

# Large Animal VETERINARY Rounds®

SEPTEMBER 2007  
Volume 7, Issue 7

AS PRESENTED IN THE ROUNDS OF THE DEPARTMENT OF LARGE ANIMAL CLINICAL SCIENCES  
OF THE WESTERN COLLEGE OF VETERINARY MEDICINE, UNIVERSITY OF SASKATCHEWAN

## Diseases Affecting the Geriatric Horse

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Geriatric horses appear to present for veterinary care more frequently and veterinarians should be prepared to address the specific needs of these aged equine patients. This issue of *Large Animal Veterinary Rounds* addresses common medical diseases of geriatric horses and provides a brief review of pathogenesis, diagnosis, and treatment. The discussion focuses on gastrointestinal, respiratory, and endocrine diseases and, therefore, is not all-inclusive. Recently, several journal issues and books<sup>1,2</sup> have been dedicated to management and the medical problems of geriatric horses, and can serve as further references for those interested in more information. The reader is also referred to an earlier issue of this publication covering the general care and management of geriatric horses.

### Prevalence of disease in geriatric horses

Predisposition to certain conditions by age is frequently taken into account in equine practice and the age of the horse may also affect prognosis and/or treatment decisions. Several studies investigating the prevalence of disease in aged horses have come to somewhat conflicting conclusions that may be explained, in part, by differences in study populations and methods. Among aged horses referred to a veterinary teaching hospital,<sup>3</sup> the most commonly affected body systems were the gastrointestinal tract (with colic as the most common presenting complaint overall), musculoskeletal system, respiratory tract, endocrine, and ocular systems. The most common specific diagnoses in this study were pituitary pars intermedia dysfunction (PPID, "equine Cushing's disease"), small intestinal strangulation obstruction by a lipoma, laminitis, recurrent airway obstruction ("heaves"), large colon impaction, and gastric ulceration. Conversely, a study of postmortem submissions revealed reproductive disease as the third most common condition after gastrointestinal and musculoskeletal diseases, possibly because of a population bias in a breeding-oriented area.<sup>4</sup> The most common reproductive disease of aged horses was uterine artery rupture in postpartum mares; this may be attributable to vascular changes and vessel wall degeneration.<sup>5,6</sup> Results from a survey among owners of aged horses revealed that old horses were more likely to have a history of colic, dental disease, tumours, lameness other than laminitis, and pituitary disease.<sup>7</sup> Historical reports of disease will obviously increase with patient age, as long as an adequate history can be obtained and the horse has not changed owners too frequently during its lifetime.

Neoplasia is commonly considered a disease of age and an increased incidence has been observed in geriatric horses.<sup>4</sup> The most common neoplasias reported are melanomas in gray horses, pituitary and thyroid adenomas, lipomas, and squamous cell carcinoma of the external genitalia in stallions and mares.<sup>8-10</sup> Sarcoids, on the other hand, are reported to decline in incidence for horses older than the age of 15.<sup>11</sup> An increased incidence of tumours in older horses, as in older individuals of other species including humans, is likely explained by cumulative exposure to carcinogens, increased likelihood of genetic alterations within cells, and diminished cellular DNA repair capacity.<sup>12</sup> Aside from pituitary enlargement, which is not considered a true neoplasia, tumours are not discussed in more detail in this article.

### Gastrointestinal diseases

Several studies have identified gastrointestinal disease as a common affliction of geriatric horses. Colic, in particular, can have catastrophic consequences and has been identified as the third most common known cause of death (including euthanasia) for horses in the United States.<sup>13</sup> Conflicting information exists concerning the prevalence of certain causes of colic in different age groups; however, several reports demonstrate an increased prevalence of strangulating lipomas,<sup>13,14</sup> impaction colics,<sup>15</sup> and small colon diseases<sup>16</sup> in aged horses. In a retrospective study of geriatric horses referred to previously,<sup>3</sup> large colon impactions represented the 5<sup>th</sup> most common specific diagnosis overall. A potential bias towards referral of certain conditions may need to be taken into account when evaluating these studies. Epiploic foramen entrapment has previously been attributed to atrophy of the right liver lobe in aging horses; however, the occurrence of liver atrophy



