Equine Dental Exam: Tools and Techniques for Success

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Abstract

Examination of the equine oral cavity has become a common part of an annual wellness plan for many practitioners. This examination is typically performed in unison with annual teeth floating (odontoplasty) to remove the enamel overgrowth / sharp points. With a well sedated and cooperative patient, a thorough examination of the dental and oral soft tissues of the mouth may be performed. Advancements in equipment have improved access to the caudal mouth and provide greater visualization. Early oral pathology can be detected, recorded and future treatment plans created in effort to prevent future tooth decay, abnormal occlusal wear / tooth attrition, extraction, sinusitis and other abnormalities.

Keyword; Equine, dentistry, dental exam, charting, dental equipment

Introduction

Modern equine dentistry has enjoyed enormous growth due largely to improved imaging, documentation, clinical research and an increased number of viable treatment options. With this growth the importance of a thorough oral exam and dental charting has never been greater. The ability to electronically share information between first opinion veterinarians and referral centers

has become increasingly easy and allows for remote consultation on cases via: oral photographs, oral endoscopy, digital radiographs, computed tomography, etc.

These improved diagnostic capabilities have led to earlier recognition of dental pathology and opportunities to treat diseased teeth prior to the need for an extraction in many cases. The horse, as an animal of prey, has evolved to hide evidence of weakness or pain. A display of pain or trouble with mastication is typically evident only at an advanced stage of dental pathology. More often than not, significant pathology may be present without the owners' prior knowledge or perception. The practitioner is tasked with identifying, documenting, monitoring and when indicated intervening to stop the progression of dental pathology that may lead to dysmastication (quidding), oral pain, tooth loss, etc.

Material and Methods

Equipment

During the past decade advancements have been made in the areas of equipment specific to equine dentistry but limitations still exist. Mobility, storage space and cost of specialized equipment is certainly a factor for many general practitioners in an ambulatory setting which is the most common place dentistry is being performed. While a CT unit, MRI and even nuclear scintigraphy can be amazingly helpful they are non-practical in an ambulatory setting. Nonetheless, there is equipment that will allow a practitioner to comfortably, safely and thoroughly examine the oral cavity of a well restrained horse. Additionally, this equipment can easily be stored in an ambulatory setting. The author most commonly uses the following for oral examinations: sedation, mouth speculum, headstand / dental halter, dose syringe, head lamp /

speculum light, dental mirror and/ or endoscope, dental explorer, dental scaler, periodontal probe and a dental chart.

As with any procedure we perform in practice, having the correct equipment makes all the difference in the world. A rickety mouth speculum that closes unexpectedly and pinches fingers is a sure way to reduce excitement of performing dental exams and floats. Systematic examination and documentation of the oral cavity allows for repeatability and increases the likelihood of detecting early pathological changes. The author prefers to break the dental examination down into five basic components and these are performed step wise on each patient.

Extra-oral exam (external exam)

The practitioner must first consider the overall health of the horse and a general physical exam including temperature and auscultation should be performed. At this time, it is appropriate to ask questions of the owner / trainer:

- Has the horse lost weight?
- Has the horse been previously sedated and what was the response?
- Any change of eating habits? i.e. difficulty eating, dropping feed, quidding.
- Does the horse hold his head sideways while chewing?
- Any trouble with the bit, head carriage under tack?
- Any previous dental problems / extractions?

After a solid history and physical, the extra-oral exam of the head is performed looking to identify areas of facial swelling /dissymmetry, draining tracts, nasal discharge, malodorous breath, boney swellings of the mandible, tearing eyes, temporal mandibular joint (TMJ) pain, enlarged lymph nodes, etc. Some of these conditions may be more subtle than you may expect

but can be very helpful in identifying underlying pathology. This step should be performed prior to placement of the mouth speculum and should include auscultation of the heart and lungs prior to sedation. Sedation with an alpha-2 adrenergic agonist is most common with the author preferring detomidine hydrochloride (Dormosedan, Zoetis, Kalamazoo, MI, USA) alone or in combination with butorphanol tartrate (Torbugesic, Zoetis, Kalamazoo, MI, USA).

With a well sedated horse and no evidence of mandibular fractures a mouth speculum is placed, the oral cavity rinsed with a dose syringe using dilute chlorohexidine solution. Next the head is elevated using either a dental headstand or by using a dental halter with rope and quick release clevis based on practitioner preference. The dental rope halter has a small footprint and fits easily into a mobile veterinary vehicle.

