

EQUINE INTERNAL MEDICINE

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Summary

Equine Internal Medicine is a Veterinary Specialty committed to the study of horse diseases excluding those that require surgical treatment and reproductive disorders. Horses can suffer the same kind of diseases that most mammals, including human beings. However, there are anatomic and physiologic peculiarities of equids which predispose them to some disorders (for instance, the unique characteristics of the equine digestive system, which is adapted to herbivore diet, makes it prone to suffer obstructions, displacements, strangulations, etc. that lead to colic). Epidemiologically, the musculoskeletal system is the first source of equine diseases and, although many of these diseases are studied in Equine Surgery, laminitis and myopathies are important medical conditions. Digestive (colic, diarrhea, gastric ulcers) and respiratory problems (recurrent airway obstruction, pleuropneumonia, laryngeal hemiplegia) are also very common in horses. Less frequent conditions are found affecting the skin (ringworm, insect hypersensitivity, sarcoids), nervous system (Wobbler syndrome, viral encephalomyelitides, tetanus, botulism), eyes (ulcerative keratitis, uveitis, glaucoma), hemolympathic (anemia, coagulation problems), cardiovascular (valvular diseases, arrhythmias), renal (acute and chronic renal failure) and endocrine (pituitary pars intermedia dysfunction, metabolic syndrome) systems. A variety of etiologic agents can cause the diseases studied by Equine Internal Medicine, including: congenital/developmental problems (cleft palate, malformations of the heart, combined immunodeficiency) viruses (equine herpesviruses, influenza, viral arteritis, infectious anemia), bacteria (*Streptococcus equi*, *Salmonella spp.*, *Clostridium spp.*, *Rhodococcus equi*) fungi (*Trichophyton spp.*, *Microsporum spp.*), parasites (*Strongylus spp.*,

Chorioptes spp., *Habronema spp.*, *Sarcocystis spp.*), immunological disorders (allergies and autoimmunity), nutritional/metabolic problems (vitamin E deficiency, mineral imbalances, endocrine disorders), neoplasia, etc. Diagnostic methods in Equine Internal Medicine range from physical exam to a variety of ancillary techniques: blood analyses, radiography, ultrasonography, endoscopy, cytology, biopsy, cultures, PCR, etc. Common treatments include drugs: antimicrobials (antibiotics, dewormers, antivirals), antiinflammatories (steroidal and nonsteroidal), fluid therapy, a variety of drugs specific for body systems (e.g. bronchodilators, diuretics, gastric acid suppressants, modulators of intestinal motility) or aimed to control clinical signs (e.g. analgesics, antipyretics); and other medical procedures (e.g. electrical cardioversion, drainage and lavage of body cavities, blood and plasma transfusions).

1. Introduction

Equine Internal Medicine is a part of Veterinary Medicine which deals with medical (i.e. those not requiring surgical treatment) conditions affecting horses. Equine Internal Medicine is a Veterinary Specialty recognized in Europe (European College of Equine Internal Medicine) and the United States of America (American College of Veterinary Internal Medicine-Large Animal). Practitioners (with or without relationship with the above mentioned Colleges) are distributed worldwide.

The main medical diseases affecting horses are summarized below structured by body systems to provide a comprehensive (although limited for reasons of space) vision of this field of knowledge.

2. Respiratory Diseases

2.1. Upper Airway Diseases

Upper airway (nose, pharynx, guttural pouches and larynx) diseases can be divided in two main groups: a) diseases related to infectious problems; and b) structural abnormalities.

