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EQUINE DENTISTRY
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Introduction

For the last seven years talks and courses have been given in Mexico City, by Veterinarians and dentistry technicians in equines, coming from different countries (United States, France, Brazil, Canada and Mexico); professionals specialized in the care of the mouth of equidae, concerning manual work as well as using different motorized equipment, or better yet the combination of both, allowing veterinarians to learn and acquire the minimum training necessary to offer a professional service, benefiting not only high performance horses but also the working horse. This has contributed to a big growth in this area, much higher than the last 30 years. At the same time, we realized that in the United States, in the last eight years it has grown from a few businesses dedicated to producing specialized dentistry equipment, to at least a dozen businesses that offer alternatives in equipment, from being able to do a manual job, as well as motorized equipment to perform cleanups and teeth whitening, complete dental units, similar to those in human dentistry to clean out cavities, for setting up de amalgams on horse, etc. On the other hand, we see more scientific articles in journals related to disorders, diagnosis and treatment of the different pathologies in the oral cavity of horses. This shows how nowadays more importance is being given to this area of knowledge, due to its importance in the performance horse. It is evident that when there is more information and thus more training, clinicians are being more careful when examining the oral cavity in patients; there are probably many disorders that are being detected now that had been ignored previously, “you cannot look for what you don’t know”, for example we are now trying to detect cavities to fix them instead of waiting for them to become a problem and losing a tooth, we look for tartar and its removal, to avoid it causing gingivitis, or if there is diastema, to try and correct it, instead of waiting to find periodontal disease.

Dentistry and orodental balance in equines is becoming more and more important all over the world. The Veterinarian who is a specialist in equine dentistry is rapidly becoming a key participant in the care and prevention in orodental problems in the horse.
This has a positive influence in the overall performance of the horse. Dentistry is not new, but is currently enjoying a rediscovery process. There are bibliographic references and quite advanced dentistry tools dating back to the turn of the twentieth century. The horse has always played a key role in the life of men: as a working tool, transportation, vital to economy. This is why, care of the mouth is a necessity and a priority to optimize nutrition.

In equine practice, we find different disorders in the oral cavity, many other that we do not diagnose because of lack of knowledge or lack of attention while evaluating the mouth of our patients. Currently the tendency to not be a “general practitioner” is increasing, and to have specialized practitioners is preferred. This has launched and created new areas of research and manufacturing of specific equipment used to evaluate, diagnose and treat in all the different specialized areas. We find ourselves in a constant educating process towards our clients, trainers, grooms and veterinarians as well, so that the care and specialized evaluation of the oral cavity is advocated, and the simple getting rid of odontophytes is forgotten.

EXTERNAL EVALUATION OF THE HEAD OF THE EQUINE

The evaluation of the oral cavity starts with an external examination of the head of the horse, assessing and palpating areas of swelling, deformities or facial asymmetry. We need to evaluate if there is pain while chewing or drinking cold water, if there are fistulas, nasal secretion from one or both nostrils, pain while palpating the temporomandibular joint, foul smell (halitosis). Is important to detect scarring or trauma to the lips, possible foreign bodies (splinters, hay, glass, metal, needles etc.). Evaluate the oral cavity looking for possible neoplasia, facial paralysis, atrophy or other neurological or nutritional problems.

The inflammation of the maxillae (just above the maxillar sinuses) can affect the good drainage of the naso-lacrimal duct, and this can cause unilateral ocular secretion.

All these are just some of the points we should consider.

It is very important to know the clinical history of the patient, as well as getting information on its performance, describe by its rider most of all. It is also important to know the bit, if there is any problem while working or being ridden, if there is any
difficulty while trying to collect him, shaking of the head, or while running in a track if
the horse goes towards the inside or the outside, if it bores down on the bit, if it drops
food while chewing, what kinds of bit has it used, nutrition, age, vices, etc. The horses
that have severe problems in the oral cavity are reluctant animals, hard to handle,
especially around the head.