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The editorial content of *Large Animal Veterinary Rounds* is determined solely by the Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine



The Canadian Veterinary Medical Association recognizes the educational value of this publication and provides support to the WCVM for its distribution.

with age has been challenged and recent evidence does not support an increased prevalence of epiploic foramen entrapment in aged horses.<sup>17</sup> Gastric ulceration is frequently mentioned as a cause of colic and weight loss in aged horses and should be considered, although these patients do not fit the typical history of a “stressed” racehorse in training. Gastric ulceration in some geriatric horses has been attributed to long-term use of non-steroidal anti-inflammatory drugs in those with chronic joint disease.<sup>18</sup> Clinicians should consider the possibility of squamous cell carcinoma in an aged horse with clinical signs of gastric ulceration and should be prepared to take biopsy samples of atypical lesions.

Diagnostic work-up of geriatric horses with colic does not differ substantially from that in other horse age groups; however, the possibility of a decreased pain response with age must be taken into account. Increased production of endogenous opiates, decreased nerve conduction, and mental depression have all been suggested as explanations for decreased pain perception in geriatric human patients.<sup>19</sup> Despite the lack of information specific to horses, many veterinarians anecdotally report encountering very stoic old horses that appear to “tolerate” significantly more pain than their younger counterparts. Therefore, the absence of overt severe pain should be interpreted cautiously when deciding to delay surgical exploration in a colicky geriatric horse, especially when other parameters (eg, abdominal fluid cytology or rectal palpation) point towards a surgical lesion.

Changes in digestive and absorptive processes with age have not been elucidated sufficiently in horses; nevertheless, decreased water intake, dental disease, chronic parasitism,<sup>3</sup> and altered intestinal motility may contribute to the development of simple feed impactions in older horses. Large colon impactions are most common, but an increased frequency of cecal impaction in older horses has also been suggested.<sup>20,21</sup> Secondary impaction due to colon displacement or enteroliths, and sand accumulation leading to impaction must be considered as differential diagnoses for horses with feed impactions and may vary in frequency between different geographic areas. Treatment of feed impaction is usually by oral and/or intravenous fluid therapy, administration of fecal softeners, withholding of feed, and pain medication. Complete dental examination and correction of dental abnormalities are essential in any geriatric horse presenting for colic. Some clinicians prefer to delay dental correction until colic is resolved and horses are back on a full-feeding regimen; this may be especially advisable in thin horses. In these patients, dietary changes along with or prior to dental correction should also be considered.

Strangulation obstruction by pedunculated lipoma (Figure 1) is a well-recognized condition in older horses; a recent retrospective study reported an average age of 18.7 years for horses with this condition.<sup>22</sup> Strangulation obstruction most commonly affects the small intestine, leading to clinical signs consistent with small intestinal obstruction, but has also been reported in the small colon and rectum. Predisposition to the formation of pedunculated lipomas has been reported for geldings, ponies, Quarter horses, and Arabians.<sup>14,15,22,23</sup> Predisposition in ponies may be related to genetic differences in fat metabolism and management factors (eg, overfeeding).<sup>15</sup> Strangulation obstruction by a lipoma invariably requires surgical correction and, frequently, resection of the affected intestine. Prognosis is generally guarded and depends on the extent of intestinal involvement and the degree of gut compromise, as well as the systemic health of the horse, which is often related to duration of the obstruction prior

**Figure 1: Strangulating lipoma in an aged pony presented for acute colic (postmortem specimen).** Severe small intestinal distention and lack of motility were evident on ultrasonographic examination, and large volumes of serosanguineous peritoneal fluid were obtained during initial evaluation. Several additional lipomas, which had not led to strangulation, were also identified.



to correction. It is not uncommon to detect additional, non-strangulating lipomas in the mesentery of horses undergoing surgery and all but the smallest of these should be removed as a preemptive measure.<sup>15</sup> Outcome analysis in one recent retrospective study revealed a short-term survival rate ( $\geq 2$  weeks) of 80% and a long-term survival rate ( $\geq 1$  year) of 64% in horses recovering from anesthesia. Economic considerations and poor prognosis were cited as the most common reasons for horses not recovering from anesthesia.<sup>22</sup>

