How to Recognize and Manage Age-Related Dental Problems in Geriatric Patients

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1. Introduction
With longevity, most equids will gradually experience decreased masticatory ability. This can frequently manifest clinically as quidding of roughage and/or thin body condition. In addition to severe dental attrition and malocclusion, it is the author’s clinical experience that affected patients also have significant senile atrophy of the muscles of mastication. Along with the negative effects of aging and dental attrition, a significant percentage of the geriatric population has coexisting dental problems that include missing teeth, displaced teeth, diastemata, and periodontal disease. From a dental perspective it is important to remember that stress associated with constant oral discomfort and inadequate digestion of nutrients may predispose to a variety of other problems. As a result, every geriatric horse should undergo thorough oral examination with regularity in order to address a variety of age-related concerns. In addition to an oral examination, it is important for the veterinarian to assess for the presence of coexisting contributors to poor health that are prevalent in older patients such as pituitary dysfunction, chronic lameness, hoof abnormalities, or ocular disturbances. With good husbandry, correct feeding of dietary components formulated for senior horses, proper dental care, and appropriate veterinary maintenance of various ailments, it is the author’s experience that unreasonable debilitation and excessively thin body condition can often be avoided or improved significantly in older horses.

2. Materials and Methods
- Sedation drugs (alpha-2 agonist, butorphanol)
- Reversal drug for alpha-2 agonist
- Dental halter or headstand
- Bright source of light
- Dental speculum
- Padding for bite plates of speculum
- Cheek retractor
- Dental mirror or oral endoscope
- Flexible 1M upper airway scope
- Periodontal probe
- Dental scaler
- Chlorhexidine gluconate 2% solution
- Pressurized oral irrigation instrument
- Right-angle periodontal forceps
- Intraoral extraction instrumentation
- Local anesthetic solution
- Radiographic instrumentation
- Test tubes and specimen cups
- Dental chart
Pertinent history is obtained, and a physical examination is performed for initial assessment of the health status of the senior patient. The author typically obtains photographs to use for comparison of body condition score during subsequent visits. Certain details about an older patient's husbandry routine are particularly important including deworming history, housing management (stall/dry lot/pasture), level of exercise, individual vs group feeding, quality of water source, and types/amount/quality of ration and roughage fed. If the patient is presented for evaluation of thin body condition and/or other history or symptoms of illness are detected then the author obtains samples for minimum database laboratory testing (i.e., CBC, serum chemistry panel, serum electrolytes, baseline adrenocorticotropic hormone (ACTH), fecal egg/gram count) and is routinely offered grazing and pellets to observe the horse's appetite and chewing ability. Oral examination and sedation procedures are detailed in a different manuscript of this session, and all abnormalities should be recorded in the dental chart. As with any equid, the front of the mouth (incisive region, lips, and bars) can be examined in senior horses without sophisticated instrumentation. With older equids, the incisor teeth may be severely worn or partially/entirely missing (Fig. 1). If this occurs, the author typically pads the bite plate of the speculum with a small folded towel to protect the gingiva when the mouth is open. The mouth should be thoroughly rinsed and the cheek teeth arcades inspected visually with a mirror to detect absence of teeth, smooth teeth, abnormally positioned teeth, overlong teeth, or other malocclusions. Fractured teeth and diastemata can easily be overlooked, especially toward the back of the mouth without the use of a mirror or dental scope. Each row of teeth should also be examined with fingers to check for sharp areas and loose teeth. Roughage entrapped by diastemata must be removed with irrigation and periodontal forceps to allow adequate visual assessment and probing. Radiographic examination is typically performed in cases with suspected apical abscess or other apical disease such as equine odontoclastic tooth resorption and hypercementosis (EOTRH) and in cases with moderate to severe periodontal disease. Some older patients are presented with foul smelling unilateral nasal discharge; in these cases, detailed oral examination, upper airway endoscopy, and radiographic examination are important procedures to rule out secondary sinus involvement or the presence of an oroantral or oronasal fistula. After opening the dental speculum, it is typical for sedated older patients to be resentful and reactive toward intraoral placement of hands and instruments; as such additional dose(s) of IV sedatives often become necessary to safely continue the exam and treatments. Without the stimulatory effects of the dental procedures, the senior patient often appears to become much more sedate and ataxic during the recovery period after the procedures are completed. When this occurs, it is important to support the patient's head to prevent severe dependent nasal edema and dyspnea, to monitor the patient closely for safe recovery and withhold feeding until sedative effects have worn off, and to make sure the patient is on soft/padded footing in case of a fall. In very rare instances, the author has found it necessary to mitigate the effects of sedation by administration of an alpha-2-agonist reversal agent in these patients. Management of several conditions of interest are discussed in the following sections.