EXAMINATION OF THE ORAL CAVITY

For the correct examination of the oral cavity it is required to have a good full
mouth speculum, a good source of light, disposable gloves, dentistry tools (intraoral
mirror, dental pick, and a good pressure irrigation system such as “water pick” for
humans, because in many instances the feed packed into cavities, diastema or periodontal
disease makes it hard to do a real evaluation and diagnosis of the area).

The evaluation of the caudal aspect of the mouth in the horse, generally cannot
be made with a non sedated horse. It is recommended while doing this procedure to
sedate the horse, using alfa_2 agonists (xilazine, detomidine, romiphidine) and in occasions
combine it with opioids (butorphanol tartrate); the use of Diazepam is recommended in
procedures where a greater relaxation of the tongue is required, though it should never
be mixed in the same syringe. If a larger dose of tranquilizer is used, the sedation will be
deeper, and this might make the examination more difficult, since the patient’s head will
be too low to the ground thus making it harder for the examiner. Plus, it should be
considered as part of the evaluation the clinical history, age, clinical signs, dietary habits,
etc.

Occasionally, the simplest evaluation of the oral cavity will cause pain or
discomfort, and this might be associated to the disorder or disease in the mouth or simply
be a matter of bad behaviour from the patient. There are some occasions when in the
presence of a very severe pathology, general anesthesia might be required to do the
procedure and/or treatment of the disorders. It is recommended to place a wooden gauge
between the patients incisors so that the examination of molars and premolars is easier,
since the full mouth speculum gauge interferes with a good evaluation of the affected
teeth, besides when using this technique the upper arcade is displaced from the lower
arcade, making it easier to have a radiographic diagnosis, also the placing of some of the

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tools like a dental pick inside the cavities, diastema or periodontal disease, making it
easier to be objective and precise in our evaluation. There should be care when informing
the owner, since there are patients with special needs, like geriatric horses, who could
fracture during this procedure. It is also important to remember that it is not possible to
correct all pathologies in just one session, since having the patient with the mouth open
for prolonged periods might cause pain or discomfort in the temporomandibular (TMJ)
joint, masseter muscles, thus affecting the intake of feed.

When we open the mouth of the horse we are able to detect if there is an
excessive wear of the incisors (aerophagia), fractures, excessively grown molars (steps),
ramps, waves, hooks, lacerations in soft tissues, occlusion problems, presence of caps in
young animals, as well as mobile or loose teeth, absence of teeth, presence of the first
molar (wolf tooth), odontophytes, cavities, etc.

**Direct Palpation and Visual Inspection**

For a better evaluation in this phase, a moderate sedation is recommended, to
have an assistant with experience in handling the patient, speculum or mouth gauge,
lamp, a syringe to wash the oral cavity with lukewarm water and an antiseptic
(clorhexidine). The cleansing of the whole equipment is done preferably with
clorhexidine, since through contaminated tools some disease can be disseminated like
Infectious equine anemia, so it is important to consider this. It is also recommended to
wash with a high pressure equipment to withdraw the food left impacted in places like
cavities. There are different options in regards to supporting the head, since very light
halter that can be hung in any part of the stall, to very complex head stands. There is a
great variety of tools and dental equipment, from intraoral mirrors, laparoscopes for
evaluating the oral cavity, to intraoral cameras that allow the operator to film and
photograph the inside of the mouth. The proper handling of the mouth gauge and
tongue, will allow us to examine the oral cavity in its caudal aspect; it should be
mentioned that the tongue should not be used as a containment method, when pulling on
it excessively, since we can damage the patient (fracture of the hyoids bone). On the
other hand, keeping the mouth open with the gauge for a very prolonged period of time
without allowing the horse to rest (closing the gauge every 15 minutes for a period of
time of 2-3 min.) can cause problems in the temporomandibular joint (TMJ), that can last
for several days after the procedure; the full mouth speculum improperly handled can
even cause fractures of the mandible.