Upper airway infection in horses is in most cases associated to *Streptococcus spp.*, particularly *Streptococcus equi* subsp. *equi* infection (strangles). Strangles is a major problem in the horse industry due to its high contagious rate and the fact that there is not a good way of preventing it (vaccines are not fully effective). *S. equi* infects lymphoid tissue in the vicinity of the upper airways causing inflammation and lymph node abscessation. In addition to adenomegalia, clinical signs include fever and nasal discharge. Diagnosis is based on identification of the causative agent either by culture or by polymerase chain reaction (PCR). Prognosis is fair in most cases although affected horses may become carriers of the disease. Identification of the carrier status is based on cultures obtained from the guttural pouches. Secondary to *S. equi* infection horses may develop a variety of problems in the upper airways (e.g. guttural pouch empyema) and the lungs (pneumonia). Treatment is based on the use of antibiotics (this bacteria is usually sensitive to beta-lactam antibiotics) although another approach to treatment is to allow the abscesses to mature and open without antibiotic therapy (which some authors believe increases the possibility of complications). The most common complication is

bastard strangles in which horses may present abscesses in multiple locations (abdominal cavity, liver, brain, etc.) and this would lead to a variety of clinical signs. Immunopathologic reactions to *S. equi* antigens can also develop after infection. The most frequent is called purpura hemorrhagica, a type III immunopathologic reaction with deposition of immune complexes in the vasculature which usually leads to vasculitis, petechiae, and peripheral edema. Immune-mediated myopathies, in which rapid muscle wasting is observed, have also been reported secondary to *S. equi* infection. These cases are managed by treatment with glucocorticoids and antibiotics.

Two areas in the upper airways are more susceptible to infection: the paranasal sinuses and the guttural pouches (which are a dilation of the Eustachian tube characteristic of equids). Sinusitis affecting the frontal sinus is usually a consequence of upper airway infection while maxillary sinusitis is often related to dental problems. In both cases the horse typically shows unilateral nasal discharge which may be malodorous, especially in cases in which dental infection is present (Figure 1). Diagnosis relies on radiologic examination of the head (to detect the presence of exudates within the sinuses and to identify potential dental disease). Treatment involves addressing the dental problem (if present) and lavage of the affected sinuses through a percutaneously implanted catheter.



Figure 1. Maxillary sinusitis in a horse. Note the unilateral nasal discharge and the facial deformity.

Guttural pouch empyema is also a common infectious problem of the upper airways, which is often associated to *S. equi*, and is characterized by pus accumulation within the guttural pouches. Affected horses show nasal discharge and sometimes deformity of the retropharyngeal area. Diagnosis is based on endoscopy of the guttural pouches and isolation of the causative bacteria. Treatment involves the use of antibiotics and lavage of the affected pouch(es). It is important that the lavage solution does not cause irritation because multiple nervous branches traverse the guttural pouches and may be negatively affected. Mycotic infection of the guttural pouches is another rare condition that may cause profuse nasal bleeding and/or neurologic symptoms (e.g. dysphagia) due

to damage to the vascular and nervous structures inside the guttural pouches. This disease is diagnosed by endoscopic examination which allows identification of the fungal growth inside the guttural pouch(es), which is normally located dorsally – adjacent to the internal carotid artery. Treatment involves occlusion of the internal carotid artery to prevent death by bleeding.

Structural abnormalities of the upper airways are characterized by respiratory noise and decreased performance (due to impaired air flow). The most important disease in this context is laryngeal hemiplegia, due to a neuropathy of the cranial (recurrent) laryngeal nerve which typically affects the left side of the larynx and is very prevalent in athletic horses. Other conditions are: dorsal displacement of the soft palate, epiglottic entrapment, arytenoid chondritis, subepiglottic cysts, etc. These abnormalities are diagnosed by upper airway endoscopy (at rest or during treadmill exercise) and often require surgical treatment.

