How to Perform a Thorough Oral Examination

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1. Introduction

A complete visual oral examination should be the basis of every dental visit and is a high standard of care. A comprehensive visual examination of the head and oral cavity is necessary to arrive at a diagnosis, perform appropriate treatments, and plan for management of challenging dental problems. The welfare of the horse depends on skilled and knowledgeable veterinarians that can characterize normal and abnormal findings both systemically and relative to the oral cavity. Clients that observe a comprehensive clinical dental examination of their horse will then compare it to their own dental care in a dentist’s office and are able to recognize the difference between veterinary dentistry and improper non-veterinary dental care. When horse owners recognize that dental treatments are based on medical expertise and accurate diagnoses, they begin to request exams for their horses instead of simply a “float.” A methodical oral and dental examination is required to diagnose diseases affecting the oral cavity. This inspection can be applied with the same degree of objectivity as would be the case during a lameness evaluation or any other body system examination. As with any examination, conclusions allow the clinician to diagnose early disease as well as identify and manage chronic problems, thus improving quality of life and benefitting the long-term general health of the horse.

2. Materials and Methods

Equipment, Location, and Sedation Considerations for a Dental Examination

Basic dental examination equipment is readily available by numerous veterinary suppliers. Recent instrumentation advances allow more efficiency and ease, and modern equine dentistry does not need to be cumbersome and labor intensive. The following basic equipment and instrumentation list is required for an oral examination:

- Sedation
- Headstand, head support, or dental halter
- Large volume dosing syringe or other method to thoroughly rinse ingesta from the oral cavity
- Full mouth speculum
- Buccal and/or lingual retractor
- Bright light source: headlight or magnetic speculum light
- Dental mirror – available in various sizes
- Extended handle periodontal probe with marked measurements
- Extended handle occlusal surface explorer
- Right angled alligator forceps and dental picks to remove feed from gingival pockets
• Short handle double-ended periodontal probe and explorer for incisor evaluation
• Forceps – incisor and molar cap extractors to test for tooth mobility
• 4 × 4 gauze
• Disposable nitrile or latex gloves
• Dental chart

Additional equipment that may facilitate examination and recordkeeping, and ancillary diagnostics include the following:

• Trained technical assistant
• Oral endoscope with light source
• Digital intraoral camera
• Digital radiography system
• Stationary stocks for restraint

Appropriate sedation of the patient is mandatory to complete a comprehensive visual oral examination.1-3 An oral examination is an invasive procedure to an unsedated horse. Although compliant horses may tolerate a brief examination of their mouth when held open, and even may tolerate the speculum, it should be noted that an unsedated horse wearing a speculum is capable of inflicting serious injury to itself and handlers.3 Following cardiac auscultation and physical examination, sedation is administered to allow patient relaxation and compliance. Muscles of mastication should be relaxed to allow speculum placement, and the tongue should be relaxed to allow complete visualization without excessive tongue motion. The author’s preference is an alpha-2 agonist/opiate combination (0.012 mg/kg detomidine® combined with 0.01–0.02 mg/kg butorphanol® IV). Ergonomics of the clinician and the patient should be considered, and the use of an appropriate head support should be used. An adjustable head stand, sling, or dental halter helps to stabilize the sedated patient, and allows the veterinarian to work in a comfortable position. A quiet indoor environment is best to avoid external distractions to the patient and working indoors with moderate ambient light allows better illumination of the oral cavity with a headlight or speculum light. Consideration should be given to flooring, which should be level and a non-slip surface. Stocks are essential in a clinical setting for treatments including extractions, and while they are not typically required for a basic examination, they can certainly facilitate the process.

Dental History Taking

History taking helps complete the clinical picture in any medical examination and a thorough oral exam is no different. A presenting complaint of a specific dental problem should not preclude the veterinarian from obtaining a complete dental history and performing a thorough dental and physical examination.4 The general history includes information such as the patient’s signalment, athletic use, medical history, dietary history, husbandry and environment, vices, and recent changes noted. Overall medical history such as prior response to sedation, musculoskeletal and neurologic status, cardiac abnormalities, respiratory disease, underlying renal or hepatic disease, and endocrine status all have an impact on how the horse is evaluated. Oral/dental specific history includes prior dental treatments, feeding habits and any perceived difficulty masticating, fecal consistency, recently noted physical abnormalities such as nasal discharge, malodor, or abnormal swellings, and biting history and any perceived discomfort and progression of such.