Malocclusion and Age-Related Dental Attrition

Cupping of the maxillary cheek teeth occurs as crown attrition progresses beyond the apical extent of the infundibula into the apical region of the reserve crown and roots. Clinically this change is first noticed as a concave appearance to the occlusal surface of teeth 109/209, along with the development of a very sharp enamel edge that causes abrasions to the adjacent cheek. In addition, an undulating wave malocclusion comprised of worn and overlong teeth is a common finding (Fig. 2). With continued attrition, the mandibular premolar teeth and remaining maxillary molars sequentially may become very smooth with the gingival margin. This pattern of age-related dental attrition results in diminished masticatory ability especially in regard to coarse roughage.

The goal of treatment in senior horses is to perform odontoplasty of sharp enamel edges and overlong teeth in order to improve comfort during mastication and performance. It is not appropriate to attempt to restore normal occlusion of the cheek teeth in an old horse with severe wave malocclusion—to do this may
worsen masticatory ability by elimination of existing areas of occlusion. As such the author is typically very conservative with odontoplasty of wave malocclusion in senior patients.

Equine Odontoclastic Tooth Resorption and Hypercementosis

Most commonly EOTRH is a condition of older horses involving resorptive lesions and hypercementosis of the incisor teeth and canine teeth, and less commonly the cheek teeth. The syndrome is gradual in onset and often undiagnosed until extensive lesions are present. EOTRH is diagnosed radiographically and typical findings include irregular areas of tooth lysis affecting one or more teeth, fracture of the reserve crown, production of excessive cementum, widening of the periodontal ligament space, and alveolar bone loss. Pathological changes of the teeth and surrounding structures may result clinically in gingivitis/bleeding, gingival recession, distortion of alveolar bone, parulis lesions (gum boils), pathologic tooth fracture, and discomfort (Fig. 3). Extraction of affected teeth generally results in resolution of clinical signs. Although general anesthesia is occasionally required due to fractious behavior or inability to achieve sufficient standing analgesia, extraction of affected incisor teeth using a simple approach can typically be carried out in the standing patient with adequate IV sedation/analgesia, regional nerve block, or local gingival anesthetic injections. Radiographs should confirm complete tooth removal, and suturing of the gingiva will help decrease contamination of healing alveoli in the days following surgery.

