

Exotic Pet

P R A C T I C E

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SCIENTIFIC ARTICLE

Husbandry and Diseases of Hedgehogs

Wm. Kirk Suedmeyer, D.V.M.

Hedgehogs have recently become popular, due to their small size and unique appearance. With a few simple husbandry requirements, most hedgehogs will live 7–10 years.

There are two species of hedgehogs found in the pet trade. The most commonly encountered is the small African hedgehog (*Atelerix albiventris*), also called the white-bellied or four-toed hedgehog. This animal generally weighs 200–600 g, and has numerous white-tipped spines. The European hedgehog (*Erinaceus europaeus*) is a much larger animal, weighing 400–1000 g. The European hedgehog is dark brown, with numerous golden brown dorsal spines, and is seldom seen in the pet trade. The spines of both animals are sharp but not barbed.^{1–3}

Both animals are classified as insectivores, and as such, owners and veterinarians need to check with local authorities as to any special permits that may be required. Many insectivorous animals are considered injurious wildlife and may establish feral populations if they escape.

Hedgehogs are relatively hardy animals. If they are provided with a proper diet and housing, few problems will be encountered. Most hedgehogs are housed in aquaria with newspaper or a soft towel for bedding. Avoid terry cloth or easily frayed towels because these can cause linear foreign bodies or entrapment of the spines and feet. At the zoo, we use old surgery towels to line the cages. Dermatopathies are common if bedding materials become soiled, so cages must be cleaned daily. A must for each cage is the provision of a hiding box. Hedgehogs are secretive, nocturnal animals, and many will not eat if they do not have a secure area to sleep. Flowerpots, small wooden or cardboard boxes, or halved polyvinyl chloride pipes work very well.

African hedgehogs should be maintained at temperatures between 25°C and 30°C (75°F to 85°F). Temperatures below this minimum cause the animals to become sluggish and prone to respiratory infections.^{1,2}

Suggested diets for hedgehogs vary. Most appear to do well on diets that incorporate a variety of foods, including minced fresh vegetables and fruits; an animal-based protein, such as dry dog or cat food; and invertebrates such as waxworms, mealworms, and crickets.

Food should be offered in the evening, and excess should be removed the next day. Hedgehogs, especially African hedgehogs, can fluctuate wildly in weight. Weighing the animals once weekly is necessary to monitor weight gain and loss, and the diet can be adjusted accordingly. Obese animals exhibit excessive adipose tissue beyond the margins of the dorsal spines when the animal is prostrate. It is more difficult to assess emaciation, and an owner or veterinarian is advised to become familiar with the normal appearance of a healthy animal.

It is usually necessary to perform physical examinations on anesthetized animals, as they readily curl themselves into a spiny ball. Attempts to manually restrain a hedgehog may result in injury to the owner or the animal,

though patience and slow movements may allow a cursory examination in well-socialized animals.

Isoflurane is the anesthetic agent of choice for virtually all procedures in hedgehogs. The most effective regimen is achieved by placing the animal in an induction chamber with 3% isoflurane in 2–3 L of oxygen/min. Animals become recumbent in 3–5 minutes and can be removed and maintained on 0.5% to 1.5% isoflurane with a small mask and a non-rebreathing circuit. It is important to maintain the animal on a warm water blanket during any lengthy procedure. We generally administer 15 mL/kg of lactated Ringer's solution or 2.5% dextrose subcutaneously for any anesthetic procedure and allow the animal to recover in an incubator.

Clinical procedures are easily performed once the animal is anesthetized. Toenail trimming, dental

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Editor in Chief**Shawn Messonnier, D.V.M.**Paws and Claws Animal Hospital
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Editorial address: Tania Banak, Mosby-Year Book, Inc., 11830 Westline Industrial Dr., St. Louis, MO 63146; (800) 325-4177; series.editorial@mosby.com

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and ophthalmic examinations, blood sampling, and complete physical examinations can be completed in a matter of minutes. Blood samples can be obtained from the lateral saphenous, cephalic, or jugular veins. Insulin syringes work well and should be used with a rubber band tourniquet. Small volumes of blood (generally 0.3–0.5 mL) are placed in lithium heparin and serum separator microtainer tubes. Most laboratories can perform complete blood counts and serum chemistry profiles on these very small amounts of blood.

