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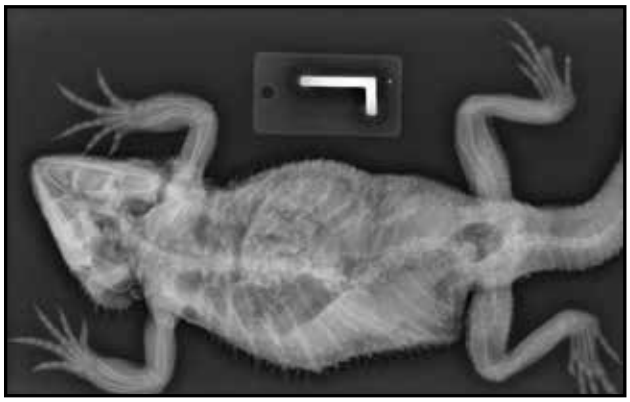
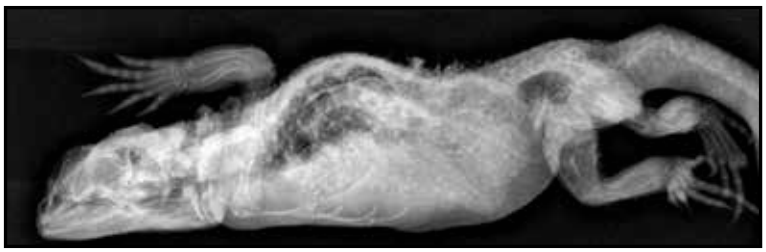
ANTECH IMAGING SERVICES

ANTECH IMAGING NEWS

Special Issue: Diagnosing Companion Animal Diseases

Focus on: Reptiles & Rabbits





DV and lateral projections of a bearded dragon with severe, chronic nutritional SHP (fractures, scoliosis, lordosis, osteopenia) and secondary pneumonia, GI stasis, and paresis.

Secondary Hyperparathyroidism in Reptiles

Secondary hyperparathyroidism (SHP) of reptiles is one of the most common pathologies seen in clinical practice of exotic pet species. The most commonly affected species are chelonians (turtles, tortoises and terrapins) and lizards. Crocodilian species may also be affected and clinical signs and diagnostics are similar to those in lizards. The condition is less common in snakes due to their metabolic needs, whole prey diets and lower requirements for UVB light in most species. In young, growing animals, this is most commonly due to suboptimal nutrition, lack of vitamin D/Calcium supplementation and inadequate UVB spectrum lighting, leading to nutritional secondary hyperparathyroidism (NSHP). In mature reptiles, renal compromise is a more common cause of secondary hyperparathyroidism (RSHP), although the clinical signs and presentations are similar.

Evaluation of the diet and husbandry are critical for diagnosis and treatment of SHP. Lizards require a UVB light source that is placed above the cage (due to location of their pineal eye which regulates day period basking), and in all cases, adequate spectrum of the bulb (which deteriorates over time, even if the bulb is still "working"), within the proper distance for spectrum absorption and not filtered through wire, glass, mesh, etc., are essential. Most bulbs lose full spectrum after 6 months and should be replaced. Additionally, an appropriate diet with balanced calcium and vitamin D supplementation is needed. In bearded dragons, it is common that they will selectively eat insects and refuse most vegetables, which can lead to NSHP. Bearded dragons are omnivores and ~80% of the diet

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Also in this issue: • Dental Challenges in Rabbits • Diagnosing an Unusual Patient

should consist of fresh, dark leafy greens, peppers, non-acidic fruits, grains, etc. and the remaining ~20% can consist of insects. Iguanas are herbivores, chameleons/geckos are insectivores/carnivores, monitors are carnivores. Presentation of food items may also be a concern, as some species need water and food presented on the leaves of plants/trees due to their arboreal nature (chameleons), which others are more terrestrial, and in these cases may consume substrate with food items (geckos, bearded dragons). Some species prefer water bowels which allow for complete submersion of the head or body for drinking (chelonians, some lizards). Knowing the natural history and needs of each species can help to best diagnose and treat these cases.