Occlusion (Orthodontic)

Occlusion / Orthodontic examination is performed by first evaluating the incisor contact. Classified on a system of 0-4: Class 0 (neutrocclusion, equal length of mandible and maxilla), Class 1 (neutrocclusion with individual tooth displaced buccal, lingual, etc.), Class 2 malocclusion (overbite), Class 3 malocclusion (underbite), prior to dental speculum placement.[1] After speculum placement the canines and cheek teeth can be further evaluated with the aid of a bright head lamp or a magnetic speculum light. Cheek teeth alignment may be abnormal i.e. shear mouth, step defects, hooks, ramps, missing teeth, supernumerary teeth, wave mouth, linguoversion, buccoversion, palatoversion or others. Identification of these malocclusions will allow the practitioner to document and formulate a treatment plan as necessary. These malocclusions of individual teeth may begin as mild insidious overgrowths, elongations or areas of increased attrition. If these subtle changes in occlusion are left untreated, they may lead to tooth fracture, diastema formation, periodontal disease or excessive wear of teeth in opposite

quadrants. When teeth are found to be longer than others in the quadrant it is important to identify the tooth in which it occludes. Typically, this shorter tooth (less erupted clinical crown) is the abnormal tooth. It is shorter due to a maleruption, fracture or other form of pathology and this has allowed the tooth in occlusion to wear at a slower rate than other teeth in the same quadrant. Occlusal wear / attrition occurs at a rate of approximately 3mm per year.[2]

The evaluation of occlusion differs largely on the age of the patient. Knowledge of expected eruption times of deciduous (birth to 6 months) and adult teeth (1-5 years) is important for the practitioner and will guide treatment planning. Unerupted or delayed eruption of cheek teeth in the middle of the quadrant (i.e. 07, 08, 09, 10) may lead to impacted teeth. If this is suspected then radiographs should be taken and the lack of eruption followed closely with recheck exams. Knowledge of the eruption ages of premolars does not constitute a good reason to remove a deciduous tooth (cap) on a horse because the book says it is time for the adult tooth to erupt. It is advisable to only remove those deciduous teeth (caps) that are freely mobile and easily removed with fingers rather that extractors. Some exceptions do exist when other pathology precludes waiting for the eruption of permanent dentition. Premature removal of the deciduous tooth (cap) will expose the developing adult dental bud and may cause damage that prevents normal eruption or in severe cases cause infection of the developing tooth. Removal of these unerupted infected teeth is troublesome, involving more advanced surgical approaches. It is for this reason that sound judgment should be used prior to removing these caps in young growing horses.

Soft Tissues

Soft tissue structures of the oral cavity include: lips, free gingiva, soft and hard palate, maxillary and mandibular bars, tongue, cheek mucosa and the caudal recess of the oral pharynx. These structures are evaluated for sensitivity, bruising / abrasions, ulcerations, lacerations, foreign

bodies, masses etc. Careful evaluation of these structures may lead to further investigation of adjacent teeth or the upper airway in some cases. Performance horses will often have varying degrees of soft tissue trauma and abnormalities. The tissues affected may vary greatly with the contributing factors being the performance discipline, bit type, rider experience and level of performance. Those horses that perform on a loose rein with little bit contact (Thoroughbred racing) will have different and often less pathology than a horse that performs with more contact and held in a collected frame while in a show ring (dressage). Experienced riders and horses typically have less soft tissue pathology than young inexperienced riders and horses. During examination of "problem bitting" horses, close inspection of the oral soft tissues will often reveal areas of bit trauma to the lip, bars, tongue or palate. Knowledge of bits, bridles, tack and training methods will help a practitioner to make recommendations to eliminate repeated concussion to already traumatized oral tissues. For example, a horse with a tongue laceration would experience increased pressure from a straight mullen and would have relief with a single break snaffle bit. The straight mullen would apply pressure evenly across the tongue and lips while a single break snaffle will form a roof over the tongue (inverted "V") and transfer contact to the bars and lips. While there are restrictions in place by some horse show governing bodies, there are times that leniency may be granted by show stewards and horses competing with oral pain may be given the chance to perform with a bit that will allow relief of pain to previously traumatized tissues. These bits may give the rider less control and a good working relationship with the trainer and practitioner are necessary to find solutions in these cases.

Trauma to the bars is also a common finding and while this tissue does not always bruise or lacerate, the horse can be very reactive to digital pressure even under sedation. Knowledge of bitting will guide the practitioner in conversations with the trainer and in making

recommendations which may include radiographs of the underlying bone. Horses with narrow mandibles with a dorsal curvature that comes to a peak rather than rounding at the area of bit contact experience more trauma. This is a common finding in Thoroughbreds and while it does not affect them while racing on loose rein, it does cause a problem when they begin their sport horse career away from the track. Not all problem bitting cases are from soft tissue abnormalities but this should be ruled out during the examination.