Patient age may be an important factor in the decision of an owner to proceed or decline surgical treatment for colic, although a consistent correlation between patient age and mortality due to colic surgery has not been demonstrated.<sup>24</sup> In one study,<sup>3</sup> aged horses undergoing abdominal surgery had a survival rate to discharge of approximately 50% and survival rates were the same among “old” ( $\geq 20$  years) and “very old” ( $\geq 30$  years) horses. Although over-interpretation of these data should be avoided and aged horses are often considered a poorer anesthetic risk, it may be concluded that aged horses with good general health should not be considered poor surgical candidates based on their age alone. Anecdotally, aged horses require more assistance in recovering from anesthesia and may be at an increased risk of catastrophic injury during recovery.<sup>25,26</sup> Old horses, especially those in poor body condition prior to surgery, may also be at increased risk of delayed recovery and may need more aggressive supportive care, including nutritional support. Care should also be taken to address any underlying diseases (eg, pituitary dysfunction) that may affect recovery from surgery and anesthesia.

## Respiratory diseases

### Recurrent airway obstruction

Recurrent airway obstruction (RAO, “heaves”) is the most common respiratory tract disease in aged horses<sup>27</sup> and a linear correlation between disease incidence and age has been reported.<sup>28</sup> Age predisposition to heaves may be related to cumulative lung damage and allergen exposure throughout life, and to changes in respiratory function with age. Changes in respiratory

function with age likely occur, given the reports of reduced arterial oxygen and carbon dioxide concentrations, and an increased alveolar-arterial oxygen gradient in older horses. It is currently unknown whether an avoidance of respiratory allergens in younger horses can prevent the development of clinical RAO (similar to reports in humans with asthma) or prolong the disease-free lifetime of a horse. A decreased response to drug therapy in older horses diagnosed with heaves has also been observed; this may be attributed to permanent pulmonary remodeling and an increased amount of lung fibrosis.<sup>27</sup> Thoracic radiography and pulmonary-function tests before and after the administration of a bronchodilator have been suggested to assess the chronicity and reversibility of disease; these examinations are attempts to improve the formulation of a prognosis for an individual horse.<sup>27</sup>

Diagnostic work-up of geriatric horses with suspected heaves follows general recommendations. The primary differential consideration is that of infectious lung disease (pneumonia or pleuropneumonia) and upper respiratory disease in horses presenting with coughing as the primary complaint. Physical examination commonly reveals coughing, increased accumulation of tracheal mucus ("tracheal rattle"), a prolonged expiratory phase and increased expiratory effort, and wheezing upon auscultation. Ancillary diagnostic tools include complete blood count to rule out infectious disease, endoscopy, transtracheal aspirate and/or bronchoalveolar lavage, and thoracic radiography. Pulmonary function testing and challenge tests (eg, histamine challenge) are becoming more popular, but are not available in all clinics. Serum biochemical and hormonal testing may be advisable in geriatric horses suspected of having additional problems (eg, pituitary dysfunction).<sup>27</sup>

Treatment of heaves is by elimination of causative allergens, and medical therapy with corticosteroids and bronchodilators as needed. Systemic as well as local inhalation therapies are available, and the advantages and disadvantages of these approaches have been discussed in detail.<sup>27</sup> Most horses affected by heaves will do better in an outdoor environment with low-dust concentrations and good ventilation, and pasture management should be considered whenever possible. Geriatric horses housed outdoors, especially in cold climates, need particular attention to shelter, feed, and water access; they must not be allowed to lose significant weight during the winter. Heated water sources, good quality roughage, and supplemental feeding, or feeding of complete feeds at adequate amounts can be helpful in maintaining these patients. Some owners may be reluctant to commit to life-long management changes and/or medical therapy in geriatric horses with heaves, or may fail to recognize the necessity of treatment in a moderately-affected horse that is no longer used for riding or other work. While these situations are difficult to address, owners should be advised of the effects of chronic disease on weight maintenance and other aspects of overall health, and may need to be counseled on the alternative of euthanasia in a severely-affected animal perceived to have reduced quality of life.

