinical signs that are usually observed in EE are abnormal respiratory noise during exercise. However coughing or dysphagia is rare. Diagnostic confirmation for EE is best made by endoscopic examination. There are several surgical approaches for the treatment of EE to include laryngotomy, transoral or transnasal axial division with hooked bistoury and transendoscopic division with a laser. The prognosis after surgery is usually good.

From the study, SEC is a rare occurrence in Thoroughbred race horses. In fact SEC among noninfectious respiratory diseases is among the lowest in prevalence. The etiological agent for SEC is unknown. Subepiglottic cysts can be treated by surgical removal of the cysts through a laryngotomy incision with the horse in dorsal recumbency under general anesthesia. The prognosis for return to function and resolution of coughing after surgical treatment is good to excellent (Holcome, 2001).

Conclusion

It can be concluded that the most common noninfectious respiratory disease in Thoroughbred racehorses is EIPH followed in order by RLN, RA, EE DDSP and SEC. The noninfectious respiratory diseases commonly associated with anatomical and physiological abnormalities. Besides history, clinical signs and physical examination, endoscopic examination is the best method to visualize

the morphology and to diagnose noninfectious respiratory diseases. Surgical treatments seem to be effective for the disease and the horses may return to racing with good or improved performance.

References

Auer, J.A. and Stick J.A. (2006). *Equine Surgery.* 3. St. Louis: Saunders Elsevier, Pp. 544–550.

Couëtil, L.L., Hoffman, A.M., Hodgson, J., Buechner-Maxwell, V., Viel, L., Wood, J. L.N. and Lavoie J-P. (2007), Inflammatory airway disease of horses. *J Vet Intern Med* **21**:356-361.

Hinchcliff K.G. (2004), Equine Sports Medicine and Surgery: Basic and clinical Sciences of the Equine Athlete. 1st Ed.Saunders Elsevier Publishing Company, Philadelphia. Pp 569-587 and Pp 614-615

Holcombe, S.J., Jackson, C., Gerber, V., Jefcoat, A., Berney, C., Eberhardt, S., Robinson, N.E. (2001). Stabling is associated with airway inflammation in young Arabian horses. *Equine Vet J* **33(3):**244-249.

Lane, J.G (1993). Grading system in racehorses, In: *Proceeding of the 15th Bain Fallon Lectures, Australian Veterinary Association*. Pp 173.

Parente, E.J. (2004) Improvements in laryngoplasty.*Havemeyer Foundation Monograph Series No 11,*Eds: P. Dixon, E. Robinson and J.F.Wade, R&W Publications (Newmarket) Ltd, Pp 66-67.

Rossdale, P.D., Hopes, R., Digby, N.J., Offord, K. (1985). Epidemiological study of wastage among racehorses 1982 and 1983. *Vet Rec* **116(3)**: 66-69.