

Hedgehog Medicine



Description

The African pigmy hedgehog (*Atelerix albiventris*) has become a very popular pet in the early 1990's. They were a fad that hit the 'get rich quick' crowd initially but now has a small but very loyal following. At first these pets sold for \$120-200, but as more people bred them the prices dropped and everyone who wanted them had them. It is not difficult to find them given up for adoption now. Now color variations exist, hedgehog clubs have been formed, and shows are held. Clinical information is becoming more abundant and easy to find.

Hedgehogs are members of the insectivore family. They possess 36-44 teeth with the first incisors being notably longer than the rest and are spaced apart. The lower incisors "fit" into this space when the jaw is closed. {Dental formula: $2(3/2, 1/1, 3/2, 3/3)$ }. Their teeth are brachyodontic like carnivores. The most obvious feature of the hedgehog is the dermal spines. These are modified hairs that provide protection from predators. Beneath the spines is a thick layer of subcutaneous fat. Hedgehogs will roll up when alarmed into an impermeable ball of spines, making them clinically challenging. They have sharply pointed snouts and typically small eyes. All possess a collarbone (clavicle). They are nocturnally active, and like to hide during daytime hours. The olfactory and auditory senses of all insectivores are highly developed, making them good hunters and foragers. Hedgehogs have a plantigrade gait, meaning that they walk on the entire soles of the feet rather than the toes alone. The most common pet species in the United States is the African pigmy hedgehog. Adults of this species generally weigh 300-600 grams. Longevity is about 5-7 years in captivity. Some color varieties are available now and if the pattern follows true, many genetic defects and a generally weakening of the species may follow from the inbreeding practices used to produce these. Hedgehogs are easy to sex, because males have a distinct prepuce like in dogs but testicles are abdominal. Females have a vulva. Hedgehogs are induced ovulators year round. Litters of 3-6 young are produced following a gestation of 34-37 days. The offspring have a protective coating over the spines during parturition, which is lost in the first 24 hours to expose the spines. Babies wean in 30-40 days and become sexually mature at about 2-3 months of age.

Diet

In the wild, hedgehogs consume insects, small vertebrates, and carrion. In captivity, hedgehogs fare well on formulated hedgehog or low fat dog or feline diets. Some recommend soaking the dry food prior to feeding. Reduced calorie formulations should be used, as obesity is the most commonly encountered nutritional problem. Fruits and vegetables should be added to the diet to dilute out the high calorie foods and to offer extra fiber. Cottage cheese, eggs, and other such protein sources can be given to breeding hedgehogs, but should be avoided or limited in sedentary animals. Insects are relished and can be given as a treat, but are calcium deficient and due to improper Ca:P ratio should not be the sole diet. Recommend feeding once daily in the evening. Also encourage evening exercise to prevent obesity.

Housing

Usually caged alone but can be housed in groups if given enough space. Excellent climbers so cages need to be smooth walled and high enough to prevent escape. It is recommended to avoid wire floors. Solid floors should have bedding such as newspaper, recycled newspaper, or wood shaving (pine or aspen). A hide/sleeping area should be provided. One can be creative in the type of hide/sleep area provided.

Examination

Hedgehogs can be very difficult to work with as patients. Their ability to roll up into a ball makes them impossible to examine if they do not want to be examined. Lightweight leather gloves should be used to prevent the spines from pricking the handler's hands. Sometimes, an aquarium with a shallow layer of water can be used to allow for visual examination. When the hedgehog is placed in the water, it must unroll so as to not breathe the water. This helps keep the hedgehog unrolled for examination. Some hedgehogs uncurl with back stroking of the rump spines. Anesthesia is almost always required for a complete examination. Isoflurane or Sevoflurane are the recommended gas anesthesia. A small mask, fashioned from a syringe case can be slipped into the opening of the ball and over the snout. Alternatively, the hedgehog can be placed in an anesthetic chamber for induction. Once anesthetized, the mask can be positioned better or an endotracheal tube can be placed (very challenging). At this point the hedgehog can be easily examined. The examination should be systematic. A visual of the eyes, nose, ears, oral cavity, teeth, spines, anal and urogenital openings, palpation of lymph nodes and abdominal cavity, and auscultation of the thorax and abdomen will detect most disorders. In many cases, the problem will require further evaluation.

