Periodontal Disease

Periodontal disease is a significant cause of morbidity in captive lizards and occurs primarily in agamids and chameleons. Mastication of a natural diet provides the required texture to keep plaque from developing. When a buildup of plaque forms on the teeth, bacteria begin to colonize and cause a reversible inflammatory response in the marginal gingiva. Gingivitis can become severe enough that it involves the periodontal ligament and causes irreversible damage, primarily loss of the connective tissue attachment and surrounding bone. When the disease becomes this severe, it is termed periodontitis.

In reptiles with excessive plaque buildup, a gram-positive aerobic cocci population predominates. As plaque matures, an anaerobic environment is created, and anaerobic flora, including gram-negative bacteria and spirochetes, develops. This change in bacterial populations occurs in both mammals and reptiles with periodontitis.

Clinical signs include gingival erythema, gingival swelling, accumulation of dental calculus, periodontal pockets, gingival recession or hyperplasia, and loosening and loss of teeth. Periodontitis is often an insidious disease, and the first signs an owner observes may be a result of systemic illness. Gingivitis appears to cause some discomfort for reptiles, but many continue to eat. The early stages of the disease are usually only recognized during an oral examination. An important note is that periodontitis is commonly mistaken for stomatitis.

In lizards with periodontal disease, visible calculus and marginal gingival erythema are seen on the lingual and buccal aspects of the oral cavity. As the disease progresses, more calculus builds, the gingiva becomes swollen, and the gingival margins begin to recede, exposing the underlying mandibular and maxillary bone. In advanced disease, the gingiva becomes hyperplastic, and gingival pockets form. Suppurative gingivitis and subcutaneous abscessation ensue. Areas of focal or multifocal osteomyelitis of the mandible or maxilla
can develop. Chameleons with oral osteomyelitis carry a grave prognosis. In the most severe cases of periodontal disease, pathologic fractures and fatal systemic infections occur.

Inappropriate diet appears to be the major cause of periodontal disease in lizards. Radiographic changes associated with severe periodontal disease include bone lysis, pathologic fractures, the presence of sequestra, and adjacent areas of periosteal proliferation (Figure 72-6). Collections of samples of affected areas for culture and sensitivity and histopathology are helpful in choosing an appropriate treatment regimen.
Treatment of periodontal disease in lizards should begin with a thorough oral examination with general anesthesia. After the calculus is removed and the gingival sulci are cleaned, the mouth is irrigated with a 0.05% chlorhexidine solution.\textsuperscript{2,4} To prevent further disease, dental prophylaxis is performed with anesthesia every 6 to 12 months. In most cases, treatment with an appropriate systemic antibiotic is indicated. The diet must be changed to provide a varied supply of adequate textures and consistencies. Poor husbandry is addressed, and the owner is advised to make any changes necessary to help prevent further disease.
Bearded dragon with periodontal disease: exotic practice challenge

THIS interesting case highlights the challenges of treating this exotic species. The central bearded dragon (Pogona vitticeps), also known as the central bearded dragon, is a species of agamid lizard that is native to the semi-arid woodlands and woodlands and rocky desert regions of Australia. They are commonly kept as pets and exhibited in zoos. Their life span can be up to 12 years and they typically weigh up to 500g at adult size.

Presentation
An eight-year-old male inland bearded dragon presented with a three-month history of decreased appetite (with selective feeding of soft fruit and mealworms), 10 per cent loss in body weight, and mandibular swelling. The diet offered also included crickets and vegetable (Table 1). The lizard was housed alone in a medium-sized vivarium measuring approximately 45cm x 76cm x 60cm. Temperatures in the vivarium ranged from 35 to 40°C in the hot spot during the day, reducing to 25 to 27°C during the night. The humidity ranged between 30 and 45 per cent. A broad-spectrum 100W ultraviolet light provided a 12-hour photoperiod.

On clinical examination, the bearded dragon was alert, but in thin body condition with prominent pelvic bones and a body weight of 380g. Oral examination revealed bilateral mandibular swelling, moderate erythema and severe gingival recession with pocketing in the caudal third of the mandibles (Figure 1). Calculus deposition and purulent material were found on the exposed bone in the mandibular pockets. No other abnormalities were found on examination.

Further diagnostics and treatment
A blood sample was obtained from the ventral coccygeal vein using aseptic venipuncture. Conscious dorsoventral and horizontal radiography and haematology and biochemistry were all unremarkable. A diagnosis was made of severe bilateral periodontal disease, primarily involving the mandibular dental arcade with some disease on the maxillary arcade. There was no evidence of osteomyelitis.

Premedication with 0.4mg/kg atropine was given intramuscularly and the lizard was maintained at an environmental temperature of about 30°C for 20 minutes. Anaesthesia induction was achieved by face mask. Intubation was carried out with a 2mm endotracheal tube, and ventilation was provided using five per cent isoflurane and 1 L/ minute oxygen in a pressure-driven small animal ventilator. Anaesthesia was maintained using 1.5 to two per cent isoflurane in 1 L/minute oxygen. Intermittent positive-pressure ventilation was provided at a frequency of 10 breaths per minute at 5cm H2O throughout the anaesthetic to mimic previously observed resting respiratory rates and coelomic excursions. Monitoring included auditory doppler ultrasonography to monitor the heart, pulse oximetry positioned in the oesophagus and coelomic temperature using a vital scan monitor.