2.2. Lower Airway and Lung Diseases

Lower airway inflammation (“heaves”) is very common in horses that spend most of their time in stalls, particularly if ventilation is poor and allergenic load is high. This disease has a multifactorial etiology but allergic reactions to inhaled antigens, usually contaminants of feedstuffs (roughage) and bedding, play a major role. Bronchial diameter decreases as a consequence of inflammation, bronchospasm and an increase in intraluminal secretions, which typically are thick and sticky. Affected horses show expiratory dyspnea, cough and may have nasal discharge. Clinical signs typically recur which has led to the name of Recurrent Airway Obstruction (RAO). Diagnosis is based on lung auscultation (wheezes and crackles), endoscopy (increase in tracheal mucus, edema of the carina) and abnormal cytologic findings in respiratory secretions (elevation in neutrophil count) obtained by bronchoalveolar lavage. Prognosis is guarded and treatment is aimed at reducing allergen exposure by improving ventilation and minimizing organic dust. Pharmacologic treatment includes glucocorticoids, to control inflammation, bronchodilators, to open the airways, and mucolytics, to facilitate elimination of secretions. These drugs are best administered through inhalation. Inflammatory Airway Disease (IAD) is a similar but less severe condition that affects young athletes and which may represent early stages of RAO. Lungworms (e.g. *Dictyocaulus arnfieldi*) may result in similar clinical features to RAO or IAD. Suspicion of parasitic lung disease may be raised in horses that share pastures with donkeys (reservoir) or in horses with high eosinophil count in respiratory secretions. Differential diagnosis is based on identification of the parasites or their eggs (in respiratory secretions or in feces). Treatment is based on the use of antihelmintics (e.g. avermectins).

Pleuropneumonia is a common lung disease in horses and is often a devastating problem that may result in death. This condition is more prevalent in stressed animals (frequently appears secondary to long-distance travels) and is caused by bacterial infections. Affected horses show anorexia, fever, depression and dyspnea. Diagnosis is based on thoracic auscultation (to recognize a decrease/abolition of normal respiratory sounds in the ventral area), ultrasonography (to evaluate the presence of fluid in the pleural cavity and consolidated lung), thoracocentesis (to characterize the pleural fluid) and

microbiologic culture of respiratory secretions obtained from transtracheal wash (to identify the causative bacteria). Prognosis ranges between guarded and poor and worsens when complications (e.g. laminitis) are present. Treatment is aimed to eliminate pleural effusion using thoracocentesis (often requiring placement of a permanent chest tube) (Figure 2) and appropriate antibiotics plus supportive care (fluid therapy, analgesics, mucolytics, etc.). Interstitial pneumonia, also known as multinodular pulmonary fibrosis, is a recently recognized disease characterized by collagen accumulation in the lungs. Its etiology remains unclear. It seems related to a viral infection by equine herpesvirus-5 (EHV-5). Clinical signs may resemble those of RAO although horses are usually febrile. Diagnosis is based on thoracic ultrasonography, radiology and lung biopsy. Treatment habitually involves the use of glucocorticoids and antivirals.



Figure 2. Chest tube draining purulent exudate from an abscess in a horse with pleuropneumonia.

Exercise-induced pulmonary hemorrhage (EIPH) is a very prevalent disease in athletic horses, particularly those performing at high intensity, like Thoroughbred racehorses (almost every racehorse in training suffers this condition). The cause of EIPH is not completely understood but rupture of pulmonary capillaries due to the high pressures reached in the pulmonary capillaries during exercise seems to be a major factor. Airway inflammation, which can occur as a consequence of pulmonary bleeding, also plays a role. Although many horses are affected, only a minority (around 5%) shows clinical signs (nose bleeding or “epistaxis”). Diagnosis is based on post-exercise airway endoscopy which allows detection of fresh blood inside the trachea. Identification of hemosiderophages in respiratory secretions (obtained from bronchoalveolar lavage) and lesions in the caudodorsal lung fields (recognized by radiology or ultrasonography) are alternative diagnostic methods. Prognosis is fair since the problem can be solved by decreasing the level of athletic activity. Treatment is based on the use of furosemide, in those racing jurisdictions where this drug is allowed, and control of associated airway inflammation (as described above for RAO).