Clinical Pathology

Hematology and serum biochemistry are often the first step in evaluating more vague illnesses in hedgehogs. Blood collection can be a bit challenging but can be mastered with a bit of practice. The jugular or cranial vena cava is generally used for venipuncture. The jugular is relatively short and runs from the thoracic inlet to the ear. A large lymph node lies just lateral to the jugular. It usually cannot be palpated, but can be blindly entered in the anesthetized hedgehog. With the hedgehog anesthetized and in dorsal recumbency, the neck should be extended. While it cannot usually be visualized, the jugular vein will generally course from the manubrium sterni to the ear. Large lymph nodes lie just lateral to the vein and serve as a landmark. The jugulars should be entered blindly with slight suction on the syringe until a flash is seen. Slow and steady pressure is used until the desired quantity of blood is obtained. One percent of the body weight can be taken, but 1ml should be adequate for routing analysis. Pressure should be applied briefly following venipuncture. Fecal examination, urinalysis, cytology are run and interpreted in the same manner as the more familiar mammals. Clinical pathology data is limited but empirically, most values are similar to canine and feline patients.

Radiographs

Radiographs are most easily taken in the anesthetized hedgehog. A ventrodorsal and lateral view can be taken on a single small film. It may be beneficial on the lateral view to elevate the excess fat pad that holds to dorsal spines. This can be accomplished by using a "chip clip". Knowledge of normal anatomy is necessary for interpretation of radiographs. A radiographic atlas of exotics is available for normal anatomy.

Therapy

The diagnosis is not the only challenge in hedgehog medicine. The same defense that prevents examination can also make treatment difficult. Once a diagnosis is made, or at least initial diagnostic procedures are finished, therapy should be started. Early treatment is crucial to success. The small size of hedgehogs makes them very susceptible to starvation and dehydration. If they are not eating or drinking, they should be force-fed and administered fluids. If shocky or critically dehydrated, fluids should be given intraosseously. A needle can be placed in the femur, in the same fashion as an intramedullary pin, and fluids or drugs can be administered in this fashion. The fluids are taken up into circulation so rapidly that this technique is equivalent to intravenous infusions, which is very difficult in hedgehogs. Less severely ill pets can be given subcutaneous or oral fluids. Maintenance fluid requirements are 60-100ml/kg/day. Therefore a 400gram hedgehog will need 24-40ml per day for maintenance plus the deficit. Force-feeding energy requirements can be calculated with the following formula:

Basal energy requirement (BER) = $68 * (\text{body-weight in kg})^{.75}$

Maintenance energy requirement (MER) = $1.25 * (\text{BER})$

Actual energy requirements will vary from 1-2 times maintenance energy, depending on the medical condition. A 400gram hedgehog will require 45-90 kcal of energy per day for maintenance. Using the higher calorie formula, this means about 23-45ml per day.

Normal room temperature should be used for housing hospitalized mammals unless they are hypothermic or hyperthermic. Hedgehogs will go into a torpid state when cold which could be dangerous if they are sick. Care should be taken, however, that they are not overheated in an avian or reptile intensive care unit. Minimizing stress is critical and somewhat more difficult when treating 'prey' type

species. These secretive creatures will feel more comfortable when adequate hiding spaces are provided. They preferably should be kept in a quieter location, away from barking dogs.

Information regarding drug dosing and efficacy is largely anecdotal at this point. There are no label-approved drugs for hedgehogs. All medications should be used with caution and with informed consent of the owner. Generally drugs and dosages published for ferrets are appropriate for hedgehogs. When exotic animals are treated, follow up evaluation takes on a critical role since we are still feeling our way along. The safest choice of available drugs should always be made. Often, injectable medications are preferred since they can be given when the hedgehog is in "spiny ball" mode. Oral medications are given in liquid suspensions or solution form. Very tame hedgehogs can be medicated easily by their owners, but some will have to have the medications put on a favorite food item. Eye and ear medications are very difficult to administer. Solution preparations are easier to apply but ointments will last longer and require less frequent administration.