Common clinical signs of secondary hyperparathyroidism are weakness, unable to lift the trunk off the ground to ambulate, soft mandible on palpation, enlargement of the soft tissue of the limbs (osteodystrophy), hyporexia/anorexia, lack of normal GI motility and fecal production (which can manifest as GI impaction/obstruction), pneumonia (secondary infection) and in severe/chronic cases, neurological signs (weakness, paresis, paralysis, seizures, etc.). Clinicopathological findings are low ionized calcium levels, inverse calcium to phosphorous ratio, and potentially secondary infection and metabolic pathologies. Imaging is essential to diagnosis of this condition and evaluation of the severity of osseous changes/pathologies present. In many cases, these patients will present in weak, dehydrated and debilitated states, and diagnostics may not be feasible without stabilization of the patient. Imaging is the least invasive method of diagnostics for this disorder, and orthogonal (DV and lateral) radiographs, with the limbs extended to allow visualization of the lungs and coelomic organs, as well as the details of the limbs, vertebrae and skull are recommended. This may be facilitated with sand bags, stockinette, tubes or manual restraint (although this may be more stressful for patients and if SHP is present, increase the risk of fractures). Employment of proper radiation safety protocols and protection of hands during restraint is important (exotic species tend to be smaller and more difficult to position than domestic species, requiring restraint and potential for exposure of the hands). This allows for determination of osseous integrity, fractures (pathological and a common finding with SHP) and organ system changes that may be exacerbating the condition (folliculogenesis, hepatic or renal enlargement/pathology) or secondary issues (GI stasis, pneumonia). If bloodwork is feasible, then evaluation of uric acid, calcium, phosphorous and CBC differential may be very helpful to confirm SHP, potential for metabolic or infectious disease, and determination of best treatment options for each patient. Other imaging that may be helpful in these cases, especially if there is concern for renal pathology, are CT/MRI of the whole body and ultrasound of the coelomic structures.

In diagnosis of these cases based on radiographs/imaging, I typically review the study prior to reading the history/patient data, which helps me not to miss things that may be concurrent, but not presenting clinically or within the history. A thorough history, with signalment and gender is very helpful to case interpretation. In reproductively active, mature females (requiring more calcium during folliculogenesis and maintenance of a gravid state), this can exacerbate the condition. In many species eggs/follicles are not shelled with a radiographically visible shell.

Marie Rush, DVM, DACZM
AIS Staff Exotic Medicine Specialist

Education and experience:
- DVM Auburn University College of Veterinary Medicine
- Internship Animal Medical Center, New York City
- Clinical Zoo/Wildlife Medicine & Surgery Residency Wildlife Conservation Society
- Director Veterinary Services & Curator of Ectotherms Birmingham Zoo
- Assistant Professor Auburn University College of Veterinary Medicine
- Associate Professor St. George's University School of Veterinary Medicine
- Veterinarian at Clinical Practice, Alabama

CONTACT US:

For technical questions:

Support (24/7/365)
Office: 1-877-727-6800
Support@AntechImagingServices.com

For all other questions or concerns

Lisa Ziemer, DACVR Chief Medical Officer
LisaZiemer@AntechImagingServices.com

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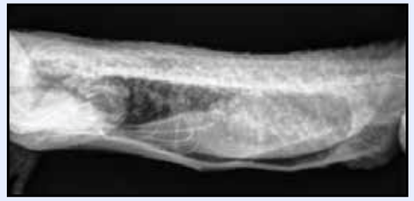


Adult bearded dragon

DV and lateral projections- Osteopenia with scoliosis of the caudal vertebrae of the tail, GI stasis and mild pneumonia. This is a case of moderate NSHP.

