

## **Cardiopulmonary problems in the Older Horse**

Mary Rose Paradis, DVM, MS Diplomate ACVIM (LAIM)  
Cummings School of Veterinary Medicine at Tufts University  
North Grafton, MA 01536

### **Cardiovascular disease**

Most cardiovascular diseases don't have age as a specific risk factor. However, degenerative valve disease does occur more frequently in the geriatric patient. The most common valve affected is the aortic valve followed in frequency by the mitral valve. If the regurgitation from a valve lesion is severe then congestive heart failure can follow.

**Cardiovascular examination** -When auscultating the horse's heart it is important to remember that the heart is more vertical in the chest than other species. The mitral valve can be heard on the left side at the level of the elbow. As you slide your stethoscope dorsally and cranially under the triceps muscle you will hear the aortic region. The pulmonic valve can be auscultated slightly more cranial and ventral to the aortic valve. The tricuspid valve is located on the right side of the chest approximately a hand's breathe above the elbow. The heart sounds in this region are soft and sometimes difficult to hear in a heavy horse.

When listening to the murmur you should try to characterize it in terms of intensity – grading on a 1-6 level. If you have difficulty deciding if the murmur is systolic or diastolic then you can palpate the facial artery at the same time that you listen to the heart. If you feel the pulse at the same time that you hear the murmur then the murmur is systolic. If you feel the pulse after you hear the murmur then it is diastolic.

**Aortic insufficiency/regurgitation** -Aortic insufficiency or regurgitation is the most common acquired valve lesion that increases with age. Incidence in a mixed population of horses in work is reported to be 2.2%. Reef reported on 23 cases of aortic insufficiency with a mean age of 12.5 years. Clinically, a holodiastolic decrescendo murmur is auscultated with the maximal intensity over the aortic valve. The murmur is often musical in nature and often described as a “cooing dove” sound. These murmurs can be characterized by a grade I to VI level of intensity.

Holodiastolic murmurs in the horse should be considered aortic insufficiency until proven otherwise. The intensity of an aortic regurgitant murmur is not a good guide to severity of the condition. Bounding arterial pulses are better correlated with increased left ventricular volume load and marked AI. Ventricular premature contractions have been associated with aortic insufficiency. Degenerative lesions on the aortic valve appear as thickening of the valve leaflets – may form nodules. Lesions also have histiocytic, lymphocytic and fibroblast infiltration of superficial layers of endocardium

This diagnosis can be made on as an incidental finding on physical examination or can be associated with decreased performance and congestive heart failure. Echocardiography is the most accurate diagnostic tool for determining whether the affected horse will be able to continue work or not. Enlargement of the left ventricle can be seen in moderate to severe aortic regurgitation. An end diastolic left ventricular diameter of > 12.5 cm is suggestive of left ventricular dilatation. The use of Doppler echocardiography is helpful in determining the size of the regurgitant jet as it comes through the aortic valve and travels across the ventricle. A regurgitant jet that flows 2/3's of the distance beyond the septal leaflet is considered severe.

In older horses with aortic regurgitation, progression is slow and has a favorable prognosis for life and performance. Regurgitant jets that extend 2/3's into left ventricular outflow tract beyond the septal leaflet of the mitral valve are considered severe. Horses with severe aortic regurgitation with ventricular enlargement may respond to treatment with enalapril, an ACE inhibitor. Periodic re-evaluation of cardiac function is recommended to determine progression.

*Guidelines for prognosis of aortic insufficiency*

<b>Good Prognosis</b>	<b>Guarded Prognosis</b>
Normal pulse quality	Bounding pulses
Valvular prolapse or mild nodular changes on valve	Diastolic pressures < 60 and elevated systolic pressures
Little ventricular dilation	Severe thickening of valves
No to moderate increase in fractional shortening	Severe left ventricular shortening
Low velocity regurgitant jet on echo	Decreased fractional shortening
	Large, high velocity jet on echo

**Mitral valve regurgitation** – Mitral regurgitation is usually a holosystolic murmur with a point of maximal intensity over the left AV valve or it may radiate dorsally toward the aortic valve. It may vary in intensity from Grade I – VI. This murmur may be clinically insignificant at time of auscultation and may remain so but it is the most likely to progress to clinical signs. Early clinical signs may be subtle and may resemble recurrent airway obstruction or small airway inflammatory disease which is also common in older horses. These signs include exercise intolerance, coughing, and increased respiratory rate. In severe mitral regurgitation, signs progress to left sided congestive heart failure.

