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DENTAL DISEASES IN RABBITS AND GUINEA PIGS
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INTRODUCTION
Rabbits and guinea pigs are the most common seen exotic pets in our clinic, with dental diseases causing most problems in these animals. Due to the special digestive tract and the unique oral anatomy, with continuously growing teeth, immediate recognition of dental problems and initiation of supportive therapy is essential for successful treatment. Therefore the current report should give a short overview of the complex anatomy and pathophysiology of dental diseases for a better understanding and early diagnosis and treatment of the common dental problems of rabbits and guinea pigs.

ANATOMY
Rabbits and guinea pigs are herbivorous species and have continuously growing, open-rooted incisor and cheek teeth (aradicular hypsodont) to compensate for constant wear. While the guinea pig is born with permanent dentition rabbits deciduous teeth exfoliate within a month after birth. The dental formulas for the permanent dentition in rabbits and guinea pigs are as follows: Rabbit: I 2/1; C 0/0; P 3/2; M 3/3 and Guinea Pig: I 1/1; C 0/0; P 1/1; M 3/3

Incisors are very long, curved and of white color. The enamel is thicker on the rostral aspect and thinner on the lingual aspect which results in the chisel shape and continuous sharpening. In contrast to the guinea pig, rabbits have second smaller maxillary incisor teeth, the peg teeth, which are covered completely by the fist maxillary incisors. The first maxillary incisors have a centrally longitudinal groove on the labial aspect in rabbits which is not present in guinea pigs and on the mandibular incisor in rabbits. In the normal rabbit the mandibular incisor teeth rest between first and second maxillary incisor teeth when the jaw is at rest. While the crowns of maxillary and mandibular incisor teeth in rabbits are of equal length, in guinea pigs the crowns of mandibular incisor teeth are normally larger than the maxillary crown.

The premolars and molars are grouped as a functional unit, are visually indistinguishable, and are therefore called “cheek teeth”. Longitudinal grooves are present on the buccal surface of the cheek teeth. In the rabbit transverse enamel ridges on the occlusal surface interlock with the opposite teeth during chewing, providing an efficient uneven rough surface for grinding of fibrous food material. As maxillary and mandibular cheek teeth differ in number, each mandibular tooth occludes with two maxillary teeth. The maxillary arch is wider than the mandibular arch and the occlusal plane is almost horizontal. In contrast, the guinea pig mandibular cheek teeth occludes with one single opposing maxillary tooth. In addition, the mandible is much wider than the maxilla, therefore the cheek teeth are curved, resulting in a 30° oblique occlusal plane that slopes from buccal to lingual. The occlusal surface of guinea pig cheek teeth are flat in contrast to the rough surface of rabbits.

The tempomandibular joint consists of the temporal latero-lateral joint groove and the mandibular condyle and allows mandibular movements in three dimensions. Rabbits have a fairly wide range of lateral chewing action in addition to rostrocaudal and dorsoventral movements of the lower jaw primarily seen in guinea pigs.

PATHOPHYSIOLOGY
Rabbits and guinea pigs have elodont teeth, which erupt and grow continuously by approx. 1cm, respectively by 0.5cm per month, throughout the life of the animal. Mandibular teeth are growing faster than maxillary teeth. Constant growth has to be in physiological balance with constant wear. Any process interfering with normal eruption of or wearing of continuously growing teeth will result in dental disease. Primary congenital or secondary traumatic, neoplastic or infectious malocclusion of either incisor or cheek teeth prevent proper wearing of teeth and subsequent overgrowth. In addition poor diet (eg. seeds, bread) can lead to unphysiologically chewing movements and insufficient wear of teeth. Clinical signs, like increased salivation and anorexia, manifest early in elongated, poorly used cheek teeth due to painful injuries in mucosal membranes of the mouth in contrast to overgrowing incisor teeth.
Diet has a major impact on dental health. Dietary fiber primarily stimulates gut motility but is also responsible for adequate teeth abrasion. Diet should be based on grass and hay to provide adequate crude fiber content. Second cut hay, often sold in pet stores as the more palatable form, has a lower crude fiber content than the first cut. The hay based diet should be carefully supplemented with branches, leaves, herbs, legumes and fruits. Guinea pigs require a dietary source of vitamin C as well for dental health because inadequate feed will lead to weakness in connective tissue and inadequate anchorage of teeth. Loose teeth will lead to irregular tooth wear and crown elongations.

Besides secondary, acquired dental diseases juveniles animals may also present with primary, congenital dental malocclusions. Rabbits are more frequent diagnosed with congenital dental diseases than any other rodent because of breeding for short heads and dwarfism.

