

Geriatric dentistry

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Three Counties Equine Hospital, Tewkesbury, UK presents an overview on geriatric dentistry in horses**

Horses (and other equids) have an increased prevalence of dental disorders, particularly periodontal disease, after 15 years of age (Wafa, 1988; Ireland et al 2011a) with recent evidence showing that donkeys also to develop serious dental disorders at 16-20 years of age (du Toit et al, 2009). This same study showed an increased prevalence of wear abnormalities, cheek-tooth displacements and diastemata, loss of teeth (see Figure 1) along with other dental abnormalities such as shear mouth and smooth mouth in donkeys older than 20 years of age (du Toit et al, 2009). A similar study showed dental abnormalities present in 95.4% of geriatric animals, which were examined prospectively (Ireland et al, 2011a). This highlights the need for preventative care in equids older than 15 years of age. Clinical signs of dental disease vary with the severity of the pathology though a significant proportion will show no clinical signs despite the presence of multiple dental abnormalities. In severe cases, quidding may be evident and the animals may take longer to masticate. Temporary cheek swellings may be present if forage becomes packed between the cheek and the teeth and long fibres may be present in the faeces. Over a period of time, these animals may be noted to drop weight associated with decreased food intake and inefficient digestion.

With geriatric animals requiring dental treatment, it is important to take a full medical history and examine the animal as a whole to rule out concurrent disease. Particular abnormalities, such as large non-healing cheek and tongue ulcers, may suggest underlying disease such as pituitary dysfunction. Cardiac disease and orthopaedic problems, such as arthritis and muscle weakness need to be considered when sedating and restraining geriatric animals for dental examination. These animals tend to have increased sensitivity and decreased clearance of the

commonly used agents (Donaldson, 2006), so a lower dose may be indicated. Currently, the author uses low dosages of alpha-2-adrenoreceptor agonists (either detomidine or romifidine) in combination with either butorphanol tartrate or morphine sulphate (if performing an extraction, use morphine). Continuous rate infusion of either xylazine or detomidine may also be used. Where possible, these animals should be placed in stocks, or backed into a corner as they tend to slump down on their forelimbs, particularly when their head is supported on a stand or sling. Where possible local blocks should be used, particularly for extractions to reduce the number and volume of sedation top-ups. Commonly used blocks in the author's clinic include maxillary, inferior alveolar, mental and infra-orbital nerve blocks. At the conclusion of the procedure or in unstimulated periods, the heavily sedated geriatric should be monitored closely, as it is the author's experience that they are more prone to profound ataxia and going off their feet.

ANATOMICAL CHANGES WITH AGEING

Equid teeth have a normal taper from the occlusal surface to the apex and the cheek teeth are tightly packed together as a single grinding unit by the opposing angulation of the 06s, 10s and 11s. As the horse ages and the teeth erupt, they become smaller on cross section, with the incisors beginning oval shaped after eruption, becoming triangular and eventually becoming oval again. Eventually, the tapering allows for the development of diastemata between both the incisors and the cheek teeth, with secondary food impaction and periodontal disease. All teeth have the presence of enamel, dentine and cementum on their occlusal surface and exposure of all three is essential for efficient mastication. The differential wear in these structures allows the formation of enamel ridges and acts as a self-sharpening mechanism. The maxillary cheek teeth have two separate infundibulae (enamel cups; see Figure 2) in the centre of the tooth, and the mandibular cheek teeth have pronounced infolding of the peripheral enamel to increase the grinding area of the tooth. As the tooth ages the infundibulae wear out and the enamel infolding becomes less prominent leading to only a thin shell of peripheral enamel left around the tooth ('cupped out' tooth; see Figure 2). Eventually, the peripheral enamel wears away at the junction of the individual roots, leaving a smooth occlusal surface (smooth mouth) which is inefficient at mastication and has no-wear resistance and may be quickly worn away. It is essential that geriatric animals that are developing 'smooth mouth' should have their body condition and diet closely evaluated at regular intervals.



Figure 1: A geriatric cadaver skull showing multiple missing teeth.

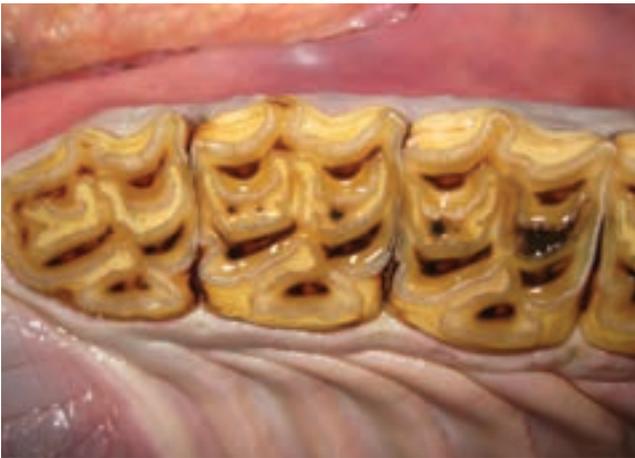


Figure 2: The top photograph shows the occlusal surface of a normal maxillary cheek tooth. The bottom photograph shows the occlusal surface of maxillary cheek tooth which has worn away its infundibular enamel, leaving only the peripheral enamel.