Hedgehogs are susceptible to a wide variety of diseases, including parasites, neoplasia, respiratory infections, and dental disease. Mites (*Chorioptes* species), probably the most commonly encountered parasites of hedgehogs, are easily noted. Excessive dander is a hallmark sign, and the mites can be observed in the spineless area of the head, around the ears, or at the base of the spines.³ One or two subcutaneous injections of ivermectin at 200 µg/kg spaced 14 days apart clear most infestations. The cage must be thoroughly cleaned to help prevent recurrence.

Sarcoptic mites are occasionally encountered, though diagnosis is more difficult because the mite lives beneath the skin. Skin scrapings are required to diagnose infections, and treatment is the same as for chorioptic mites, although additional treatments may be needed.

Other parasites that may be seen are tapeworms, various nematodes, fleas, and ticks.¹ Most tapeworm infections respond to subcutaneous injections of praziquantel at 7 mg/kg. Fenbendazole (Panacur) at 15 mg/kg (PO once, repeated in 2 weeks), and ivermectin 200 µg/kg will clear most nematode infestations.

Neoplasms are commonly encountered. We have removed mixed mammary gland adenocarcinomas and basal cell adenomas from European hedgehogs and have observed renal carcinomas in aged African hedgehogs.

Respiratory infections are a common type of infectious disease in hedgehogs. Keeping animals at suboptimal temperatures predisposes hedgehogs to respiratory infections. A wide variety of underlying causes have been documented, including *Pasteurella* sp., *Streptococcus* sp., *Bordetella* sp., and cytomegalovirus.¹ A complete medical evaluation is necessary to diagnose and treat these infections. Bacterial culture and sensitivity, radiography, and a CBC and serum chemistry profile complement the history. Commonly used antibiotic agents include trimethoprim-sulfadiazine (Tribrissen) at 30 mg/kg bid PO, and penicillin (Flocillin) at 3 IU/kg IM q48hr. In our experience, a moderate increase in humidity appears to allow the animal to breathe easily and may help maintain respiratory ciliary movement.

Dental problems are frequently encountered.³ Dental tartar and apical abscesses are treated in much the same way as in other domestic species. Hedgehogs have 36 teeth and can inflict a painful bite if provoked. Annual prophylactic dental care is recommended, and depending on the diet, a hedgehog may require a cleaning twice a year to prevent dental problems.

Hedgehogs certainly present special challenges to the practitioner but are generally healthy animals. With a basic understanding of a few husbandry parameters, the veterinarian is better equipped to define disease processes and treat accordingly.

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PRACTICE

TIP

Shawn Messonnier, D.V.M.

Minimize Hematoma Formation in Birds After Venipuncture

Hematoma formation may occur following venipuncture in pet birds, especially if the basilic vein (wing vein) is selected, because this area has minimal subcutaneous tissue that aids in preventing hematoma formation. As a rule, I prefer jugular venipuncture to minimize hematoma formation and prevent venous collapse. When I must use the basilic vein, I try to use the smallest gauge needle possible (usually a 27-gauge needle). I also apply pressure to the venipuncture site for 1–2 minutes following venipuncture. This seems to prevent hematoma formation.

WHAT'S YOUR DIAGNOSIS ???

A 6- to 7-year-old female grey cheek parakeet (*Brotogeris sp.*) was evaluated for loss of feathers on the head, watery droppings, and listlessness. The watery droppings and listlessness had occurred several days prior to the visit; the feather loss had occurred over several weeks. The bird was housed with several other grey cheek parakeets that all appeared normal to the owner.