### **Sinusitis**

Sinusitis is frequently mentioned as a disease that occurs more commonly in aged horses, and may be related to dental disease and/or presence of pituitary dysfunction in these patients. The presence of sinusitis in an aged horse should prompt a thorough history taking and physical evaluation, a complete dental evaluation including radiographic assessment of tooth roots and,

possibly, ancillary testing in horses suspected of suffering from pituitary dysfunction. Treatment must address all potential underlying disorders to ensure the successful resolution of sinusitis.

### **Endocrine diseases**

PPID occurs with increasing prevalence in aged horses and appears to be a common disease in geriatric horses overall. In one referral population,<sup>3</sup> prevalence of pituitary disease increased from approximately 6% in "old" horses ( $\geq 20$  years) to almost 20% in "very old" ( $\geq 30$  years) horses, while a prevalence of  $< 1\%$  in the overall horse population has previously been described. One caveat in interpreting these data is that studies may vary in the use of diagnostic methods to establish a diagnosis of pituitary dysfunction. Interestingly, a survey of horse owners<sup>7</sup> revealed that while only 8% of horses had been diagnosed with pituitary dysfunction by attending veterinarians, approximately one-third of horse owners reported clinical signs of hirsutism. Recent research has improved the understanding of pituitary dysfunction pathophysiology and has identified oxidative damage to dopaminergic neurons similar to that occurring in human Parkinson's disease.<sup>29</sup> The loss of dopaminergic innervation leads to hyperplasia of the pituitary pars intermedia and overproduction of pro-opiomelanocortin derived peptides, including  $\alpha$ -melanocyte-stimulating hormone, corticotropin-like intermediate peptide, and  $\beta$ -endorphin-related peptides.<sup>30</sup> Pituitary dysfunction is often associated with development of laminitis; in one referral population, a history of laminitis or a concurrent diagnosis of laminitis was reported in 33% of horses with pituitary disease, while 50% of horses with laminitis were also diagnosed with pituitary dysfunction.<sup>3</sup> Aside from PPID, an increased occurrence of chronic laminitis in aged horses has been attributed to deterioration of hoof quality, decreased keratin synthesis, and cumulative damage, whereby the relative importance of age versus nutrition, environmental factors, and improper maintenance appears unresolved.<sup>31</sup>

Clinical signs of advanced pituitary dysfunction are generally easy to detect during the physical examination of an aged horse. Hirsutism (Figure 2), weight loss and abnormal distribution of body fat, polyuria and polydipsia, excessive sweating, and lethargy are considered typical and may be encountered individually or in combination. Additional clinical signs may be related

**Figure 2: Hirsutism in an aged mare with pituitary pars intermedia dysfunction.**



to chronic recurrent infections (sinusitis, hoof abscesses), chronic parasitism, neurologic dysfunction (blindness, seizures), endocrine dysfunction (diabetes mellitus), and reproductive failure.<sup>30</sup> Diagnosis of early cases is more difficult and usually requires diagnostic testing. Much research has been devoted to developing reliable diagnostic tests for the disorder; however, the lack of a universally accepted gold standard for comparison of test results and the difficulty in obtaining certain diagnostic drugs such as thyrotropin releasing hormone (TRH) has limited widespread use of some tests. Most clinicians still consider the overnight dexamethasone suppression test to be the most thoroughly evaluated, the most cost-efficient, and the easiest to administer. The abbreviated protocol allows for collection of only 2 serum samples before and approximately 19 hours after administration of dexamethasone and is easily performed under field conditions. Dexamethasone (40 µg/kg IM) is administered in the afternoon (usually between 4 and 6 pm) following the collection of a pretest serum sample. A second serum sample is collected at noon the following day; both samples are simultaneously submitted to the lab for measurement of serum cortisol concentration. A positive test is indicated by failure to suppress cortisol production below 1 µg/dL (27.6 nmol/L). A seasonal effect on the results of dexamethasone suppression has recently been reported,<sup>32</sup> and should be taken into consideration when using this test. Concern is often expressed over administering dexamethasone to horses suffering from chronic laminitis and, in those cases, clinicians may choose a different test protocol or forego testing altogether. Advantages and disadvantages of the available diagnostic tests have recently been reviewed.<sup>33</sup> Response to therapy may be an appropriate way to establish a diagnosis in horses with typical clinical signs, but with diagnostic testing considered too risky.

