Special Dental Concerns of the Geriatric Horse

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The age at which an individual animal is classified as geriatric, can be based on chronological, physiological or functional age. The prevalence of disease conditions has been reported to increase with age and a high prevalence of disease in apparently healthy horses has been identified at veterinary examination. At least one dental abnormality was detected in 95.4% of horse over 15 years, with a large proportion of horses having generalized dental abnormalities (Irland et al. 2011). In this study only 25% of horses with dental abnormalities on examination were reported by the owner to have a dental problem. This supports previous studies showing dental disease in geriatric horses was most always diagnosed during veterinary evaluation of another health problem. Geriatric horses have a higher incidence of generalized health issues such as pituitary dysfunction, laminitis, arthritis, gastrointestinal disease, heart murmurs, respiratory disease and tumors. This text will review anatomic changes and some of the more common dental pathology seen in older horses.

Older Horse Dentition

The change in normal equine dental anatomy with age results in dental disease that is specific to the geriatric horse. In addition, the culmination of dental disease throughout the life of the horse often results in advanced dental disease in older animals. The approach to treatment of specific dental disease conditions must be adapted for older horses in order to compensate for the reduction in reserve crown and occlusal enamel. Ensuring oral comfort and maximizing masticatory ability are the mainstays of geriatric dental treatment. Recognition of dental disease common to older horses will ensure that the correct treatment can be applied. Furthermore, older patients often require long-term management changes, such as dietary modification, to manage dental disease effectively.

The natural ageing process of equine teeth contributes to the majority of dental disease observed in geriatric equids. Central to the ageing changes seen in equine teeth are that they are hypsodont and have a finite crown length. Various factors such as management and type of diet contribute to the rate at which teeth are worn and this may accelerate age-related changes. A coarse, forage-based diet with lots of silicates may increase the amount of wear on the teeth.

Young Horse Dentition

Old Horse Dentition

The decrease in enamel thickness and enamel enfolding further apically in teeth, means less enamel is exposed on the occlusal surface as the teeth wear. This results in aged teeth that are not able to resist wear as effectively, thus, the rate of attrition increases. As a result of the teeth narrowing
apically, aged horses will have less tooth surface area, less tooth angulation and the compression forces in each cheek teeth row are unable to maintain close interdental contact between teeth. Senile diastemata (or multiple diastemata developing along a cheek teeth row) is a possible consequence.

A recent, detailed biomechanical study determined that in older horses, mandibular cheek teeth became more curved rostro-caudally, but did not change their dental positions. In contrast, the maxillary cheek teeth did not become more curved, but had an increase in mesio-occlusal angle i.e. changed their dental position. As this changes, the occlusal contact between maxillary and mandibular cheek teeth, it may contribute to changes in wear patterns observed in geriatric horses. Incisors also decrease in length with age and the contact angle between the maxillary and mandibular incisors become more acute. If this change of angle is not equal on both upper and lower jaws, it may adversely affect the normal wearing of the occlusal surfaces.

**Dental Disease in Older Horses**

Geriatric horses often have the culmination of dental disease that accrues throughout their lives. Due to the ageing process, dental disease such as worn teeth, diastemata and periodontal disease are very common in older horses. A study in a large population of donkeys, clearly showed a significant increase in the prevalence of dental disease as the animals aged. In particular, there was a significant increase in dental disease in the 15 – 20 year old age range (du Toit, Burden and Dixon 2009). Incisor disease is commonly diagnosed in older horses and can be a source of chronic pain.

The mainstay of dental treatment in older horses is aimed at ensuring oral comfort and maximizing masticatory ability. The short remaining reserve crown limits dental crown reduction treatment in geriatric horses. This is especially so if prophylactic dental care has not been maintained throughout the horse’s life. Trying to achieve major changes in the cheek teeth row occlusal profile is more detrimental to the patient at an advanced age. Odontoplasty procedures should be limited to removal of sharp enamel projections or occlusal crown elongations that are causing soft tissue trauma or limiting jaw motion.

Diastema is defined as a detectable interdental or interproximal space between adjacent teeth and is the most common dental condition predisposing the horse to periodontal disease. Not all diastemata should be considered problematic. Only when the diastema contributes to the stagnation of feed material and leads to the development of secondary periodontal disease, should it be considered clinically significant. The stagnation and fermentation of feed material causes a secondary anaerobic bacterial infection to develop at the gingival margin. As infection progresses, inflammatory mediators cause stretching and inflammation of the periodontal ligament. This can be very painful and lead to a loss of attachment at the gingival-cemental junction and reduction of production of peripheral crown cementum. Left unchecked, this periodontitis can lead to gingival recession with spread of infection into the sinuses and other adjacent osseous structures.