Physical examination revealed a slightly depressed bird. Auscultation of the thoracic and abdominal areas were within normal limits; the cloaca and choana appeared normal. Abdominal palpation was unremarkable. The bird weighed 59 g. Polyuria was present; feces appeared normal.

Questions

1. What laboratory tests would you recommend?
2. What are causes of “watery droppings” in birds?

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ROUNDTABLE

Dental Disease in Rabbits and Rodents

Q. What are common dental problems in rabbits?

Dr. Tynes: Overgrown incisors are the most common dental problem I see in rabbits.

Dr. Suedmeyer: The most commonly seen problem is malocclusion, leading to overgrown incisors, premolars, and molars. Far less commonly, we will see apical abscesses and dental tartar. On occasion, we will see fractured or chipped teeth, usually secondary to overgrown teeth.

Q. What are common dental problems in rodents?

Dr. Tynes: I don't see many rodents with dental disease; when I do see them, they usually have overgrown incisors as well.

Dr. Suedmeyer: We frequently see malocclusion problems in rodents, especially guinea pigs. Apical abscesses are also commonly encountered, more so than in rabbits.

Q. Is there a genetic basis to dental problems in rabbits or rodents?

Dr. Tynes: I believe there is, especially when we see improper alignment of the incisors.

Trauma, husbandry, and diet may play important roles as well.

Dr. Suedmeyer: According to Dr. Steven Russell, UMC College of Veterinary Medicine, a genetic basis for malocclusion is suspected in many cases but not absolutely proven in rabbits and rodents. Hereditary prognathism in the rabbit (which has a genetic component) appears to be the cause of most malocclusive disease.

Q. How do you diagnose overgrown premolars/molars in rodents?

Dr. Tynes: Diagnosis almost always requires general anesthesia (I use isoflurane) and a small vaginal speculum or otoscope for looking into the back of the mouth.

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FROM THE LITERATURE

Prozac for Feather Picking

Fluoxetine (Prozac) has been reported effective in treating feather picking in some psittacine birds. As an inhibitor of serotonin uptake, fluoxetine increases serotonin concentration in the synaptic cleft. While tricyclic antidepressants such as amitriptyline may also be effective, they are not as selective or as potent as fluoxetine. The recommended oral dose is 2–3 mg/kg q24hr.

Behavior Q&A. *Veterinary Medicine*, April:318–319, 1997.

HOW I ...

Diagnose Infectious Stomatitis in Reptiles

Shawn Messonnier, D.V.M.

Infectious stomatitis, also known as “mouth rot,” is often seen in pet reptiles. I most commonly diagnose the condition in snakes, particularly pythons, and occasionally in lizards such as green iguanas and chameleons. It occurs rarely in turtles and tortoises.

An early sign of infectious stomatitis is the presence of petechial hemorrhages on the mucous mem-

branes of the oral cavity. These are often seen during a routine physical examination when the pet is brought in for another problem. Therefore, it is critical to carefully examine the oral cavity of all reptiles.

Whenever infectious stomatitis is suspected, a culture and sensitivity test should be performed. Usually, I perform only an aerobic culture. An

Editor's Note: Feather picking is a difficult condition to diagnose and treat. Before you begin any drug therapy, it is important to rule out medical causes for the feather picking. This is done by performing diagnostic tests including Gram's stains of the choana and cloaca (along with culture and sensitivity tests if needed), microscopic fecal analysis (along with specialized tests as needed to rule out giardiasis), whole-body radiographs, complete blood count and serum biochemistry analysis, skin biopsy, and culture and sensitivity test. Psittacine beak and feather disease should also be ruled out can also be tested and should be included in the workup of any bird with feather loss. After ruling out medical causes, behavior-modifying medication can be tried. Fluoxetine is another drug (in addition to haloperidol and other medications) that can be tried to control feather picking.

anaerobic culture can be performed routinely or if the aerobic culture fails to grow organisms.