Adult slider turtle

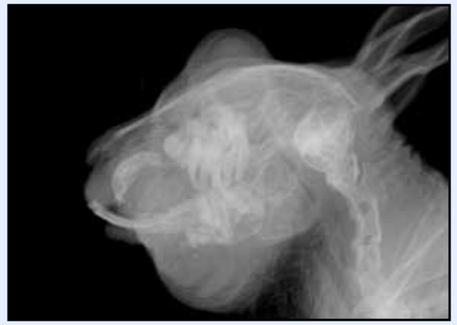
DV and lateral projections- Severe osteopenia, GI ileus, areas of osteolysis and pneumonia due to NSHP from lack of adequate calcium/diet and UVB lighting, subsequent decreased immunity and poor water quality (allowing for secondary shell infection).

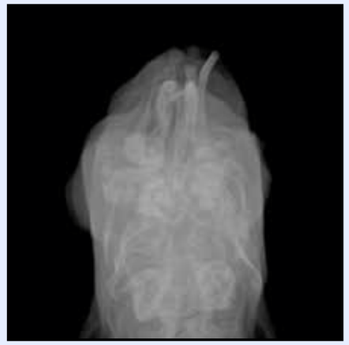
Adult female chameleon

DV projection- Severe generalized osteopenia, fractures and bowling of the long bones, pelvic deformity and follicle/egg production. This patient is suffering from NSHP and has subsequent follicular stasis due to the neuromuscular pathology from hypocalcemia.

When reviewing cases of SHP, I often rank/stage the level of osseous pathology present based on comparison to normal for the species, and address any additional pathology noted in image studies. Understanding the level of change present can be helpful for treatment selection, and overall prognosis for patient improvement. Many cases of SHP have clinical manifestations of pathology that may be difficult to completely treat, and residual malunion fractures, neurological or renal issues are a concern in severe/chronic cases. Treatment/management options for these cases are based on the individual case, all diagnostic findings, client needs and addressing any concurrent pathology that is found by the clinician.

Incorporation of the team at Antech Imaging Services provides the practitioner with access to board certified specialists that can assist with imaging findings, interpretation of findings and relevance to the case with respect to history and clinical signs, and with potential case management options.





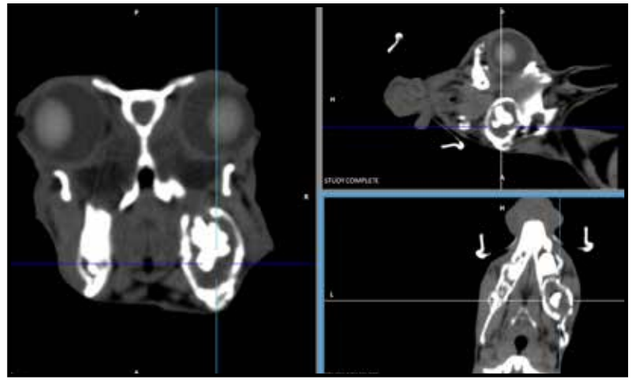
Right lateral and VD projections of rabbit with severe, chronic malocclusion and osteomyelitis. There are no unaffected teeth or osseous skull structures in this patient. The sinuses, orbits and bullae are all affected. The lack of normal osseous density is suggestive of nutritional or metabolic pathology in this patient.

Diagnosis and Management of Dental Challenges in Rabbits:

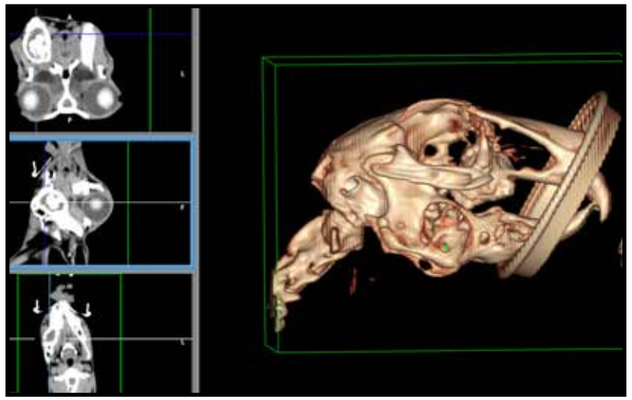
One of the most common clinical conditions of rabbits is dental malocclusion. In rabbits, the teeth have varying type, and continue to grow for the duration of the lifetime, in the primary and secondary crowns. These types of dentition are heterodont and diphydont. Dental malocclusion may occur due to many causes, including fractured/broken teeth (usually incisors), abnormal wearing of the teeth (incisors and cheek teeth), pain which decreases or shifts normal mastication, etc. Malocclusion can be difficult to diagnose clinically when mild, as rabbits have a narrow/small oral cavity which precludes a through dental examination without the use of high intensity lighting or endoscopy (and is best done with sedation in most patients). Individual patients may have varying levels of clinical signs with dental pathology. I have seen rabbits with such severe dental overgrowth and osteomyelitis that it is amazing they are still alive, let alone eating normally. I have also seen cases with very small points on the cheek teeth, and normal dental length, but they have stopped eating due to the minor malocclusions present. Radiographs can provide valuable insight to development of dental points/hooks, irregular occlusal surfaces, fractures of the teeth, and invasion of the secondary crowns into the sinuses and mandibular cortex, which can lead to abscesses. In many cases, patients with dental abnormalities will present with gastrointestinal signs (stasis, bloat, ileus, etc.) or decreased food intake or fecal production. Overgrowth of the dental primary crowns into the oral cavity can lead to penetration of the

Lateral and VS skull with normal teeth, bullae and calvarium, but with increased opacity within the maxillary sinuses, from sinusitis or turbinate pathology.

maxillary palate by the incisors, entrapment of the tongue, and trauma to the buccal and lingual soft tissues. Much like horses, "floating" or trimming the teeth can resolve minor points and occlusal issues, however, in severe or chronic cases of secondary crown overgrowth, these can cause penetration of the ventral mandibular cortex and secondary abscess formation, impingement on the nasolacrimal and ocular structures (usually causing ocular signs) and penetration of the sinuses (leading to sinusitis). There are special, miniature floats designed for use in dental trimming in rabbits and rodents, although some clinicians design their own instruments or utilize Dremel tools, depending on the case. The use of nail clippers (cat, dog or human) to trim the incisors is not advised, as the uneven pressure application on the teeth can cause them to fracture into the secondary crowns. Secondary infections, dental impactions, neoplasia, abscesses, etc. may be concerns for pathology that may not be visible on clinical or oral examination, but may be radiographically apparent. Multiple views are needed when taking skull images, including obliques, anterior-posterior, lateral (both left and right) and dorsoventral projections. All views are recommended to assure the best potential for diagnosis. If available, CT of the skull is superior for identification and mapping of skull pathology, and allows for review in different planes simultaneously, and 3-D reconstruction if needed. I thoroughly enjoy working with referring veterinary clinicians to evaluate these cases based on radiographic changes and options for treatment, surgery and management over time.



Severe mandibular abscess (viewed in MPR), with hypoattenuation of the periapical space and lysis of the lateral and ventral mandibular cortex (pathology at the crosshairs).



3-D reconstruction with MPR of the skull, with the cross hairs and green dot marking the larger lesion in the mandible. Measurements and suggested directives/locations for surgical intervention were reported, and the attending clinician was able to surgically treat this patient.