If there is no speculum for the evaluation of the cavity, it is recommended to hold
the tongue with one hand by the side of the mouth, and with the thumb of the other hand
push upwards towards the hard palate to keep it open during the examination. It is
advisable to do the examination in a systematic way, using for example the modified
Triadan System. This system can identify numerically all the teeth, using three digits:
The first digit refers to the quadrant, being 1 the upper right quadrant, 2 for the upper
left quadrant, 3 for the left lower quadrant, 4 for the lower right quadrant. For deciduous
teeth, this first digit changes to 5, 6, 7 and 8. The two posterior digits refer to the
number that is assigned to each tooth, initiating in the central incisor of each quadrant,
being this the 01, and so on until the last molar, being this the No. 11. It is very useful in
the evaluation sheets for the oral cavity, so a note can be written or checked in every
disorder found o take pictures of the disorders found in order to have a register of each
patient; this information is also useful when presented to the owner to keep him updated
in what is being done, as well as a quotation list. A very useful procedure is try to put
pressure and try to introduce a dental pick to detect cavities and areas of more
sensitivity, or even painful. It is also very useful to use a mirror for the examination of
the occlusal surfaces, cavities, and changes in color, fractures, etc.

Intraoral palpation is a procedure that can be risky, the hand of the examiner has
to go into the oral cavity, and if there is not enough experience or care, or the speculum
is not safe, it can close suddenly and cause it to have an accident. The inadequate
handling of the tongue can also cause for the examiner to get bitten o to have
considerable lesions.

Radiology

Radiology is an excellent tool to confirm the diagnosis of disorders of the oral
cavity. It can be done with the majority of portable equipment. It is recommended to
sedate the patient during the procedure to reduce the movement. If there is a fistula, it is
advisable to put something small made of steel, in order to have a reference on the
radiograph, or if it is possible to introduce a cannula (hard or flexible) or a radio opaque
catheter to help us locate and determine the extension of the lesion; it is also useful to use contrast media. Some high frequency portable equipment produce excellent quality radiographs; the views depend on the affected area. It is advisable to do: latero-lateral (from right to left or vice-versa), oblique views, dorso-ventral views and occlusal views. It is advisable to take the radiographs with the mouth of the horse open, a piece of wood can be placed between the incisors to achieve this, and if it is possible place a metal object in the affected tooth to have a better localization and evaluation of the affected piece. Experience and knowledge of the anatomy of the region is required to interpret the radiographs of the skull. It is advisable to do a latero-lateral view in disorders that involve the roots of molars communicated to paranasal sinuses, more so if there is presence of fluid; in this view it is easy to observe the line of the fluid, as well as masses obstructing the paranasal sinuses. The oblique views allow us to evaluate the roots of the affected tooth, because it separates the contralateral arcade, and the occlusal views are recommended in the case of fractures of incisive teeth and/or fractures of this area.

Intraoral camera

Its use is reported in human dentistry. It is valuable in examining disorders of the oral cavity such as: Periodontal disease, stains on the enamel, lingual or oral ulcers, deciduous teeth (caps), ramps, hooks, cavities, patent infundibulum, fractured teeth, abnormal mastication patterns, waves, steps, exaggerated transverse ridges (ETR), evaluation of wax or acrylic implants, post-extraction of a tooth, complications of a procedure, etc. it allows the evaluation of fistulas more clearly, since contrast media can be injected and examine if they are connected, as well as its exact location. On the other hand it allows to do follow up examinations, especially in the most caudal regions. All this, the video or pictures can be done at the same time the patient is treated or examined.

PATHOLOGIES IN THE ORAL CAVITY

Ramps: Lack of wear or irregular wear of the occlusal surfaces in second premolar and third molars (mainly in lower teeth). It predisposes to irregular mastication.