INCISOR DISORDERS

As with younger horses, the incisors of geriatric animals are prone to excessive wear due to behavioural problems such as cribbing and wind-sucking. If teeth are lost, malocclusions may develop, with overgrowth of the opposing tooth and often displacement of the remaining teeth, and regular reduction of the overgrown incisor is required to maintain normal occlusion. It is advisable to reduce overgrown incisors in stages, several months apart to avoid pulpar exposure.

The occlusal surface of geriatric incisors is often abnormal with the development of a ventral convex curvature (smile), a dorsal convex curvature (frown) or a diagonal surface (slope or slant mouth). These changes are due to abnormal mastication, usually as a result of cheek-teeth problems, though 'smile' mouth may be regarded as a normal finding in aged donkeys. Once the cheek-teeth abnormalities have been corrected, the incisor curvature may be addressed. The tapering of the incisor teeth towards the apical region may lead to the development of senile diastemata in a number of geriatric horses (see Figure 3). This may lead to food impaction and secondary periodontal disease, though as these teeth are not subjected to huge masticatory forces, they rarely develop deep periodontal pockets. The



Figure 3: Photograph of an incisive region showing the early development of senile diastemata and food packing between the teeth.

impacted food can be relatively easily cleared by most owners using a standard toothbrush, though particularly narrow or 'valve' diastemata may be widened with a rotating diastema burr.

A more severe form of incisor periodontal disease has been recognised in geriatric patients which is associated with radiographically lytic changes and cemental hyperplasia (Stasyk et al, 2008). This form of periodontal disease is called equine odontoclastic tooth resorption and hypercementosis (EORTRH). The precise aetiology is unknown but it primarily affects the intra-alveolar aspect of the teeth with odontoclastic cells causing resorptive lesions extending into enamel, dentin and cementum causing loss of the normal tooth architecture. Initially these horses present with mild gingival inflammation and oedema, though with progression, draining tracts may develop in the gingiva and there may be gingival swelling and recession. This is usually accompanied by hypercementosis (see Figure 4) of the reserve crown and apex. Eventually, the interdental bone becomes lytic and the incisors become loose. These horses may present with varying clinical signs with some presenting only with hypercementosis, whereas some present with pain on mastication, particularly if the



Figure 4: Photograph showing hypercementosis around the maxillary incisors.

teeth are loose. The author's experience of treating these cases with long-term antibiotics and anti-inflammatories has been unsuccessful and staged removal of loose incisors is now his treatment of choice.

CANINE DISORDERS

Calculus accumulation and mild periodontal disease is the most common disorder of the canine teeth, and this is easily treated with forceps removal of the calculus accumulation. Extremely large accumulations of calculus around the mandibular incisors can be associated tongue ulcers. These teeth may also become fractured or damaged, necessitating removal.

CHEEK-TOOTH DISORDERS

Geriatric horses suffer from the same abnormalities of wear as younger horses though, usually, at a more advanced stage, with step mouth, wave mouth and shear mouth all present. Overgrown teeth tend to be complicated by the lack of reserve crown to the tooth and may be unstable in the alveolus leading to displacement or loss of these teeth. Smooth mouth (described earlier) is seen in geriatric animals when the teeth become inefficient grinding units. A study looking at the prevalence of cheek tooth disorders in animals >15 years old has shown the most prevalent dental pathologies to be mandibular lingual enamel points (64%), maxillary buccal enamel points (51%), periodontal disease (42.9%) and cheek-teeth diastemata (41.9%) with the prevalence of wave mouth (see Figure 5), step mouth, smooth mouth (see Figure 7), diastemata (see Figure 6) and periodontal disease all significantly increased with increasing age (Ireland et al, 2011a). A similar study looking at animals ≥30 years old has shown similarly high prevalence of dental disorders with cheek-teeth diastemata (78.7%), periodontal disease (75%) and smooth mouth (71.7%) the most prevalent (Ireland et al, 2011b). Similar prevalence of dental disease has been shown in geriatric donkeys (du Toit et al, 2009).