Periodontal

Periodontal tissues (periodontium) are comprised of the alveolar bone, periodontal ligament, cementum of the reserve crown and the attached gingiva. Of these only the attached gingiva can be seen during an oral examination. For evaluation of the alveolar bone, periodontal ligament and reserve crown additional diagnostic imaging is required such as radiographs or cross-sectional imaging.

Visualization of all the attached gingiva in the mouth can be difficult and use of a dental mirror or oral camera/ endoscope will allow the practitioner to see all surfaces in the mouth. Technology has recently improved in the area of oral cameras and oral endoscopy. There are mobile options now available for practitioners to use in a field setting that no longer require a bulky tower and processor. A low-tech way to evaluate the periodontal status of the teeth is to feel each tooth in the horse's mouth with your fingers palpating for pain and mobility, the author does this in every oral exam. Using the mirror / scope, areas of the gingival sulcus can be examined for inflammation, gingival recession, feed packing, diastema formation, draining tracts, parasites, masses or other pathology. A dental probe with color bands in millimeters is a useful tool in measure the depth of periodontal pockets (areas of gingival recession and loss of attachment). Discovery of periodontal disease leads to the need for treatment planning. Only the

attached gingiva can be seen with the naked eye and for further evaluation of the alveolar bone, periodontal ligament and reserve crown additional imaging is necessary. Only then may you accurately assign a grade to the degree of periodontal disease based on attachment loss as seen in Table 1. This grade is necessary for treatment planning. For example, a horse with Grade 4 periodontal disease (>50% attachment loss) is a poor candidate for diastema burring, gingival curettage and medicament placement. Likewise, a horse with Grade 1 periodontal disease does not require an extraction as a treatment.[3]

Periodontal disease is often considered the most painful finding in the mouth of a horse. With a prevalence of 49.9% in the general equine population.[4] Left untreated it will often lead to additional pain, potentially systemic illness and most certainly tooth loss in many cases. While the most severe cases are often in older patients, early detection and intervention in younger horses can prevent premature tooth loss.

Endodontic

Endodontic evaluation requires close inspection of the occlusal surface of each tooth and significant knowledge of the internal anatomy of the tooth. Small changes in color and defects over the pulp horns may indicate areas of pathology or abnormal wear from the forces of mastication involving the tooth in occlusion. The surface of each tooth is comprised of layers of cementum, enamel and dentin; each with a distinctive color and appearance. These are most easily viewed with an oral scope or mirror to allow for complete visualization and magnification.

Caries and open pulp horns: Voids and defects in the occlusal surface will often gather feed from the horse's diet. This "food stasis" (food being stuck) is not a benign condition. The accumulation of this feed and later decay within the tooth creates an acidic environment ideal for

cariogenic bacteria. This environment subsequently leads to caries (cavity) formation within the structures of the tooth. This most commonly occurs within the infundibulum of the maxillary cheek teeth and peripheral cementum of the cheek teeth. However, they can also be seen within defects of the irregular secondary dentin of the pulp horn occlusally. The presence of feed that does not easily flush from the mouth and remains stuck in teeth or between teeth always requires closer inspection. This should include a dental pick or explorer to remove the feed and probe for depth. Often decay will be present and seen as tooth destruction locally with dark staining. Tannic acids from the forage of the equine diet cause predictable staining of the softer dentin within the tooth and should only be present over the pulp horns on the occlusal surface of the teeth. If one of those pulp horns is a different shade of brown or tan than surrounding pulp horns, probing is indicated and radiographs to evaluate for apical changes may also be warranted.

Fractured teeth: Pathology involving the tooth structures will cause weakening of the tooth and eventual fracture. Fractured teeth should be imaged and may require extraction. It is useful to know that the equine tooth has a remarkable ability to persevere. Unlike brachydonts, the hypsodont equids have the ability to for dentinal bridges (layers of tertiary dentin) that can form a stop gap within a pulp horn. This dentinal bridge prevents the oral cavity from accessing the apex of the tooth and thereby preventing apical infection and the need for an extraction.

Discussion

The dental exam is an important part of the annual wellness plan for each horse. Often owners call asking for a dental float. If as a practitioner we look at a horse with the mindset that the horse is here for teeth floating (odontoplasty), then that's what you will do, float teeth. If instead we can adjust our mindset to one that is focused on performing an exam prior to giving a treatment, we are more likely to identify pathology. The treatment of the elongated clinical

crowns, steps, ramps and sharp enamel points will still need to be reduced and the floating (odontoplasty) will have been the appropriate treatment but this is done after the exam. The primary goal is that by performing a systematic, repeatable approach to the oral exam that more pathology will be identified and successfully treated. The aim of our profession is to improve the welfare of the horse. This welfare will improve as our ability to recognize painful abnormalities in patients that often show no outwards signs, improves.