Hooks: Acute growth presented by irregular wear in second premolar and third molars.
**Steps**: Irregular growth in premolars and molars in the shape of a step, due to the lack of wear of the opposite tooth, or when there is a delay in the shedding of the cap.

**Dyastema**: Is the excessive space between any tooth, be it a molar, premolar or incisor. It predisposes to feed accumulation and periodontal disease.

**Periodontal disease**: It is damage or gradual loss of tissue that surrounds teeth. It predisposes to the formation of sacks or periodontal bags, allowing the presentation of the disease.

**Waves**: Disorder acquired by the irregular wear of the occlusal surfaces or premolars and molars, giving the appearance of waves in rostro-caudal direction.

**FRACTURES**

Fractures in the rostral region of the mandible are common, especially in foals. When horses are kept in overpopulated paddocks or corrals, the competition for feed is more intense, predisposing weak horses to get kicked on the face. There is also a predisposition in stallions during breeding, especially with mares that are not in heat or mares that are hard to handle and tend to kick the stallion.

Fractures in the mandible frequently involve one or two branches, rostral or caudal to the incisors; Maxillae can also suffer fractures, having as a result one or more fractures teeth. Diagnosis is made by clinical history, clinical examination, and confirmed by radiographs of the affected region. The treatment of these fractures is generally surgical, and is achieved withdrawing the loose fragments, cleaning and stabilizing the pieces by internal fixation, mainly with wire cerclage. The prognosis is favorable in most cases. Oral and lingual fractures of premolars and molars are mainly associated to a bad or poor dental care; when there are irregularities in the dental surfaces, or by having foreign bodies like metal or stones in the feed; the treatment for these fractures will depend of the size and depth of it, being a worse prognosis the one that involve deeper into the alveoli, and that can favour the development of periodontal sacks, and further on periodontal disease.

**DENTIGEROUS CYST (ectopic tooth)**

It refers to the growth of dental germinal tissue out of place; with a variable form
and size, it can be found in different places. It generally has a radio opaque appearence, since most of it is dental tissue. It can be localized in the base of the ear, involving the petrous portion of the temporal bone. It is usually detected when the mass or growth is evident, usually there is a fistula around or near the ear, that does not resolve as a common abscess. The diagnosis is made through radiographs, using a cannula and/or contrast media to determine the depth and location of the tooth. Treatment mainly consists of surgery, the difficulty of this surgery will depend on the location of the cyst; prognosis is favorable.

MALOCCLUSION

Braquignatism (parrot mouth): This is the most common occlusion problem there is in horses. It is believed to be an hereditary condition, since it has been observed consistently in some bloodlines of Quarter Horses and Thoroughbreds, nevertheless, its heredability has not been demonstrated. On first sight, it is always thought that the maxillae has grown too much, but the real problem is that the mandibular bones presents a shortening. The main problem that is reported is the irregular contact of incisors, further on it will be reported that there are also alterations on the molars and premolars. Irregular contact of the teeth causes problems of mastication, as well as lesions on soft tissue.

Prognatism (monkey mouth) it is also a problem of occlusion, where there is an elongation of the mandible. It is less common than braquignatism, and it is seen frequently in ponies and miniature horses. It is always advisable to look for these abnormalities during a pre purchase examination, more so if the horses are going to be bought for breeding purposes. The treatment for these horses, is to try to correct the “bite” through balancing the affected teeth. There are reports of the use of containment plates in foals trying to correct this problems. Although unfortunately it is difficult to achieve in advance cases. Treatment is aimed at improving mastication and reducing the damage to soft tissues.

SUPERNUMERARY TEETH (Polidontilia)

Polidontilia is the presence of more teeth than the dental formula of the horse. It
is observed commonly in deciduous teeth, mainly incisors. It can be some of them or the entire upper or lower row, on the lingual aspect or the oral aspect, occasionally causing problems as lacerations of the gums or lips. It is a bigger problem when it is presented in premolars, since more space is needed for extra teeth, this causes displacement of teeth, affecting the mastication pattern. Diagnosis is made through an examination of the oral cavity, radiographs are not necessary. It is important to differentiate between the deciduous teeth and the permanent ones. The recommended treatment is to take them out, only if there is discomfort. There are some clients that will ask for an extraction just for a more cosmetic look.