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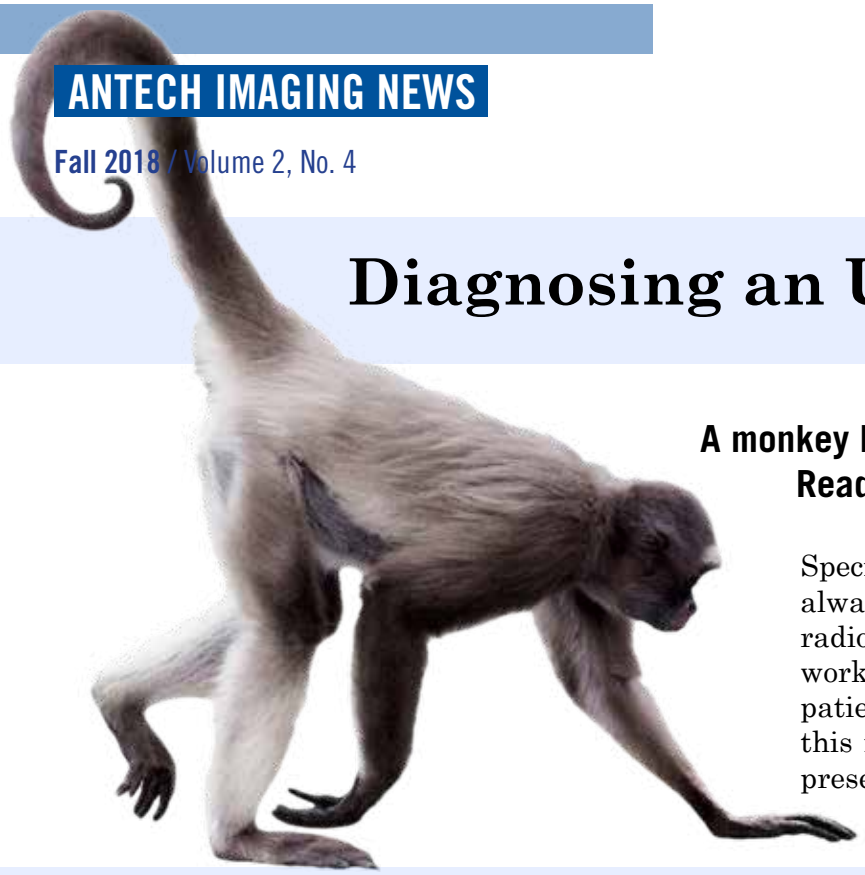
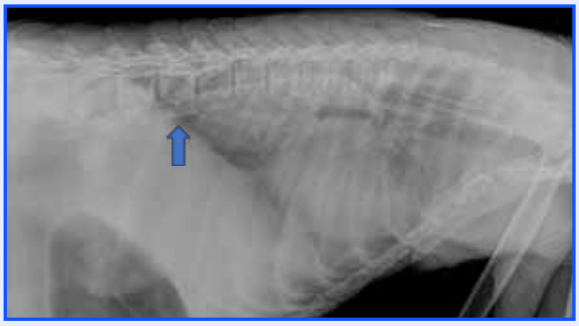
Diagnosing an Unusual Patient



A monkey has a routine check-up...
Read below to see what was revealed!

Specializing in zoo, wildlife and exotic species is always interesting and whether it is a clinical case or a radiographic case, I love the adventure and challenge of working with each case to give my best services to the patient and the referring clinician. I would like to share this interesting case of a geriatric spider monkey that presented for a general wellness exam.



Left lateral thorax

VD thorax

Although there were no clinical signs in this patient, there is a visible alveolar pulmonary pattern (which may be due to some less than optimal inflation of the lungs (anesthesia), age related change, infection, infiltrative disease, inflammation, etc.), the most interesting finding is the sclerosis of the aorta, noted in the thorax and in the craniodorsal abdomen. Cardiovascular disease is common in non-human primates, and is multifactorial in origin with similar clinical signs to humans in many cases.

Western U.S. AIS Representative:

Leslie Dowd, DVM
Office: 1-949-397-5338
Leslie.Dowd@AntechImagingServices.com

Central U.S. AIS Representative:

Ryan Reynolds, DVM
409-527-0408
Ryan.Reynolds@AntechImagingServices.com

Eastern U.S. AIS Representative:

Cory Ellis, DVM
803-389-7389
Cory.Ellis@AntechImagingServices.com