A deep swab of the periodontal pocket was taken for bacterial and fungal culture; this was performed at both 25°C and 37°C. Antibiotic sensitivity testing was also carried out. Ultrasound scanning was performed on both the maxillary and mandibular dental arcades to remove the calculus. After scaling, moderate bilateral gingival hyperplasia was revealed on the mandibular dental arcade. The gingival pockets were flushed with 0.1 per cent chlorhexidine acetate oral solution; this was continued daily for four weeks.

Cefazidine 20mg/kg, given subcutaneously every 72 hours, was started one week prior to the procedure and continued for a further four weeks. Anaesthetic recovery was unremarkable, and spontaneous respiration resumed within 30 minutes of the isoflurane being turned off. Dietary modification was initiated. The lizard was fed an increased proportion of harder and larger invertebrates and firm vegetables. The frequency of the firm fruit was also decreased (Table 1). These modifications were accepted within a few days.

The aerobic and anaerobic bacterial culture was negative; however, a heavy growth of Candida albicans was isolated. Itraconazole 5mg/kg was given orally every 24 hours for seven days. Re-examination of the patient after four weeks found no gingival erythema or purulent material, although the gum recession was unchanged.

Discussion
Periodontal disease is common in captive lizards with acrodont dentition, such as agamids and chameleons.

Unlike pleurodont teeth seen in most lizards and all snakes, acrodont teeth are not regularly replaced and are simple triangular teeth ankylosed to the mandibles and maxilla.

A longitudinal ridge of bone, only covered by a thin layer of stratified squamous epithelium, is exposed between the teeth and gingival margin. There is no periodontal ligament. This exposed...
A diet. A survey of 21 wild-caught bearded dragons – a commonly seen in some cases, but not always detected.

Bacteroides and spirochetes is reported in this example, whereas a case example, the heavy fungal growth of C. albicans probably affected the culture. Candida species was found to be the most common yeast isolated from a survey of 91 reptiles. C. albicans and C. tropicalis have been associated with stomatitis in lizards, with C. albicans having the highest virulence. Myotic disease is seen in immunocompromised reptiles. This case had both chronic disease and malnutrition; therefore, the lizard may have been immunocompromised. As yeasts are common oral commensals of reptiles, a diagnosis of myotic infection should, where possible, be made on histopathology. Biopsy was not considered appropriate for this case due to the location, chronicity and severity of disease.

Treatment was aimed at physical removal of the calculus, purulent material and a presumptive secondary mixed bacterial and fungal infection. Systemic cefazidime and imipenem and topical chlorhexidine were instigated and a good clinical response was seen within four weeks.

Modification to a diet that requires more manipulation has been shown to reduce plaque formation and, in mild cases, prevent recurrence. A regular dental examination every six months has been scheduled.

Conclusion

This case demonstrates a typical presentation of a common condition seen in captive inland bearded dragons. The prognosis for recurrence of periodontal disease in this lizard is poor, as the gingival recession is permanent and the pocket formation makes it prone to calculus accumulation. However, dietary modification and regular dental scaling should manage the condition and prevent further progression to osteomyelitis, which would carry a grave prognosis.

Although few drugs are licensed for reptiles, the author notes that the use, in this species, of medications mentioned in this article has been widely reported.

The author thanks Sharon Redrobe and staff at Bristol Zoo Gardens for their contribution.

The author, along with Kevin Edworthy, will discuss exotic emergencies at a CPD event in Newcastle on June 25. For full details, visit www.vet-cpd.co.uk

References

PROCEEDINGS OF THE
NORTH AMERICAN VETERINARY CONFERENCE
VOLUME 20

JANUARY 7-11, 2006
ORLANDO, FLORIDA

SMALL ANIMAL EDITION

Reprinted in the IVIS website (http://www.ivis.org) with the permission of the NAVC. For more information on future NAVC events, visit the NAVC website at www.tnavc.org
MANAGEMENT OF PERIODONTAL DISEASE IN LIZARDS

Scott J. Stahl, DVM, Diplomate ABVP (Avian)
Stahl Exotic Animal Veterinary Services
Vienna, VA

McCracken and Birch (1994) were the first to describe a periodontal disease-like condition in agamid lizards and old world chameleons. These lizards all acrodont teeth (not rooted, but simply attached to the surface of the mandibular and maxillary bones), which predisposes them to periodontal disease, stomatitis and potentially osteomyelitis. This unique dentition results in a thin gum line along the lateral surface of the mandibular and maxillary bones. When this fragile gum tissue is damaged or abraded bone is exposed and becomes readily permeable to bacteria.