Overt cases of infectious stomatitis, where obvious bleeding is present or a large amount of mucous or purulent exudate is seen, are easily diagnosed. Cultures should still be performed to allow accurate identification of the organisms responsible and to identify which antibiotic agents are most likely to be effective.

What's Your Diagnosis???

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Answers

1. The owner consented to Gram's stains, a urinalysis, a fecal smear, and a CBC and biochemical profile. A urinalysis showed a specific gravity of 1.020, a pH of 8.0, and other biochemical parameters within normal limits. The fecal smear was negative for parasites. The Gram's stain of the feces was negative for mycobacterial organisms and showed a moderate amount of gram-positive bacilli with a small amount of gram-positive cocci. The CBC and biochemical profile showed anemia (PCV, 25%), mild leukocytosis (WBC, 13,000, heterophils, 7020; lymphocytes, 5980), elevated AST (398 IU/L),

elevated GGT (106 IU/L), and elevated CPK (1743 IU/L). The results indicated hepatopathy with secondary anemia.

2. “Watery droppings” can be caused by polyuria (most common) or true diarrhea (less common). Any number of conditions can cause polyuria, including diabetes, kidney disease, liver disease, septicemia, and stress.

How would you proceed?

The bird was treated with one injection of enrofloxacin (100 mg/kg IM) and oral trimethoprim-sulfamethoxazole (100 mg/kg q12hr). The bird's condition deteriorated, and it died 2 days later. Necropsy showed moderate hepatopathy. Histopathologic examination revealed hepatic and proventricular mycobacteriosis.

Grey cheek parakeets are prone to mycobacteriosis. The acid-fast organisms that cause this disease may be found on Gram's stains of the feces (they appear as non-staining “ghost” rods) or on acid-fast preparations of the feces or tissues obtained by endoscopy or at necropsy. Treatment is controversial, prolonged, and expensive. While not common, mycobacteriosis can be zoonotic. All owners, especially those with deficient immune systems, should exercise care when keeping a pet with mycobacteriosis.

Euthanasia may be considered to prevent zoonotic infections.



Dental Disease in Rabbits and Rodents

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Dr. Suedmeyer: A good history can give an indication of a problem. Dropping food, foul odors, excessive teeth grinding, and drooling indicate that further examination is warranted. We have had success in diagnosing these by simply using a metal otocone and gently placing it in the buccal "pouch." Most rodents attempt to chew on the cone, allowing the operator to adequately examine the dental arcades. In very fractious animals, masking with isoflurane allows for a better evaluation of the arcades. Radiographs certainly are war-

ranted, but the owner seldom consents.

Q. What is the recommended treatment for overgrown teeth in rabbits and rodents?

Dr. Tynes: Frequent trimming of the teeth with a high-speed dental saw is usually my treatment of choice.

Dr. Suedmeyer: Frequent trimming of overgrown teeth is necessary to prevent complications such as weight loss, abscesses, or penetration of the mandibular maxillary bones, mucosa, etc. The teeth are open-rooted, allowing the teeth to grow continuously. Practitioners need to be aware that, in general, if the incisors are overgrown, quite commonly

so are the premolars and molars. In this case, the animal should be anesthetized and the teeth trimmed. Use of a dremel tool with a sanding disk should be used. Toenail trimmers will splinter the teeth, predisposing to apical abscesses.

A permanent solution to overgrown incisors has been described for rabbits.¹ Basically, the animal is anesthetized and the incisors are removed. A periosteal elevator is used to loosen the tooth roots of the lower incisors first, whereby they are removed with a gentle upward and caudal motion (the roots are gently curved). The maxillary incisors are curved more sharply, and care must be taken to remove them with a downward and sharply caudal motion. Fracturing the teeth allows for the tooth to regrow. This technique works well, as the rabbit can procure and eat food without difficulty. The rabbit should be placed on antibiotics after the procedure for 5–7 days.

Prevention is key. Use of chew toys, blocks, etc., will not prevent malocclusion. Owners should have prospective pets examined for evidence of malocclusion. Buying pets from a reputable breeder that has generation records will help.