Observation and General Physical Examination

Observation of the animal in its normal surroundings can provide important information. Objective data about body condition can be recorded with photographs, weight tape or scale, and can be valuable in management of patient nutrition. Abnormalities with the horse’s posture and ambulation should be observed and taken into consideration for a sedated examination. Dropped grain or partially chewed boluses of hay (quids) can be observed in the stable environment and feces should be examined for volume and consistency, as long forage stems or whole grain visible in feces indicate poor mastication.5 Observation of the mastication process while the horse eats several different types of food can be time consuming, but it can lend important information to the examination as well as address client concerns if they have noticed more difficulty with a particular feed or hay. It can be particularly useful to observe the horse eating to evaluate for mastication difficulties, as prehension problems look very different from dysphagia. It is important to remember that the horse as a whole should be taken into consideration when being evaluated for dental disease. Oral health is impacted by systemic health and systemic health plays a role in oral health, and the two must be considered collectively in order to make an effective treatment or management plan.1,6

Comprehensive Oral and Dental Examination

Routine comprehensive examinations, beginning with an oral examination at birth for congenital abnormalities, should be performed at an interval that allows for detection and treatment of problems while they are still minor. For most horses, this will be every 6–12 months depending upon their eruption and development of dental problems as they age. The appropriate schedule is variable between individual horses and will be affected by variables such as their own anatomy, use of the horse, stage of development and oral conditions present or developing, and previous treatments performed.1,7

For complete evaluation of all oral/dental structures the comprehensive dental examination needs to be
systematic and organized (Table 1). Extraoral examination is completed first, followed by examination of occlusion, soft tissues, periodontal status, and endodontic status for both the rostral oral cavity (incisors and canines) and then the caudal oral cavity (including premolars and molars). Exam specifics will be outlined in this manner as this is how the author performs a dental exam. The reader should develop their own methodical approach to completing the oral exam to include the components outlined here. Performing a methodical examination will reduce the chances of failing to identify abnormalities so that the veterinarian can ensure that all aspects of oral health are assessed and then apply those findings to reach a diagnosis and treatment or management plan.

**Extraoral Examination**

The dental examination begins with an external visual inspection and palpation of the structures of the head for evaluation of the following:

- **Skull symmetry, conformation, shape:** The ears, eyes, facial crests, musculature, nasal bones, and muzzle should be symmetrical. Breed differences and head conformation may predispose to certain dental concerns, and awareness will aid the practitioner in approaching the dental case.
- **Bony enlargements, thickening, or depressions involving the maxillary region and the mandible:** Gross abnormalities such as these with heat, swelling, or associated with a draining tract may indicate apical infection if unilateral in nature.
- **Symmetry of muscles of mastication:** Temporals, masseter, and pterygoid muscles should be bilaterally symmetrical without atrophy or hypertrophy.
- **Temporomandibular joints (TMJ):** These should be bilaterally symmetrical, free of effusion, and nonpainful on palpation. There will be individual variation, but the practitioner should acquire a sense of normal TMJs to be able to recognize abnormal bony enlargement of the TMJ.
- **Parotid salivary glands and intermandibular lymph nodes:** All lymph nodes and salivary glands should be palpated for enlargement and symmetry.
- **Nasal airflow, odor, or discharge:** Airflow should be symmetrical from each nostril, and odor from each side should be assessed. Nasal discharge should be assessed for character, consistency, volume, and odor. Dental sinusitis typically presents as a fetid unilateral mucopurulent discharge. If a noxious odor or discharge from one side is present, the practitioner should plan to evaluate the maxillary dentition meticulously visually on that side for indications of disease.
- **Ocular structures:** Orbital structure, eyes and eyelids should be symmetrical, clear, and free of discharge.
- **Discharging tracts or nonhealing wounds:** Any wound or draining tract over maxillary structures or mandibular rami should be assessed as these typically will have a dental or traumatic origin.
- **Muzzle and lips:** These should be evaluated for swelling, wounds, or masses. The commissures of the lips are common places to find scars or ulcers from bit injuries, as well as...
melanomas in gray horses. Muzzle deviation to one side can indicate neurologic abnormalities secondary to temporohyoid osteopathy (THO) that should be assessed prior to any significant dental procedures.8–10