**CAPS**

Presence of deciduous teeth, after the permanent teeth have begun to erupt. They can be incisors or premolars, and can be located in the oral or lingual surface. Treatment consists in extraction, and generally the permanent tooth will grow in its original position and alignment, displacing the caps.

In premolars it is recommended to use a long tool to extract them. Not extracting them predisposes to accumulation of feed and periodontal disease, or it causes for the permanent teeth to grow misaligned and produce problems in mastication.

**PRESENCE OF THE FIRST PREMOLAR (wolf tooth)**

This first premolar exists in approximately 20% of horses. It can cause local lacerations and interfere with the bit. The presence of this tooth should be evaluated if there is a complaint from the rider or trainer; occasionally when it does not erupt completely it can cause pain, a small protuberance can be palpated, anterior to the second premolar.

Diagnosis is made during the oral cavity examination. Treatment is the extraction; this procedure is done with the horse standing and sedated. If the special tool for extraction is available, it is just held tightly, it is forced from side to side to loosen it and then it is just pulled. If not, is better to use local anesthetics around the tooth, and with a periostium elevator, taking care no to damage the palatine artery, the gum is separated around it until it can be pulled from the root, trying not to break it. If the tooth is broken
and a small piece is left, it is recommended to soften it, make it rounder so that the gum is not injured.

The wolf tooth is generally on the upper arcade and very rarely in the lower one.

**ABCESES IN THE ROOT**

The etiology of abscesses is always multifactorial, a severe periodontal disease for example, can complicate and cause alveolar osteitis, than can also extend and involve the pulp of the teeth; a cavity or patent infundibulum, can cause an infection of the root; the fracture of a tooth that involves the pulp is a frequent cause of infection. There has also been reports of an hematogenous infection.

The abscesses in incisor teeth are very rare, the first upper molar is the most frequent place of infection, although the second upper molar and fourth upper premolar can be involved occasionally. Diagnosis is made through the clinical history and the oral cavity examination. The signs vary, there can be weight loss, colic, poor performance; the signs relate to the tooth involved, there can be inflammation of the mandible or maxillae, draining fistulas, halitosis, dropping feed from the mouth, nasal exudates, etc.

Patients are evaluated for presenting abnormal behavior, shaking of the head, are not drinking cold water. With the radiographic evaluation it is determined if the roots are involved with a nasal or paranasal sinus. An endoscopy can be performed to try to determine where the nasal secretion comes from.

In cases of sinusitis, an infected root or patent infundibulum should be ruled out. If there is an arthroscope available, it can be used to evaluate dental disease in its first stages. Treatment is generally surgical, although in cases detected early enough, the use of antibiotics for prolonged periods (2 to 4 weeks), trimetorpim sulpha, metronidazol, are the drugs of choice, as well as frequent lavages ad rinses with solutions (saline or Hartmann) with iodine or clorhexidine, can give good results. The aim of doing first the medical treatment, is to try and salvage the tooth, nevertheless, if there is no improvement, it should be evaluated radiographically and consider surgery before osteomielitis develops.

**NEOPLASIA**

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Neoplasia is very rare in the oral cavity. The most frequent one is squamous cell carcinoma; this can involve hard palate, tongue and oral mucosa. There can also metastasize to lungs and local lymph nodes.

FOREIGN BODIES

Although not very frequent, sometimes they are found, and they vary from wire, wood, glass, metal, that will become incrusted or impacted in the soft tissue of the oral cavity. They will cause discomfort, pain, and difficulty eating and chewing.

The diagnosis is made through the clinical history, evaluation of the oral cavity and if needed radiographs. The treatment will depend of the foreign body found, and is always aimed at removal.