Dental care for hedgehogs is difficult. Few owners can brush the teeth and yet periodontal disease, tooth root abscesses, and decay are all common problems. Recommendations include using dry food formulated for dental care, using crisp vegetables, and if possible, the use of oral cleansing gels (example: Maxiguard®).

Client education is critical to proper treatment. In addition to demonstrating the proper method of treatment, owners should be informed of predisposing factors and how to correct them.

Anesthesia

Certain diagnostic and therapeutic procedures may require anesthesia for restraint and prevention of pain. In most cases, isoflurane gas, administered by mask is the simplest, safest, and most rapid method. Endotracheal intubation is difficult and requires that the hedgehog be deeply anesthetized, so not recommended for novice clinicians. About 1.5-2 mm endotracheal tube is needed for an adult hedgehog. Injectable anesthetics carry the inherent disadvantage of greater difficulty to control depth of anesthesia. Hedgehogs lose much heat more rapidly, the tracheal lumen occludes more easily, the patient is more difficult to monitor. A supplemental heat source is essential, and cotton tipped applicators should be available to swab out the throat. A small endotracheal tube should be available for emergency intubation. Clear adhesive drapes facilitate monitoring. Most importantly, a technician should be dedicated to the constant monitoring of the patient. The tidal volume is generally too low to move the bag on most systems so respiration cannot be monitored in this way. The low tidal volume also leads to a large amount of dead space within the delivery system. Semi-open, non-rebreathing systems must be used for hedgehogs. Special bags are available that adjust to the small tidal volume. Alternatively, a balloon can be used as a bag on the non-rebreathing circuits. A respiratory monitor helps detect early changes in respiratory rate or tidal volume. An ECG facilitates monitoring well.

Surgery

Preparation of the surgical site can be a challenge if surgery is performed on the dorsal part of the body. The spines must be removed so a surgical field can be formed. They can be plucked or clipped at the base. These spines are very difficult to pluck. Clipping is done with a pair of scissors just at the base, leaving a little behind. The skin is then prepared as in other animals. Surgery of hedgehogs can be enhanced by the use of several types of instrumentations not commonly used in traditional pets. Their small size requires finer instruments, methods of controlling small amounts of hemorrhage, magnification and directed source of light. Microsurgical or ophthalmic instruments are frequently used. Microsurgical instruments should be counterbalanced and have rounded handles to allow them to be manipulated by gently rolling them between the fingers. There should be no locking mechanism on needle holders as releasing these causes considerable jarring. Delicate surgery should be performed while seated with the wrists supported on the table to minimize motion. Hemorrhage can be controlled by the use of electrocoagulation. Bipolar instrumentation is preferred. Vessels must be isolated and then coagulated. If bipolar instruments are not available, the vessel can be isolated with forceps and the electrode is then touched to the forceps. Care must be taken not to cause excessive tissue destruction. Ligatures will be required on larger vessels (>2mm). Small sizes of suture (4-0 to 10-0) can be used for these when they are in an accessible area. Vasculare clips (Hemoclips) are preferred when working in a restricted area such as the body cavity or when speed is required. Occasionally hemorrhage will occur when none of the above will be applicable. In these cases, the area can be packed off with absorbable foam sponges (Gel Foam). Due to the small size of hedgehogs, magnification of the surgical field is advantageous. Optical loupes can be used for many procedures and are reasonably priced. Operating microscopes will provide greater magnification and also lighting and are very beneficial for many procedures. Working under magnification is very different from standard surgery. Every movement is magnified and the field is very restricted. It is sometimes difficult to even find instruments. Surgical procedures performed under a

microscope can be done with much greater precision, but they also take more time. Considerable practice is required to master microsurgery. The most commonly performed surgeries are tumor removal procedures and pyometra surgery.

Common Problems

Ectoparasites are the single most commonly presented problem of hedgehogs. Mites, especially *Chorioptes* and *Caparina sp.* are very common in hedgehogs. These parasites are just barely visible to the naked eye and the crusts can be seen to move in heavily infested hedgehogs. Loss of spines, pruritus, and scaling of the skin are the primary clinical signs of this disease. A skin scraping should be performed routinely on hedgehogs as these mites can take a long time to cause overt disease. When diagnosed, hedgehogs should be treated with an ivermectin product. A dose of 0.5mg/kg given subcutaneously once weekly for 3-6 weeks is generally effective in eliminating the parasite. Revolution® (Selamectin) used topically at 9mg/pound once and then repeated in 3 weeks has shown good success also in the treatment of these mites.