Reference

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Client Teaching Guide

Reptile

CARE SHEET

Wm. Kirk Suedmeyer, D.V.M.

The Box Turtle (*Terrapene* species)

- ✓ **Other names:** Include Eastern, Three-toed, and common box turtle. The Ornate box turtle (*Terrapene ornata*) is also a common box turtle.
- ✓ **Namesake:** This turtle can completely close its shell, protecting itself from predators. This "box-like" shape gives the turtle its name.
- ✓ **Place of Origin:** Native to North America. A different genus (*Cuora*) is also called "box" turtle, i.e. the Asiatic box turtle, three-lined box turtle.
- ✓ **Adult Length:** 7–10 inches
- ✓ **Average Life Span:** These turtles have been documented as living more than 50 years, though numerous anecdotal records suggest life spans more than 100 years.
- ✓ **Diet**
 - Immature box turtles should be fed daily, and adults two to three times weekly.
 - Diet should include more invertebrates and live prey than vegetable matter. This includes slugs, earthworms, and soft-bodied insects with small amounts of fruit and vegetables. Do not feed turtles hamburger, bologna, or breads. Mince the food for better acceptance.
 - Most box turtles are attracted to red-colored fruits and vegetables.
 - On a daily basis, fresh water should be offered in a shallow dish below eye level.
- ✓ **Cage Temperatures**
 - Air temperature during the day should be 75°F to 95°F (24°C to 35°C).
 - Optimum air temperature during the evening is 70°F to 75°F (21°C to 24°C).
- ✓ **Cage Humidity:** Optimum is 60%; box turtles generally do better in a drier environment.
- ✓ **Reproduction**
 - This kind of turtle lays eggs in the soil, about 8 to 12 at a time.
 - It is difficult for box turtles to breed in captivity.
- ✓ **Common medical problems**
 - Anorexia (not eating) is most common in the fall, when the turtles attempt to hibernate. It is recommended to release the turtle in late summer, as owner attempts to hibernate the turtle are rarely successful.
 - Upper respiratory tract infections
 - Turtles can carry salmonella, a type of bacteria. This is generally not a problem if proper hygienic measures are followed.
- ✓ **Veterinary Recommendation:** Yearly physical examinations, including fecal examination and culture.
- ✓ **Ranking as a reptile pet (scale: 1 = best, 10 = worst):** Gentleness, 1; Ease of maintaining, 2; Medical problems, 4; Longevity, 1; Price, 2; First-turtle recommendation, 1.

CASE REPORT

Orchiectomy of the Mature Sugar Glider (*Petaurus breviceps*)

This case report was contributed by one of our readers, Sharmie D. Johnson, D.V.M., of Arrow Animal Hospital in Glendale, Arizona. If you would like to submit a Practice Tip, Question, or Case Report to be considered for inclusion in Exotic Pet Practice, please send your submission to: Tania Banak, Mosby-Year Book, Inc., 11830 Industrial Dr., St. Louis, MO 63146.

Three fully developed male sugar gliders weighing 84–95 g have been successfully neutered at Arrow Animal Hospital. All three animals were intolerant to handling by the owner or myself; therefore, a rudimentary physical examination was done prior to anesthesia and a more thorough examination was performed before surgery with the animal under anesthesia.

The first two sugar gliders had been fasted for at least 4 hours before surgery. The third was fasted for 2 hours, and some regurgitation was noted with this animal during chamber induction with isoflurane. This animal's mouth and pharynx were cleaned using a cotton-tipped applicator, and there were no complications resulting from the regurgitation during surgery or recovery.

All of the sugar gliders were induced in a chamber using 5% isoflurane and 5 L oxygen until the righting reflex was abolished. The isoflurane level was then decreased to 2% while the oxygen was kept at 2–3 L. A face mask was applied for the remainder of the surgery. A small amount of sterile eye lubricant was applied to both eyes. The animals were positioned in dorsal recumbency on a circulating water blanket and sandwiched between two warmed 1 L bags of IV fluids for extra warmth.