Treatment of cheek-teeth disorders in geriatric animals is often limited due to the lack of reserve crown. As much of the occlusal crown should be preserved to allow efficient

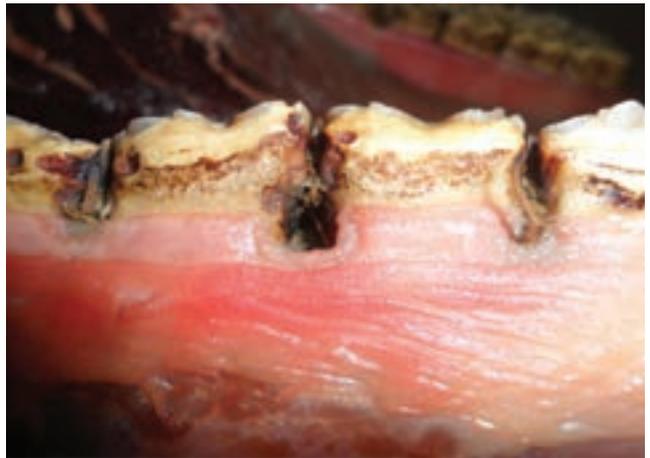


Figure 6: Cadaver photograph showing multiple diastemata and the formation of extensive periodontal pockets.

mastication, though all sharp points which may contact the oral soft tissues should be removed (usually the buccal aspect of the maxillary cheek teeth and the lingual aspect of the mandibular cheek teeth). Excessively large teeth should be reduced in stages to prevent pulpar exposure and with great care as these teeth may be unstable within the alveolus. Overgrown, slightly loose teeth may firmly re-attach once the overgrowth is removed. Severely displaced teeth should be extracted if associated with soft tissue trauma or marked periodontal disease. Digitally loose teeth should be extracted by way of opening, where possible. Diastemata and periodontal disease often involves the caudal cheek teeth and a dental mirror and light source are essential for complete evaluation. In geriatric animals, many diastema may be due to the anatomic tapering of the tooth towards its apex and the loss of angulation of the rostral and caudal cheek teeth, so therefore, the cause cannot be eliminated. All periodontal pockets should be flushed clear of food material and the type of diastema and the severity of the periodontal disease assessed. If the diastemata is narrower at the occlusal aspect than the gingival aspect, widening with a rotating diastema burr may improve the severity of the periodontal disease (Dixon et al, 2008). Any exaggerated transverse ridges opposite the diastema should be reduced to decrease impaction of food into the diastemata (Townsend et al, 2008). Some authors have advocated packing of the periodontal pockets with dental impression compound with or without antibiotic gel (Klugh, 2005) but this has not been substantiated in clinical studies. Horses with smooth mouth are difficult to treat as any remaining enamel should be preserved as much as possible. All enamel points that may cause soft-tissue damage should be reduced and the body condition score of the animal monitored closely. These animals tend to do well in the summer months when grass is freely available, but struggle in winter when asked to eat hay. The hay or grass cubes may be fed in two to three feeds per day. Complete and pelleted feeds are available, though are expensive and require soaking. Vegetable oil may also be added to increase the calorific content. For a more detailed description of geriatric nutrition, readers should refer to the



Figure 5: Photograph of a geriatric cadaver skull showing extensive wave-mouth formation.



Figure 7: Photograph of a proportion of a cadaver maxilla from a horse with a smooth mouth. Note how the O7 has been worn away to its constituent roots.

previous article on geriatric nutrition.

EXTRA-ORAL PATHOLOGY

Temporomandibular joint (TMJ) pathology, although common in humans (Rugh and Solberg, 1985), is relatively uncommonly diagnosed in equine patients. This may not be due to a low prevalence of disease but, in fact, definitively diagnosing TMJ pathology in horses is difficult. Clinical signs associated with TMJ osteoarthritis include a decreased range of mandibular motion and a preference to chew on the non-affected side (with the subsequent development of a shear mouth on the affected side). Joint distension and bony swelling over the affected joint may also be present, with masseter-muscle atrophy present in chronic cases. A definitive diagnosis can be reached with intrasynovial anaesthesia of the affected TMJ using previously described approaches (Rosenstein et al, 2001; Weller et al, 2002). Imaging of the equine TMJ through radiographic projections (Ramzan et al, 2008; Townsend et al 2009), ultrasonographic examination (Weller et al, 1999b; Rodriguez et al, 2007), scintigraphic examination (Weller et al, 1999b) and computed tomographic (CT) examination (Rodriguez et al, 2008) have been described. Treatment options for TMJ arthropathy include intra-articular medication with corticosteroids, arthroscopic exploration (Weller et al, 2002b) and mandibular condylectomy and meniscectomy (Nagy and Simhofer, 2006). Difficulty in mastication may also be due to osteoarthritis of the temporohyoid joint, which has recently been shown to develop age-related pathology (Naylor et al, 2010).

FURTHER READING

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