Diastema is under-diagnosed in clinical practice due to: 1) lack of awareness of the seriousness of the condition and, 2) poor dental examination techniques. Modern dental examination techniques require utilizing both digital palpation and visual inspection of the oral cavity. Proper patient restraint, a mouth speculum, bright light source, dental mirror and/or oral endoscope are needed to inspect all the dental surfaces. Radiographs should be performed to assess the width and depth of the diastema and extent of horizontal and vertical bone loss within the periodontal pocket. Through the use of intra-oral or open mouth oblique extra-oral radiographs, the veterinarian is able to properly assess the number, depth, and severity of the diastemata; develop a treatment plan; and
monitor progression (Barakzai and Dixon 2003, Baratt 2013). Treatment methods consist of dietary modification, diastema cleaning and packing, occlusal crown reduction to reduce occlusal pressure from opposing teeth, orthodontic treatment with odontoplasty, widening interdental spaces with a bur or tooth extraction. Diastemata diagnosed early and managed properly can prevent the progression of periodontal disease and allow affected horses to preserve their dentition into old age (Walker et al. 2012, Easley and Odenweller 2016).

The upper cheek teeth have two deep infoldings of enamel that are filled with cementum referred to as infundibulae. Dental infundibular caries involving the upper cheek teeth have been reported in up to 90% of horse over 15 years of age with the 09s being most severely affected. Cemental hypoplasia of the infundibulum is recognized as areas of complete developmental absence of cementum with exposure of enamel in infundibulae. This is most commonly seen near the apical aspect of the infundibulum and is the reason for this developmental condition not being detected clinically until the tooth has worn down later in life. This infolded enamel is usually 60-90% as long as the dental crown and adds to the wear resistance of the central part of the upper cheek tooth. When the infundibulum is decayed or worn out the tooth begins to show excessive wear and the central area can become smooth predisposing to a wave type wear pattern. Recent publications have looked at the morphological variations and pathological change affecting the infundibulae (Suske et al. 2016). Infundibular hypoplasia and caries if severe has been known to predispose teeth to fracture. Infundibular restorations have been advocated to by some practitioners to stabilize severely diseased teeth with mixed long-term results (Pearce 2012, Dixon et al. 2014).

Equine odontoclastic tooth resorption and hypercementosis (EOTRH) is a painful, progressive condition that can affect the teeth in older horses. The cause and pathophysiology of equine tooth
resorption are still under investigation and demonstrate some distinct differences from the disease seen in other species, namely hypercementosis or invasive irregular cementum. Tooth resorption and hypercementosis affect mainly the incisors and canine teeth of the horses typically over 17 years of age. Recently, a small number of anecdotal reports of resorption and irregular cementum involving premolars have been confirmed by histopathology. The disease is characterized by internal and external resorption of dental structures sometimes associated with excessive production of irregular cementum on the exterior and interior of the tooth. The apical 1/3 to 1/2 of the tooth is commonly affected. The disease tends to start along the lingual/palatal aspect of the tooth with expansion in a mesial and distal direction. As the disease progresses, the pulp, dentin, periodontal ligament, and alveolar bone become inflamed and infected leading to reduced structural support for the teeth, degradation of gingiva, increased incisor angle, fistula formation, tooth fracture, and pain.

Periodontal inflammation is reported as a possible initiating trigger for tooth resorption. It is suspected that chronic inflammatory mediators, particularly PGE2, an inflammatory factor that plays a primary role in the stimulation of osteoclasts, perpetuate the resorptive process. Osteoclastic activity has been shown to be influenced by several hormones and cytokines as well. A reparative reaction involves fibroblasts, odontoblasts and cementoblasts invading spaces between the osteoclasts to produce a cementum-like tissue to fill the dental defects. Depending on individual animal and tooth reaction, the balance between resorption and cementum deposition can vary resulting in the variety of stages seen sometimes in one mouth.

Histopathology of resorptive lesions and proliferative cementum has demonstrated abnormal location and activity of osteoclasts, odontoclasts, and cementoblasts. Osteoclasts in normal dentition typically reside against the bone surface occupying shallow hollowed-out depressions they have created called Howship's lacunae. Histopathologic examinations of resorptive lesions revealed osteoclasts and odontoclasts residing in very large, atypical lacunae within bone, cementum, enamel and dentin. The term hypercementosis is a rather nondescript term used in pathology reports to describe hyperplasia of normal cemental tissue and proliferation of irregular cementum.