A sugar glider's testicles are located within a scrotum and are

attached via a short stalk to the body wall in the area of the umbilicus. The hair was plucked with either hemostats or fingers from the stalk portion approximately 5–8 mm from the body wall. The surgical field was draped on four corners with gauze pads moistened with chlorhexidine followed by a standard surgical draping. The skin had already been cleansed with dilute chlorhexidine scrub followed by hydrogen peroxide as a rinse in a three-step wash (alcohol was avoided as it tends to reduce body temperature).

A 0.5 cm longitudinal incision (parallel to and running along the stalk) was made. Blunt dissection of the supporting soft tissue was then made to expose the blood supply and vas deferens of the testicles. A transfixing suture of 5.0 monofilament polyglyconate (Maxon) was placed around the vas deferens followed by an encircling loop around the vasculature. Due to the bulk of the suture knots, a single ligature was used. The skin was then closed with 5.0 Maxon using a subcuticular pattern with buried knots. It is very important to bury the sutures, as the sugar gliders have a propensity to chew at their incision when awakened.

The sugar gliders wakened 30 seconds to 2 minutes after gas anesthesia had been terminated. The animals recovered in an 80°F setting on the incubator (normal body temperature reported to be 89.6°F).¹ The first animal that was neutered awoke violently and tore at his incision with his teeth. Because this animal was difficult to handle, and we did not want him to open the incision, he was given an oral cocktail of 0.1 mL acepromazine (10 mg/mL) with 0.1 mL butorphanol tartrate (10 mg/mL) and diluted with 1.0 mL normal saline (0.9%). A total of 0.2 mL of

this solution was given orally using a 24-gauge intravenous catheter sheath attached to a 1.0 mL tuberculin syringe. This quieted the animal, and he did not need to be dosed a second time. Based on this experience, the other two animals were given a combination of 0.01 mL acepromazine (10 mg/mL) and 0.01 mL of ketamine hydrochloride (100 mg/mL) subcutaneously during the start of the skin closure.² These two animals recovered smoothly with only a slight tendency to tear at their incisions. The animals rested quietly for approximately 30–45 minutes after surgery when this combination was used.

Ideally, medicating the animals before surgery would be desirable. In the animals described, this was not practical, as these animals were not accustomed to being handled.

All three sugar gliders were given 0.1 mL of pediatric trimethoprim-sulfamethoxazole (8 mg/40 mg/mL) PO q24hr for 5 days as prophylaxis against infection from chewing at the incision site.* The owners were instructed to give this drug by mouth, hidden in a favorite food if necessary. All three animals resumed eating that evening, and all were placed back into a communal setting when fully recovered from anesthesia.

While it is possible to manually restrain the animals with gloved hands and provide a preanesthetic sedation, this sort of aggressive handling appears unnecessary as the animals do quite well without preanesthetic sedation. And, finally, fasting for 4 hours seems to be ideal to avoid potential problems with regurgitation.

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* Dose extrapolated from that used in domestic rabbits.



Answer by Shawn Messonnier, D.V.M.

What do you recommend for annual care for exotic pets?

This varies depending upon the species of pet, and I'll address what I do in my practice by species in future editions.

For now, let me share with you what we do for pet rabbits. Annually, we perform a full physical examination, paying particular attention to the ears (for ear infections); incisors (checking for overgrown incisors); and any skin lesions that might indicate parasites, tumors, or abscesses. We also perform a microscopic fecal analysis checking for coccidiosis. Finally, using jugular venipuncture, we draw blood for an annual blood profile. The blood profile lets us know if the rabbit has any underlying disorder and also serves as a normal baseline for the pet. Finally, we review diet and environment and make sure the pet has been spayed or neutered.

Readers: Please submit any questions to Tania Banak, Mosby-Year Book, Inc., 11830 Westline Industrial Drive, St. Louis, MO 63146; tania.banak@mosby.com; fax (314)453-4191.



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