Commonly kept species of lizards seen in practice with acrodont dentition include bearded dragons, Asian water dragons, frilled dragons, and all old world chameleons.

EXAMINATION AND DIAGNOSTICS

On physical exam, these lizards often present with signs of stomatitis or swellings along the mandibular and maxillary bones. On close inspection these bones will be discolored, specifically green or brown-black, along their surfaces. Often lysis of bone is evident on presentation. Swellings of the soft tissue over the mandibular or maxillary bones is also common as the soft tissue adjacent to the periodontal disease becomes infected.

Regular oral exams should be performed to inspect the gum line for signs of discoloration, irregularities in the surface, and loss of tissue. If suspicious lesions are present, gentle curettage with dental instrumentation is useful to assess soft tissue and bone involvement.

Abnormal physical exam findings consistent with mandibular and maxillary bone involvement should be assessed with radiographs. Osteomyelitis in reptiles is characterized radiographically by bone lysis. Radiology is useful to assess the severity of the bone involvement and thus help to formulate a therapeutic regimen. Additionally, radiographs can be used to monitor therapeautic progress.

Culture and sensitivity can be utilized to identify the bacterial (or fungal) organisms involved and to determine the most appropriate antimicrobial for treatment. Since mixed infections are common, both aerobic and anaerobic cultures should be taken. A sterile prep should be performed over the site to be sampled, and a sterile scalpel or needle should be used to collect a deep culture sample. Blood cultures may also be diagnostic as reptiles with osteomyelitis may often be septic.

Biopsy of bone or associated soft tissue may also be useful as a method for identifying organisms involved. Histopathology of these lesions with special stains can help to identify other possible pathogens such as fungal organisms and mycobacteria.

Isaza and Jacobson (1995) found the most common bacterial organisms isolated in cases of osteomyelitis in reptiles were gram-negative bacteria, including *Salmonella* spp., *Aeromonas* spp., *Pseudomonas* spp., *Escherichia* spp. and *Morganella* spp. They also fund gram-positive bacteria such as *Streptococcus* spp., *Staphylococcus* spp., and *Corynebacterium* spp., and anaerobic bacteria such as *Clostridium* spp. and *Bacteroides* spp. were occasionally isolated from infected reptile bone, but often in conjunction with aerobic bacteria.

TREATMENT

Prior to treatment, the overall status of the patient must be assessed. Supportive care may need to be initiated prior to treating the disease. The reptile should be warmed to the high end of its preferred temperature zone (POTZ). Fluid therapy should be initiated at 20-25 ml/kg daily as needed.

After rehydration, and while awaiting the results of culture and sensitivity, the lizard may be started on a broad spectrum antibiotic regimen. Due to the high incidence of mixed bacterial infections and the severity of osteomyelitis, a combination of two antimicrobials is recommended initially (Isaza and Jacobson, 1995).

Amikacin at 5mg/kg IM/SQ as an initial dose followed by 2.5 mg/kg IM/SQ every 72 hours OR enrofloxacin at 5-10 mg/kg IM/SQ/PO every 24-48 hours in combination with ceftazidine (20mg/kg IM/SQ every 72 hours) or carbenicillin (400 mg/kg IM every 24 hours) are good initial choices.

Anaerobic and gram-positive bacteria may have resistance to enrofloxacin and amikacin, so antibiotics such as ceftazidine (as above), ampicillin (20 mg/kg IM every 24 hours), and metronidazole (20-40 mg/kg PO every 24-72 hours) may be more appropriate or should be utilized concurrently with another drug depending on the results of culture and sensitivity.

Aggressive surgical debridement of affected areas is important to open and expose the infected tissue. Standard wound flushing solutions with chlorhexidine or betadine can be used to aggressively flush wounds once or twice daily for several weeks. Unhealthy or discolored bone should be curedt and removed. Again, radiographs are important in helping to determine what bone(s) may need to be removed.

A topical treatment which can be used to encourage deep local penetration of antibiotics after flushing is a solution of DMSO and amikacin (7.5 ml of DMSO is added to .25 ml of amikacin 50 mg/ml) or, depending on culture and sensitivity results, DMSO and enrofloxacin (7.5 ml of DMSO to 0.5 ml of injectable enrofloxacin 22.7 mg/ml). These solutions are typically applied once or twice daily, depending on the severity, for 3-4 weeks. Alternatively, silver sulfadiazine cream can be packed into the wound once daily after flushing.

Osteomyelitis in reptiles must be treated in most cases for a minimum of 8-12 weeks and sometimes up to 6 months (Isaza and Jacobson, 1995). Treatment may not need to be as long if aggressive bone curettage is
successfully utilized because the primary bacterial nidus has been eliminated.

The prognosis for lizards with periodontal osteomyelitis and loss of bone is guarded to fair depending on severity and progression. Lifetime dental prophylaxis with an oral cleansing product (Maxiguard Oragel, Addison Biological Laboratory) will be necessary to reduce progression and minimize recurrence of osteomyelitis.

References