Intraoral Examination

The intraoral examination includes evaluation of occlusion, oral soft tissues, periodontal, and endodontic status of all dentition. It is helpful to separate the intraoral examination into two parts: the rostral oral cavity including incisors and canine teeth, and the caudal oral cavity including premolars, molars, bars, tongue, and palate. The oral cavity should be rinsed thoroughly to remove all feed material so that visualization of dental structures is not obscured, especially the dental occlusal surfaces and gingival margins. Complete endodontic, periodontic and infundibular assessment requires the use of occlusal and periodontal depth probes to objectively quantify the degree and type of pathology present, this is significantly aided with appropriate lighting and sedation. Most of the rostral examination should be performed prior to speculum placement. The incisors and canine teeth should be evaluated for the following:

- Occlusion: Orthodontic status of incisors should be assessed with the horse’s head in a natural position, not manually elevated by the examiner or assistant as this can give the false impression of maxillary prognathism (overjet).11 Rostrocaudal movement of the mandible can be evaluated by observing the relationship between the upper and lower incisor when the chin is raised and lowered.4 When evaluating occlusion, the examiner should consider whether occlusion or malocclusion is due to a dental or skeletal abnormality or asymmetry. Incisor diagonal malocclusion has been reported to be due to skeletal asymmetry and not a primary dental malocclusion.12

Number and alignment of incisors and canines should be assessed. Presence of diagonal or dorsal/ventral curvature incisor malocclusion should be recorded. The dental age should be estimated and compared with the known age of the horse. The lateral excursion to molar contact test (LMC) may be used to evaluate for masticatory symmetry and suspected oral or dental pain.4,13–18 Normal lateral excursion produces a relatively even, subtle to moderate vibration and sound. Deviations from this can be an indication of abnormal dental contact due to cheek teeth overgrowths. It must be kept in mind that this maneuver does not replicate the chewing motion of the horse. If the horse resists this part of the dental examination, sedation may be indicated to help the horse relax and allow a more thorough visual examination.4

- Soft tissues: Any masses, wounds, ulcers, or erosions to labial gingiva and mucosa should be noted. Attached and free gingiva should be evaluated for indicators of inflammation and subgingival disease, fistulae, recession, or hyperplasia.
- Periodontal status: A double ended periodontal probe and occlusal explorer used for small animal or human dentistry is useful for incisor and canine examinations. The periodontal probe with depth markers is useful to assess degree of attachment loss, and teeth should be palpated and manipulated individually for mobility scoring. Pain response such as chattering or resistance to probing should be recorded, heavily sedated horses will still show significant pain responses to light probing, particularly with equine odontoclastic tooth resorption and hypercementosis (EOTRH) affected incisors and canines.19 Accumulated calculus should be scaled to accurately assess the gingival margin.
- Endodontic status: Canines and incisors should be assessed for eruption status, traumatic damage, resorptive lesions, and hypercementosis. Occlusal surfaces of all incisors and canines should be examined for pulp exposure and defects.

Examination of the caudal oral cavity will include visual evaluation of the premolar and molar dentition and gingiva, buccal and lingual mucosa, bars, tongue, hard and soft palate. When the patient is appropriately sedated, a speculum may be applied, and the head rested on a headstand. The veterinarian equipped with a bright headlight or speculum light can visualize structures deep within the oral cavity but does need to use a dental mirror, intraoral camera, or a dental endoscope to visually examine oral and dental structures.2 If the horse is inadequately sedated, effective examination with a mirror is almost impossible. The veterinarian should practice using a mirror or endoscope with every dental examination. Although it may be frustrating at first, skill is acquired with consistent practice. Occlusal and periodontal lesions will no longer be missed, and it will elevate the quality and breadth of the examination. To use a mirror (or endoscope, the same general procedure may be performed with either one) to systematically evaluate all surfaces of the teeth and oral soft tissues, start with the mirror placed between the right maxillary and mandibular arcades so that the occlusal surface of 106 is reflected in the mirror. The mirror is then advanced caudally to visualize the occlusal surface of each tooth in the
100 arcade. When 111 is reached, the mirror is then tipped to visualize the palatal aspect of 111, and then withdrawn rostrally to examine the palatal mucosa and interdental spaces. When 106 is reached, the mirror is again advanced to distal 111 and withdrawn rostrally but tipped to visualize the buccal mucosa and vestibular interdental spaces. The same process is then repeated for the 200, 300, and 400 arcades to evaluate all aspects of each tooth in addition to surrounding soft tissues.20 Examination of all structures should be completed in the same systematic manner as described below.