Echocardiography with Doppler can be used to determine the size of the regurgitant jet and chamber size. Both the left atria and ventricle become enlarged in moderately to severely affected animals. Changes on the leaflet can also be seen. Prognosis is determined by the severity of the regurgitation. If chamber sizes are not enlarged and the jet is mild then the problem is likely to be slow in progression.

## **Respiratory Disease of the older horse**

Very little has been done in the area of pulmonary function testing in the normal older horse. In human geriatrics, the effect of aging on the normal lung has found that elastic recoil is reduced, vital capacity and maximal expiratory flow rates fall and  $\text{PaO}_2$  decreases probably due to VQ mismatching.

One study in equine geriatrics did look at the comparison of arterial blood gases and acid-base balance in horses that were > 20 years of age with that of horses between 3 and 8 years of age. It revealed that the older horses had significantly lower  $\text{PaO}_2$  and  $\text{PaCO}_2$  values and significantly higher alveolar-to-arterial partial pressure of oxygen ( $\text{P(A-a)O}_2$ ) and arterial blood pH. It was hypothesized that the old horses had an impaired transfer of oxygen from alveoli to blood in capillaries and that increases in ventilation rate compensated for this ventilation-perfusion mismatch. Hyperventilation, however, results in a lower  $\text{PaCO}_2$  level and a respiratory alkalosis. It is possible that geriatric horses are predisposed to the development of respiratory tract disease because of an age-related change in pulmonary function

Respiratory tract disease was the third most common body system affected among the geriatric horses in our hospital study. Although recurrent airway obstruction (RAO) or heaves is not restricted to old horses, age has also been determined to be a risk factor for RAO. It was the most common specific respiratory tract disease diagnosed in our study population. In the survey study 19% of the older horses that were receiving medication were receiving drugs that were compatible with the treatment of heaves. RAO is an inflammatory airway disease similar to asthma in humans. Inflammation of the airway plus bronchoconstriction leads to severe obstruction.

Clinical signs of RAO include increased respiratory rate and effort, cough, the development of hypertrophied muscle along the ventral rib cage, exercise intolerance and increase crackles and wheezes on auscultation of the lung fields.

Treatment of RAO is aimed at decreasing inflammation and bronchoconstriction. Environmental reduction of allergens is a main objective in the treatment of this disease. 24 hour turn out and elimination of hay from diet, improve ventilation and decrease dust in the environment are important elements of the treatment. For a more rapid reduction in lung inflammation, oral or inhaled steroids are the primary anti-inflammatory drug of choice. Dexamethasone and prednisolone are the system drugs of choice and beclomethasone is the most common inhaled steroid.

Bronchodilation can be achieved with several different drugs including the following: Albuterol – inhaled, Ipratropium – inhaled, Clenbuterol – oral, and Aminophylline – oral. Albuterol is probably the most affective.

## References

Marcus LC, Ross JN Jr: Microscopic lesions in the hearts of aged horses and mules. *Path vet* 4:162-185, 1967.

Marr CM, Elliott J: Geriatric cardiac disease. *In* Proceedings, 18th ACVIM, Seattle, 2000.

Sage AM: Cardiac Disease in the geriatric horse. *Vet Clinics Equine*, 18(3):575-589, 2002.

Aguilera-Tejero E, Estepa JC, Lopez R, et al: Arterial blood gases and acid-base balance in healthy young and aged horses. *Eq Vet J* 30(4):352-354, 1998.

McKeever KH, Malinowski K: Exercise capacity in young and old mares. *Am J Vet Res* 58:1468-1472, 1997

Reef VB, Spencer P: Echocardiographic evaluation of equine aortic insufficiency. *Am J Vet Res* 48(6):904-909, 1987.

Brosnahan MM, Paradis MR: Demographics and clinical characteristics of geriatric horses: 467 case (1989-1999). *JAVMA*, 223(1):93-98, 2003.

Brosnahan MM, Paradis MR: Assessment of clinical characteristics, management practices, and activities of geriatric horses. *JAVMA*, 223(1):99-103, 2003.