Endoparasites were quite common in imported hedgehogs but appear to be uncommon in the domestic raised ones commonly encountered in private practice now. Fecal examinations should be routinely performed to determine if any are present and then they should be treated appropriately.

Periodontal disease occurs frequently in hedgehogs. This also frequently progresses to tooth rot abscesses. Affected hedgehogs will lose weight, show abnormal feeding behavior, may have swelling of the jaw, maxilla, or periorbital region or may become anorectic. A thorough examination of the mouth, including probing the periodontal pockets will detect most problems. Skull or dental radiographs may be needed in some cases. Minor cases may respond to supragingival and subgingival scaling, antibiotics, and nutritional support. More often, extensive extractions must be performed. Hedgehogs appear to do well with few or no teeth. If no teeth are present, softer foods may be needed.

Hedgehogs are emerging as rivals of budgerigars, ferrets, and boxers in the arena of tumor production. Neoplasias of many different types have been reported in hedgehogs, despite the relatively sparse literature on them in general. Squamous cell carcinoma of the oral cavity and lymphosarcoma of any body part are over represented in the literature. Whenever a lump is encountered, it should be aspirated or removed for histopathology. Vague clinical signs of illness often result in a final diagnosis of cancer. Thorough palpation of the lymph nodes, neck, abdomen, and auscultation of the thorax should be done on each exam. Radiographs and ultrasound are helpful for early detection or gaining further information about a tumor. Currently, the treatment of choice for tumors is surgical resection. If done early, this can achieve a cure in many cases.

Obesity is a common occurrence in pet hedgehogs. The combination of unlimited supply of high calorie food and the lack of exercise results in a calorie excess (fat deposition). Some are so fat that they cannot or have difficulty rolling into a ball. Treatment of obesity includes changing the diet to a low calorie cat/dog food, limiting the amount given to 2/3 of the current ration, giving fresh fruits and vegetables for fiber, and increasing exercise by giving a wheel and allowing more play-time outside of the cage.

Trauma can also occur to the limbs of hedgehogs. One must be careful to not have string-like material on the floor or in the cage. There have even been reports of even human hair causing constriction bands around the limbs/digits leading to avascular necrosis.

Enteritis has been sporadically encountered in hedgehogs. Often clostridial organisms are seen on cytological examination of the feces. Amoxicillin and metronidazole are both effective in elimination of the clostridium and the diarrhea in most cases.

Preventive Medicine

Client education is the most important key to maintaining a healthy hedgehog. A combination of written, spoken, and visual aids are usually necessary for adequate retention of information. Information about housing, nutrition, sanitation, behavior, and health care should be given to each client.

Nutrition is key to keeping any animal healthy and with exotic pets, where formulated diets are not available; the task is much more difficult. Common sense is important. A diet that would not be balanced for more familiar species would not be for hedgehogs as well.

Parasite control should be routinely applied/performed. Fecal samples should be checked once or twice annually and any parasites treated. Skin scrapings are very important for detecting external parasites.

Early detection and treatment of diseases is critical. Small "prey" species try to hide any signs of illness or weakness as a mechanism to prevent predation. In captivity, this trait leads to presentation late in the course of the disease. A hedgehog that looks sick is often very sick. A "wait and see what happens" approach is very dangerous in exotic animals. Rapid diagnosis and treatment is essential.

Suggested reading

1. Gregory MW, Stocker L: Hedgehogs. *In* Beynon PH, Cooper JE (eds); Manual of exotic pets. Gloucestershire, England, British Small Animal Veterinary Association, 1991, pp 63-68.
2. Hofer HL: Hedgehogs. *In* Vet Clin North Am Sm Animal Pract 24 (1)pp 113-120, 1994.
3. Reeve, N: Hedgehogs. T&AD Poyser Ltd, London, 1994.