EOTRH with Gingival Recession, Hypercementosis and Caries
Tooth resorption in general is a painful disease, and the level of pain appears to intensify with the severity of the lesions. A common initial sign of incisor pain reported by owners is a reduced ability/desire to grasp carrots. Other signs of pain include sensitivity to biting, head shaking, ptalism, resistance to turning during work, shyness about the head, periodic decreased appetite, weight loss and decreased use of incisors for grazing. Some horses become incredibly adept at grasping feed with the lips, sliding it past the incisors and moving it into the mouth through the “bar” region. Observing a horse eating hay prior to an oral examination is a good way to gauge the animal’s discomfort and stage of disease. Recently a group of Danish and Swedish researchers have developed “Equine Pain Face score” is being used to objectively evaluate equine pain. Some horses that are in the earlier stages of disease, or with primarily hypercementosis may show no apparent signs of discomfort. However, level of pain can difficult to evaluate in the horse. Oral exam can be quite challenging because patients are resistant to manipulation of the lips and pressure on affected teeth. Placement and opening of an oral speculum can stimulate dangerous behavior due to pain even under heavy sedation. Oral exam findings can include enlarged mandibular lymph nodes, decreased incisor angle not appropriate for age, prominent juga, loss of dental papillae, gingival and mucogingival fistulas, severe regional inflammation, purulent drainage, calculus and feed accumulation, fractured or missing teeth, hyperplastic gingiva, gingival recession, bulbous enlargement of dental structures, tooth mobility, and supragingival regions of dental resorption. Resorptive lesions in older horses can be found under excessive tartar deposition on the mandibular (more common) and maxillary canine teeth. Exposing these lesions after removal of tartar will cause discomfort for the horse.

Evaluating tooth resorption and hypercementosis necessitates intraoral radiographs to properly diagnose and formulate a treatment plan. Radiographic findings typically include varying levels of dental resorption and hypercementosis, loss of the periodontal ligament space, disruption of alveolar and regional cancellous bone, osteomyelitis, and tooth fracture. A radiographic classification system for tooth resorption based on location is useful in categorizing the type of resorptive lesions present in dogs. The system radiographically evaluates lesions for 7 types of resorption which includes external surface resorption, external replacement resorption, external inflammatory resorption, external cervical root surface resorption, internal surface resorption, internal replacement resorption and internal inflammatory resorption.
Periodontal disease is commonly present with EOTRH. The cause of EOTRH has not yet been determined, but loss of dental and regional structure resulting from EOTRH opens the door for severe periodontal infection. The inflammation resulting from periodontal disease causes further degradation of both hard and soft periodontal structures. Treatment of periodontal disease will not stop EOTRH, but it will break the negative feedback cycle between EOTRH and periodontal disease temporarily. In the early stages of EOTRH where loss of the dental papillae and periodontium lead to regional feed accumulation, both veterinarian and owner can work together to keep the incisors and canines debris-free. Daily tooth brushing, oral irrigation and frequent professional periodontal therapy (every 3-6 months) should be initiated. Antibiotic therapy can also be used to temporarily decrease the build-up of periodontopathogenic bacteria and regional infection.

Treatment planning will depend heavily on clinical examination, radiographic findings and the patient's level of pain. Horses with mild subgingival resorption and no regional osteitis or alveolitis can be monitored with oral exam and radiographs as the pace of disease progression varies between teeth and individuals. It is not uncommon to see radiographically a variety of disease stages ranging from normal to severe throughout the incisors and canines. Once supragingival lesions, alveolitis, osteomyelitis, tooth fractures and extensive resorption of the reserve crown and root are detectable radiographically, extraction is recommended. Moderate to severe cases require staged or complete extraction of the affected teeth to alleviate infection and pain caused by this disease. Incisor extraction can be accomplished in two ways depending on the nature and severity of the pathology associated with the tooth/teeth. Singular incisor extraction by elevation and avulsion can be accomplished simply in mild to moderately affected teeth. In cases of multiple incisor and canine tooth extraction with severe disease, a surgical approach is necessary to allow for complete removal of dental material, visualization of tooth and diseased structures, debridement and closure. In addition, a surgical approach increases the surgeon’s ability to deal with complicated extractions where reserve crowns and roots have fractured due to initial trauma and resorption.

Severe cases of EOTRH require staged or complete extraction of the affected incisor and canine teeth to alleviate infection and pain caused by this disease. Owners often need extensive pre-surgical counseling regarding the surgery, post-operative care, nutrition, possible complications, and anticipated outcome. It is also recommended that horses requiring extraction of all incisors be referred to a veterinary dentist or surgeon experienced in this procedure as retrieval of all infected dental material and extraction of severely resorbed teeth can be technically challenging.

**Removed EOTRH Affected Incisor Teeth (gross and radiographic changes)**
Horses with severe EOTRH display little discomfort after extraction of all incisors. Post-operative pain is controlled with non-steroidal anti-inflammatory medication and an antibiotic is given 7-10 days to prevent infection. Horses with no incisors are able to eat hay. Many owners and veterinarians report that these horses can graze by grasping forage with the lips and pulling. Although it is impressive that these horses can graze, it should be assumed that they cannot maintain themselves on pasture alone until proven otherwise. Therefore, owners will need to be aware that supplementation with hay, hay stretchers, senior feed or similar additives will be necessary for pasture horses. Once healed, horses will be able to return to full work, and many owners report improved disposition and increased energy. The removal of all or most of the incisors can lead to extrusion of the tongue beyond the labial margin. The tongue appears to protrude most when horses are at rest, but there is tremendous variation between individuals and they appear to suffer no physical or mental trauma as a result of this complication.

References