2.3. Viral Respiratory Diseases

Viral diseases that affect predominantly the respiratory system will be discussed under this subheading. Respiratory viruses affect both the upper and lower airways, in fact

many of them affect the whole body and in some cases the predominant clinical signs may be related to other body systems. Respiratory clinical signs, which are shared by all these viral diseases, are cough and nasal discharge, fever, anorexia, lethargy and lymph node enlargement. Diagnosis is based on virus identification (by culture or PCR) and antibody titration by serology. In addition to the preventative measures, specific for each virus, treatment is symptomatic.

Equine influenza

Influenza is an acute, self-limiting infection caused by a single-stranded RNA Orthomyxovirus. Currently the subtype H3N8, which has an American and a European strain, is the most prevalent. Control is based on vaccination which, although not fully effective in preventing the disease, decreases morbidity and severity of the clinical signs.

Equine herpesvirus

The most common equine herpesviruses are types 1 and 4. In addition to respiratory signs, they may be responsible for abortion and myeloencephalopathy (see below). After infection, herpesviruses typically remain latent and may experience subsequent reactivations. Vaccination provides some level of protection against respiratory and reproductive signs but not against neurologic forms.

Equine viral arteritis

This infectious disease is caused by a single-stranded RNA virus from the Arteriviridae family that, in addition to its respiratory spread, may have a venereal transmission. This fact is very important for the international shipment of cryopreserved semen. Carrier stallions play a pivotal role in the transmission of the disease. In the same way as in herpesvirus infections, abortion is a common complication. Prevention is based on control programs restricting the contact of susceptible horses and on vaccination.

3. Digestive Diseases

Most problems affecting the mouth of horses origin in teeth and will not be considered in this chapter. Diseases of the equine pharynx (due to its anatomical peculiarity which creates a direct communication between nasal cavity, pharynx and larynx, sealed by the epiglottis and the caudal border of the free palate) are mostly associated to respiratory diseases. Thus, we will focus on esophageal and gastrointestinal disorders.

3.1. Esophageal Obstruction

Esophageal obstruction also known as “choke” is the most common esophageal complaint in horses. Its etiology is related to feeding habits (horses that are too greedy) and the nature of the food (e.g. pellets predispose to obstruction). The obstruction can be located anywhere in the cervical or intrathoracic esophagus. As a consequence of the inability to pass food to the stomach, horses regurgitate a mixture of food and saliva (typically eliminated through the nostrils) and also show drooling or excessive salivation. Diagnosis is made by nasoesophageal intubation (inability to pass the tube) or by endoscopic examination of the esophageal lumen. Treatment involves a variety of techniques aimed to dislodge the obstruction (lavage and use of mechanical

instruments) and drugs that relax smooth muscle (spasmolytics). Antibiotics are usually administered to prevent aspiration pneumonia which is a common complication. Another complication is the formation of esophageal strictures as a consequence of cicatricial retraction, which may predispose to future obstructions. Uncommon esophageal disorders are megaesophagus and other motility problems.

3.2. Gastric Ulcers

Equine gastric ulcer syndrome (EGUS) has two distinct presentations in horses which affect adults and foals, respectively. The mucosa of the equine stomach has two parts: non-glandular and glandular. Most equine ulcers are found in the non-glandular section. In adult horses gastric ulcers are usually related to stress and diet. Chronic administration of nonsteroidal antiinflammatory drugs also plays a role in the development of glandular gastric ulcers. EGUS is typically found in sport horses that receive high energy feeds and that spend most of their time enclosed in stalls. Clinical signs maybe quite unspecific including: pain, decreased body weight, teeth grinding, diarrhea, behavioral changes, etc. Diagnosis is based on endoscopic examination of the stomach. Treatment includes management –many horses heal just after being placed at pasture- and, when necessary, drugs that suppress acid production in the stomach: proton pump inhibitors (e.g. omeprazol) or H₂-blockers (e.g. ranitidine), and drugs that bind the ulcerated mucosa (e.g. sucralfate).

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