- Occlusion: Orthodontic assessment of premolars and molars is performed, including counting teeth in each quadrant and recognition of general wear abnormalities and focal malocclusions. Note the position of the clinical crown of each tooth and its orientation and relationship to adjacent and opposing teeth. Any defects or asymmetry in the occlusal crown surface in one row is usually reflected in a wear abnormality or defect in the opposite row. Assess each quadrant of premolar and molar teeth as a functional unit.6

- Soft tissues: Examine all oral cavity soft tissues including all surfaces of the tongue as far caudally as vallate papilla, lingual folds, sublingual mucosa, the hard and soft palates, the gingiva, mucogingival junction, and alveolar and vestibular mucosa. Any masses, wounds, ulcers, or erosions should be noted and their association with dental structures or trauma noted. Attached and free gingiva should be evaluated for indicators of inflammation and subgingival disease, fistulae, recession or hyperplasia.

Visualization and palpation of the interdental space (bars) should be performed for unerupted (“blind”) or vestigial wolf teeth or canine teeth, subgingival remnants, periosteal exostoses (“bone spurs”), or biting trauma.21,22

- Periodontal status: A long-handled thin periodontal probe is necessary for premolar and molar periodontal assessment. Examination may reveal halitosis, bleeding at the gingival margins of the teeth, pocketing and necrosis of tissues around the teeth, and loose teeth.7 If there is impacted feed or supragingival calculus in between or around the teeth, remove it entirely with long-handled oral picks or forceps to enable accurate probing and gingival assessment. The periodontal probe with graduated markings can be used to measure gingival pocket depth and assess degree of periodontal attachment, which will range from 0.5 to 5 mm for normal teeth.23 It has been shown that gingival pocket depth measurements at the corners of the teeth significantly increases with periodontal disease.24,25 Diastemata width and depth, periodontal pocketing, and interproximal space anatomy should be recorded. Teeth should be palpated and manipulated individually for mobility scoring and any pain response noted.

- Endodontic status: A detailed examination is performed to evaluate the physical structure of each tooth. Defects over the pulp horns on the occlusal surfaces of endodontically infected teeth can be detected by carefully probing the secondary dentin of the occlusal surfaces of suspect teeth.26,27 A long-handled occlusal explorer is used to assess occlusal surface for abnormal secondary dentin or presence of tertiary dentin, open pulp horns, fissures/defects in dentin, enamel or cementum, crown fractures, infundibular cemental hypoplasia, or caries. Peripheral cementum is also examined for dysplasia, hypercementosis, and peripheral caries. Infundibular status is assessed using the Modified Honma system of grading of occlusal caries28

Dental Recordkeeping and Documentation
Completion of a detailed dental chart and images (intraoral photography, video, or image capture from endoscopy) documenting examination findings should be included to complete the medical record. Accurate records are critical for the veterinarian to be able to thoroughly follow a case, communicate with other veterinarians, and provide a medical/legal document if necessary. In dental charting, the dental formula and anatomical locations in the mouth must be standardized to make documentation consistent. Use of standard abbreviations29 for dental terms to describe anatomical boundaries, abnormalities, diagnostics, and therapeutic procedures make communication possible between equine practitioners and other colleagues in both the veterinary and human dental professions.7 Important information recorded in the dental chart includes the following:

- Horse identification and signalment
- Owner information and date and time of examination
- General physical exam abnormalities, vital signs, and body condition score
- Presenting complaint and case history
- Record of sedation and medication administration
- Objective findings for extraoral and intraoral exam components including measurements taken, sketches of visible abnormalities such as fractures or focal malocclusions
Fig. 1. Sample dental chart.
The detailed dental chart should help the veterinarian progress through the exam methodically. The completed record should integrate and interpret examination findings, taking into consideration the history and presenting complaint. This record should assist the practitioner in coming to a diagnosis and a subsequent management or treatment plan. Recording images, videos, and radiographs digitally allows these images to be incorporated in the computerized dental record. 

Integration of the history and examination findings with the radiologic findings and other diagnostic procedures greatly improves the chances of an accurate diagnosis being formed. A sample dental chart used by the author is included (Fig. 1).

3. Conclusions
The thorough oral examination is the mainstay of the routine dental visit. The veterinarian must have a thorough working knowledge of gross and ultrastructural anatomy of the dentition, as well as an understanding of the etiology and progression of dental pathologies to understand the findings and develop a management plan. Developing a consistent and efficient examination procedure will allow the veterinarian to reliably diagnose pathologies in the early stages of development. Improving the quality of the oral examination will increase the quality of dental care provided to patients. It is every clinician’s responsibility to obtain the evidence and use evidence-based decision making to improve the way in which oral care is administered.

Acknowledgments

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

Conflict of Interest
The Author has no conflicts of interest.

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