Conflict of Interest

The author discloses no conflicts of interest.

Declaration of Ethics

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

References

1. Easley J, Schumacher J. Basic equine orthodontics and maxillofacial surgery. In: Easley J, Dixon PM, Schumacher J, editors. Equine dentistry. 3rd edition. Philadelphia: WB Saunders; 2011. p. 289-310.

2. Baker GJ. Oral examination and diagnosis: management of oral diseases. In: Harvey CE, editor. Veterinary dentistry. Philadelphia: WB Saunders; p. 217-28.

3. Klugh D. Equine periodontal disease. Clin Tech Equine Pract. 2005; 4:135-47.

4. Walker H, Chinn E, Holmes S, et al. Prevalence and some clinical characteristics of equine cheek teeth diastemata in 471 horses examined in a UK first-opinion equine practice (2008 to 2009). Vet Rec 2012; 171:44.

Figure 1a. Dental Chart

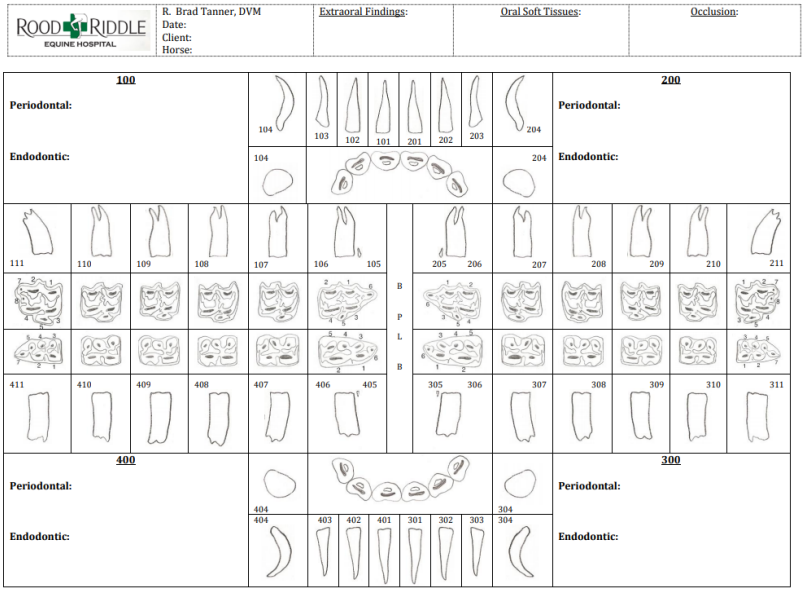

Figure 1b. Dental Chart

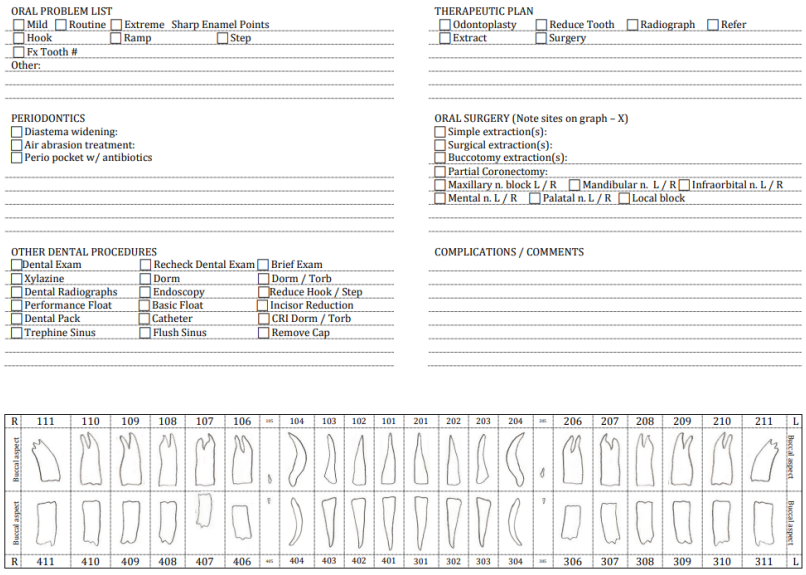

Table 1. Periodontal Grading Scale

Table 1 Periodontal Disease, grading based on periodontal pocket depth and radiographic attachment loss		
Grade of Periodontal Disease	Perio pocket depth (mm)	Attachment loss
0 No disease	<5	0
1 Gingivitis	<5	0
2 Mild disease	5-9	<25%
3 Moderate disease	10-14	25-50%
4 Severe disease	>15	>50%