Treatment of PPID consists of medical therapy combined with proper supportive care to address sequelae such as laminitis and chronic infections. The dopamine agonist, pergolide, is considered the most effective drug for treatment of pituitary dysfunction and typically results in stabilization of affected horses and improvement of clinical signs (eg, hirsutism). An initial dose of 0.001 mg/kg, or 0.5 mg/horse/day, administered for 4 to 8 weeks, is suggested.<sup>30</sup> Treated horses are then re-evaluated for clinical improvement and the dose can be increased weekly by 0.25 mg/day (up to approximately 2 mg/horse/day), if necessary. Some clinicians repeat dexamethasone suppression tests to assess response to treatment; however, normalization of the test probably does not occur in all horses. If treatment is successful, it must be continued for the lifetime of the horse; this aspect should be discussed with the owners prior to beginning therapy, since their commitment must be ensured to prevent dissatisfaction and treatment failure. Horses that do not respond to therapy should be re-evaluated to ascertain that the initial diagnosis of PPID was correct and to assess any underlying or complicating conditions requiring additional treatment. Clinicians should further consider that dosage recommendations are mostly based on the commercially available drug (Permax<sup>®</sup>) that was recently taken off the market due to concerns over heart valve damage in human patients receiving the drug for treatment of Parkinson's disease. Therefore, veterinari-

ans are required to use compounded products (the pergolide compound itself continues to be available) that may vary in bioavailability from the previously licensed product. Until further information is available, dosage adjustments should be made based on proper diagnosis, clinical assessment of treated horses, and repetition of diagnostic tests where appropriate. Inappetence, the most common reported side effect of pergolide in horses, generally improves with dosage reduction. Alternatives to pergolide include other dopamine agonists (eg, bromocriptine), as well as serotonin antagonists (eg, cyproheptadine); however, minimal information about the use of these drugs in horses is available and they are generally considered less effective. Successful use of herbal treatments such as chaste berry extracts has also been anecdotally reported, but scientific evidence for their effectiveness is lacking at this time.

### **Thyroid dysfunction**

Declining thyroid hormone concentration in older horses has been described;<sup>34</sup> however, clinically significant hypothyroidism is rare. Clinical signs sometimes attributed to thyroid dysfunction – obesity, development of a cresty neck, and laminitis – may be more likely caused by another endocrine dysfunction referred to as “metabolic syndrome.” A “response” to thyroid hormone supplementation in these horses may be due to a generalized increase in metabolic activity and is not in itself proof of hypothyroidism. When presented with a horse with suspected thyroid dysfunction, clinicians should consider, as well, that circulating thyroid hormone concentrations are affected by a number of non-hormonal factors,<sup>35</sup> making one-time serum hormone determinations unreliable in the diagnosis of thyroid disease.

Nonfunctional thyroid adenomas (Figure 3) occur rather frequently in aged horses and may be cause for presentation to a veterinary practitioner. Adenomas may be unilateral or bilateral and pose little risk to the horse unless tracheal or esophageal compression occurs. In horses with thyroid enlargement, clinicians must differentiate functional tumours (adenocarcinomas) that result in clinical signs of hyperthyroidism, including weight loss despite increased feed intake, nervous behaviour and increased excitability, and tachycardia.<sup>35</sup> T<sub>3</sub> (3,5,3'-L-triiodothyronine)-suppression testing to diagnose hyperthyroidism in horses has been reported.<sup>36</sup> Treatment is warranted for functional tumours and may include surgical removal of the thyroid gland, radiation therapy, or chemotherapy. Laryngeal hemiplegia is a recognized potential complication of surgical thyroidectomy.<sup>37</sup>

### **Cardiac disease**

Heart murmurs are frequently encountered in aged horses and are usually due to degenerative valvular disease leading to valve insufficiency or regurgitation. Degenerative changes are the most frequent cause of valve insufficiency overall; however, inflammatory and infectious etiologies (eg, endocarditis) must be considered as differential diagnoses. Valvular stenosis is rare in horses. Degenerative valvular disease in aged horses is often clinically insignificant, but heart murmurs should be addressed diagnostically, nonetheless, to identify signs of congestive heart failure, assess structural changes in the heart, and establish prognosis. Presence

**Figure 3: Unilateral, non-functional thyroid adenoma in an aged horse.**

(a). The adenoma was not associated with any clinical signs. The horse was euthanized for unrelated reasons; (b). Post mortem examination demonstrated the extreme difference in size between the affected and normal thyroid gland.



of cardiac disease may put aged horses at an increased risk when undergoing sedation or general anesthesia and may pose a safety concern to owners. An annual evaluation, including echocardiography in horses with cardiac murmurs, is recommended to monitor progression.