**CLINIC**

Rabbits and guinea pigs are prey species which hide clinical signs as long as possible and animals with dental diseases are presented often late in disease process. Therefore careful dental examination is essential during every veterinary appointment. Early clinical signs associated with dental disease are often due to the painful disease process (e.g. dental spurs) or mechanical interferences (e.g. crown elongations) and include weight loss, general loss of condition, decreased food intake, dysphagia, anorexia, changes in fecal size, quantity or appearance and wet fur due to excessive salivation. Later during the disease process alterations can lead to epiphora, dyspnea, exophthalmos, facial masses and swellings, purulent nasal discharge, ocular disease (dacrocystitis, conjunctivitis, corneal ulceration), dermatitis, gastric impaction and bloat, inability to close the mouth, and restricted or painful mandibular movements. These secondary conditions can be the result of spreading infections, insufficient crushing or intake of food, unphysiologic dental pressure, and trauma. Besides primary dental lesions like dental spurs, loose or broken teeth and malocclusions, dental problems can lead to apical dental growth and to bony alterations, which can be easily palpated at the ventral mandible ridge. Apical dental growth has to be differentiated from local abscesses.

**DIAGNOSTIC**

The largest advances were achieved in the areas of diagnostics and treatment in recent years. Increased availability of endoscopy and computed tomography greatly improved diagnosis and the ability to render a more accurate prognosis. Nevertheless, the diagnosis of dental disease is based on thorough examination of the oral cavity, radiology and endoscopic evaluation.

Incisors can be easily inspected during routine physical examination. Examination of cheek teeth can be more difficult, require the proper restraint of the patient or sometimes even an anesthesia. Instruments like an otoscope or a smaller nasal specula are required as a visual aids. Guinea pigs have physiologically always food in their mouth which has to be removed with cotton tips and water for better inspection. During examination it is necessary to turn special attention to deviations of the cheek teeth occlusal plane, dental spurs or spikes, loose or fractured teeth, pus, widened interdental spaces, teeth discolorations and soft tissue alterations. However minimal lesions might be missed and further diagnostics are necessary.

Oral endoscopy enhances visualization and identification of dental diseases by magnification and illumination. Further benefits are documentation of lesions and client information. A complete radiologic examination, with laterolateral, ventrodorsal and oblique projections in two directions (10-20°), is necessary for proper identification of dental disease and for appropriate treatment options. The use of mammography films are recommended to produce adequate detail in these small animals. Computer tomography exceeds identification of dental diseases by radiographic examination and is an outstanding diagnostic aid for dental disease visualization where available.

**TREATMENT**

Most rabbits and guinea pigs with dental diseases are anorectic or show at least decreased food intake. Therefore supportive therapy with forced feeding, analgesia and fluid therapy is indicated to stabilize the patient.

Dental disease treatment consists of restoration of normal tooth length, restoration of the normal occlusal plane, extraction of diseased teeth and treatment of associated abscessation. Overgrown teeth or dental spurs are trimmed best with a high speed drill and with various types of spurs. Slow working speed might result in thermal injury. Regular dental trimming is necessary in cases of malocclusion and repeated all 4-8 weeks. Instruments like cheek...
dilatators, spatula and mouth or tabletop gag facilitate an adequate visualization in the mouth. Teeth cutters are not recommended because of produced forces can cause vertical dental fractures.

Extraction of incisor or cheek teeth require either a Crossley’s luxator or properly contoured hypodermic needles, which were flattened with a pair of needle holder, to break down the periodontal ligament. After loosening, the tooth is gripped carefully with a needle holder or a dental forceps and extracted from its socket with slowly increasing force, taking care to follow the curvature of the root. Once extracted, the teeth should be examined to ensure that the entire tooth and its pulp tissue have been removed. Any germinal tissues within the alveolus must be destroyed by inserting a needle into the alveolus in order to prevent tooth regrowth. The alveolar cavity is flushed with diluted iodine or chlorhexidine solution. The alveolae can be closed with simple interrupted sutures, except when infection is present. Post-extraction feeding with soft or grated food and analgesic treatment for five days is necessary. Animals with removed incisor teeth require regular grooming.

Periapical abscessation requires the removal of the affected teeth and bony tissue. After debridement and flushing of the affected area the soft tissue is usually marsupialized, allowing regular postoperative flushing and debridement of the site. Application of antiseptics, insertion of depot-antibiotics products and long-term antibiotics are recommended.

REFERENCES