Periodontal Disease

Diastemata of the premolar/molar teeth are very common in aged horses in part due to gradual narrowing of tooth circumference as the tooth is worn toward the apical region. Thus, over time a small interproximal gap occurs between neighboring teeth that allows entrapment of roughage (known as a senile diastema). Less severe cases exhibit gingivitis and halitosis. These benefit from odontoplasty of overlong teeth and tall occlusal transverse ridges, along with daily mouth rinses to help control gingivitis. An effective oral rinse solution can be prepared using a solution of dilute chlorhexidine gluconate 2.0% solution and water (10–20 mL of chlorhexidine sol. per gallon of water). Feeding soft diets comprised of fine grass hay, lush pasture, and/or complete feed pellets help reduce entrapment of coarse roughage within affected interproximal spaces. The author will commonly perform intraoral extraction of mobile cheek teeth in senior equids affected with advanced periodontal disease. These include teeth that are depressible within the alveolus, teeth that have mobility greater than 3 mm, and teeth that are abnormally positioned in association with severe valve diastemata. Adequate IV sedation/analgesia, local gingival anesthetic, and regional nerve block allow the extraction to proceed with maximal patient comfort. In cases of diastemata exhibiting bleeding, odor, gingival recession, and < 2–3 mm of tooth mobility, the author typically performs radiographs to assess the apical region and ascertain the degree of alveolar bone loss. In the absence of apical abscess or other complicating factors, the severity, bleeding, odor, and discomfort in these cases generally improve substantially after odontoplasty and mechanical widening of the affected interproximal space. A small diameter but problematic oroantral fistula or oronasal fistula may develop in aged horses in association with diastema, fractured teeth, or severely worn teeth in the maxillary arcades. Chronic periodontitis in these cases allows progressively deeper involvement and destruction of alveolar bone resulting in fistula formation. Clinically an oroantral or oronasal fistula allows oral contents and roughage stems to enter the
Ipsilateral maxillary sinus or nasal passage (Fig. 4). Either of these situations manifests primarily as unilateral nasal discharge with foul odor. For diagnosis, oral examination will identify a deep valve diastemata or deep periodontal tract alongside the offending tooth. Nasal endoscopy and radiography are indicated if an oroantral or oronasal fistula is suspected; however, CT imaging is highly rewarding in these cases in terms of identifying apically infected teeth and defining the severity, extent, and location of the fistula. Effective treatment of an oroantral or oronasal fistula in geriatric patients requires patience and owner commitment. In general terms, treatment entails fistula debridement, extraction of loose teeth or apically infected teeth, and temporary obturation of the oral side of the fistula until healing. Appropriate treatment of sinusitis is required in the management of an oroantral fistula, and for an oronasal fistula roughage stems can be removed from the nasal passage with long forceps under endoscopic guidance. Effective treatment of an oroantral or oronasal fistula in geriatric patients requires patience and owner commitment. In general terms, treatment entails fistula debridement, extraction of loose teeth or apically infected teeth, and temporary obturation of the oral side of the fistula until healing. Appropriate treatment of sinusitis is required in the management of an oroantral fistula, and for an oronasal fistula roughage stems can be removed from the nasal passage with long forceps under endoscopic guidance. A very important management principle is elimination of coarse-stem roughage from the diet until healing of the fistula occurs. In the absence of apical infection or loose teeth on either side of a diastema, it may be possible to obtain closure of the fistula in aged horses by treating concurrent sinusitis and sealing the oral aspect of the interproximal space with dental acrylic.9 There are a few clinical reports detailing successful surgical treatment of oroanastatic fistulae in horses.10–13

Oral Masses
An oral neoplasm originating from bone, soft tissue, or dental tissue should be included as a consideration if an oral mass is encountered upon examination14,15 (Fig. 5). In some cases the presence of a non-neoplastic mass such as granulation tissue or gingival hyperplasia may mimic the appearance of an oral neoplasm.15 If an oral neoplasm is suspected then referral to a specialty center for advanced imaging and potential treatment is suggested by the author. Appropriate initial workup of an oral mass includes biopsy of the lesion and histopathology, CBC-Chemistry panel, and radiography or CT study to evaluate underlying structures.

Feeding an Older “Thin Horse”
Nutritional counseling is an important aspect of veterinary dental care in senior patients. The author is not a nutritional expert but does attempt to keep a few simple rules-of-thumb in mind when making nutritional recommendations for otherwise healthy but thin senior patients:

- A thorough dental exam and appropriate laboratory workup should precede ration modification.16
- Thin geriatric patients should be fed a commercial senior feed formulation. The author typically recommends to gradually build up to at least 1%-1.5% body weight per day divided into three to four feedings.
- If thin patients are unable to masticate high quality long-stem hay, then an alternate roughage source such as soaked alfalfa cubes or pellets should be fed in addition to the commercial senior ration. Fat supplementation can be helpful in these patients to increase caloric intake for improvement in body condition.

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• Some geriatric horses will tend to do fine with grazing fresh pasture where the high moisture content of the forage allows less mastication.\textsuperscript{17,18}
• If ever in doubt, consult an expert or trusted colleague when formulating nutritional recommendations for thin patients or for those with disease conditions such as hepatic dysfunction, insulin resistance, pituitary dysfunction, etc.

3. Results and Discussion
The challenges associated with dental care in senior age equids can be somewhat unique from other age groups. Despite decreased chewing ability, older horses, ponies, and donkeys can have a good quality existence with proper intervention.\textsuperscript{17} Oral examination presents an opportunity for the veterinarian to create client awareness of the effects of age-related dental attrition and to discuss important dietary modifications that may be required.\textsuperscript{6} Along with identification and treatment of various age-related dental and non-dental abnormalities, the attentive veterinarian can capably assess the older patient’s nutritional status. Veterinarians should continually strive to equip themselves with proper dental knowledge and instrumentation in order to successfully manage problems in the particular age group under examination.

Acknowledgments

Declaration of Ethics
The Author has adhered to the Principles of Veterinary Medical Ethics of the AVMA.

Conflict of Interest
The Author has no conflicts of interest.

References