The mitral and aortic valves are most commonly affected by insufficiency, leading to systolic and diastolic heart murmurs, respectively.<sup>38</sup> Mitral regurgitation is the abnormality most likely to result in congestive heart failure or have sequelae such as atrial fibrillation due to atrial enlargement.<sup>38</sup> While progression to congestive heart failure is a more common result of valvular insufficiency, sudden death due to pulmonary hypertension and pulmonary artery rupture has been reported in horses suffering from left-sided cardiac failure;<sup>38</sup> this should be considered when counseling owners on the maintenance and potential use of a horse with cardiac disease.

### Ocular diseases

Information concerning ocular and vision changes in geriatric horses is limited; however, an effect of aging appears to be present and should be considered when evaluating the older horse with ocular disease. Nuclear sclerosis, chorioretinal pigmentation changes and retinal degeneration, deterioration of tear production, loss of cranial mass, and primary corneal endothelial dystrophy have all been described in aging horses; these may affect vision and predispose older horses to various abnormalities of the

eye.<sup>39,40</sup> In addition to changes associated with aging, older horses may also develop problems as a result of the accumulation of minor traumas and/or inflammation throughout their lifetime that culminate in clinical disease at an advanced age. Vision loss may only occur under certain conditions (eg, dim light) and clinical examination should reproduce the conditions under which abnormalities were noted.<sup>39</sup>

Corneal ulceration remains one of the most commonly recognized diseases of the eye in horses. Diagnosis and treatment do not differ in the geriatric horse, but the possibility of an age-associated delay in ulcer healing should be considered. Concurrent endocrine diseases such as PPID, decreased epithelial viability and insufficient attachment to the underlying stroma, as well as mechanical impairment from corneal edema have been cited as causes of delayed ulcer healing in geriatric horses.<sup>39</sup> Ophthalmic diseases that occur with greater frequency in older horses include equine recurrent uveitis, glaucoma, onchocerciasis, squamous cell carcinoma, and optic neuropathies.<sup>39</sup> Senile cataracts in horses have been described<sup>41</sup> and may be related to accumulating oxidative injury or chronic presence of inflammatory cytokines.

### Summary

Geriatric horses are generally affected by all diseases affecting younger mature horses; however, certain conditions such as strangulation obstruction by lipoma and PPID appear to be typical for the aged equine. In addition to differences in disease prevalence, certain aspects of treatment and management may differ for geriatric horses and should be considered in discussion with the owner. The possibility for concurrent disease, such as pituitary dysfunction in a horse with laminitis or chronic sinusitis, should always be considered when working with aged horses and veterinarians, as well as owners, are well advised to establish all the medical problems of the animal before deciding upon a treatment regimen or embarking on long-term management. That said, old age, as such, should not be considered a contraindication to treatment (eg, colic surgery) in itself. Healthcare and maintenance of an aged companion horse can be a rewarding experience for both veterinarians and horse owners.

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## Upcoming Meetings

26-30 September 2007

### International Veterinary Emergency and Critical Care Symposium

New Orleans, Louisiana

CONTACT: [www.vecs.org](http://www.vecs.org)

18-21 October 2007

### American College of Veterinary Surgeons Symposium

Chicago, Illinois

CONTACT: [www.acvs.org](http://www.acvs.org)

1 - 5 December 2007

### 53<sup>rd</sup> Annual Convention of the American Association of Equine Practitioners

Gaylord Palms Resort & Convention Center

Orlando, Florida

CONTACT: [www.aaep.org](http://www.aaep.org)

*Dr. Lohmann has stated that she has no disclosures to announce in association with the contents of this issue.*

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This publication is made possible by an educational grant from

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