CRITICAL RODENTS AND OTHER SMALL EXOTIC MAMMAL EMERGENCIES

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A common scenario for all exotic pets is chronic disease presenting as an acute onset of illness. Many rodents and smaller exotic pets fall into the category of prey species, with inherent instincts to hide illness until unable to do so. Therefore, any animal presented in acute crisis must be carefully evaluated for long-term chronic underlying illness.

Common underlying factors in diseases affecting these species are malnutrition and improper husbandry, especially in those with difficult husbandry requirements, for example, sugar gliders. All efforts at diagnosis and treatment must include careful investigation into husbandry and explicit recommendations for correction based on the most recent understanding of the needs of these species.

The principles of emergency care and stabilization are the same as those established in human and more traditional pet medicine: airway and cardiac support, control of hemorrhage, correction of underlying fluid and electrolyte abnormalities, and restoration of normothermia.

Some patients require sedation, or even general anesthesia to reduce pain and stress associated with critical care procedures. Sedatives and anesthetic agents must be chosen carefully to reduce the risk of exacerbating the condition or causing death.

AIRWAY SUPPORT

Intubation of these species for direct establishment of an airway is possible in theory with use of the endoscope and/or specialized laboratory animal rodent intubation instruments. However, this is often not a realistic option for the practitioner, especially in the critical patient. Emergency tracheal intubation via tracheotomy may be an option in very small animals using a standard tracheotomy approach and small endotracheal tubes, IV catheters, or red rubber catheters. The author has no experience with a small rodent patient post recovery of placement of a tracheostomy tube, but assumes the risk of tracheal damage and/or stricture to be high.

In less severe cases oxygen can be delivered via facemask or while the animal is resting quietly in an oxygen chamber.

CONTROL OF HEMORRHAGE

Blood volume of mammals is estimated at 7% to 10% of body weight, and it is estimated normal healthy individuals can tolerate an acute loss of approximately 10% of blood volume. Direct pressure is often the most effective means to control hemorrhage. Silver nitrate and coagulative powder products may be used for nail hemorrhage. More severe bleeding may require ligation of the compromised vessel.

Treatment for blood loss includes blood transfusion or the use of colloids with oxygen-carrying ability such as Oxyglobin.

Rough guidelines for the indication for blood transfusion are similar to those used in other species and include acute blood loss resulting in packed cell volume (PCV) below 20%, or chronic blood loss with PCV below 12% to 15%. Overall patient condition (bright and alert versus pale and depressed) is also important when considering transfusion.

With the exception of the ferret, small exotic companion mammals are known to have distinct blood types. However, the likelihood of transfusion reaction after a single transfusion is unlikely. The risk of reaction must be weighed against the risk of withholding transfusion.

Sources of blood donors include the ill pet's housemates, or pet stores. The author keeps a list of owners willing to provide blood donors in exchange for clinic credit. Blood is collected from healthy donors under sedation with 1 mL acid citrate dextrose (ACD) per 10 mL blood, maximum 10% of blood volume based on calculated body weight. Blood is administered via intravenous (IV) or intraosseous (IO) catheter.

An example of blood transfusion following hemorrhage in a rodent or other small exotic mammal is outlined below:

- Control external hemorrhage with direct pressure, or consider a bandaging technique.
- Administer a sedative if needed to facilitate handling (midazolam .25 mg/kg IM). Administer general anesthesia if necessary, weighing the risk of a potentially hypotensive anesthetic procedure against the risk of stress and manual restraint.
- Place a 25- to 22-gauge IO catheter into the tibia or humerus of the recipient after installation of lidocaine as a local block.
- Place a catheter cap or injection port, and secure the catheter with tape
- Administer midazolam .25 mg/kg to a healthy same species donor and then mask induce with an inhalant anesthetic agent.
- Collect blood from the donor (7–10% of body weight) via the vena cava into one or several 1- to 3-mL syringes prepared with sodium citrate 1 cc/ 10 mL blood.
- Administer whole blood via the IO catheter manually over 3 to 5 minutes, or with a small precision infusion pump.

Optimal fluid therapy is critical for treatment of hypovolemic shock and correction of dehydration. While little information exists on specific guidelines for treatment of hypovolemic shock in these species, information can be extrapolated from work with other species, including the guinea pig, rabbit, and ferret. For these species, Lichtenberger recommends rapid intravenous infusion of warmed isotonic crystalloids at 10–15 mL/kg, followed by colloids (Hetastarch, 6%, Braun Medical, Irvine, CA) at 5 mL/kg over 5 to 10

minutes. After achieving systolic Doppler blood pressure of above 40 mmHg, aggressive external heat support is initiated until rectal body temperature reads at least 98°F. Boluses of isotonic crystalloids (10–15 mg/kg) and colloids (5 mL/kg) are continued until systolic Doppler blood pressure reads above 90 mmHg. At this point dehydration deficits are calculated and corrected using isotonic crystalloids over a 6-hour period in cases of acute disease, and 12 to 24 hours in more chronic diseases cases.

Vascular Access

Intravenous catheterization is difficult for species smaller than guinea pigs. However, vascular access is feasible with intraosseous access, via the tibia or humerus. The author prefers the use of standard IV needles (27–22 gauge), which are placed, secured with tape and fitted with a standard catheter infusion cap. Confirmation of correct placement can be assumed by stability of the catheter and failure to accumulate fluids in soft tissues, but absolute confirmation requires radiographs of the catheter in situ in two views.

Fluid infusion is accomplished via intermittent administration via a small volume syringe, as larger syringes produce excessive pressure. It is often difficult to use an infusion pump in conjunction with a small IO catheter.

Small needles used as catheters occasionally occlude with bone or blood clots, which can be removed using very fine sterilized cerclage wire as a stylette.

Measurement of Blood Pressure

Measurement of systolic Doppler blood pressure has been reported in these species, and has been found to be similar to that in other small mammals. Practitioners may find this more challenging in smaller individuals, in particular hedgehogs and sugar gliders, but like every challenging technique improves with practice. For some very small or active patients it may be more feasible to monitor blood pressure trends with the aid of anesthesia or sedation. Measurement of indirect systolic blood pressure is accomplished with pediatric blood pressure cuffs and a Doppler vascular monitor. In most exotic mammals, the cuff is placed at the humerus, and the Doppler placed in a shaved area just above the ventral forelimb footpad. Several manufacturers offer blood pressure cuffs for human digits, which can be easily adapted to limbs of small exotic mammal patients.

When blood pressure measurement is unsuccessful, practitioners may be forced to make judgment calls regarding perfusion status based on patient response and parameters such as capillary refill time, turgor of visible surface vessels, temperature, and heart rate.

RESTORATION OF NORMOTHERMIA

Normal rectal body temperature of small companion mammal species vary widely. Measurement of body temperature is not difficult in debilitated animals. The author recommends a constant readout flexible temperature probe that can be inserted rectally, and taped into position. Depending on size, probes may not be practical in smaller species. Methods for external rewarming include heating pads, warm water bags or bottles, forces air warming devices, radiant heat sources, and commercial small mammal incubators. Internal rewarming can be accomplished via infusion of warmed IV fluids, which has been shown to be extremely important for the prevention of an afterdrop effect, or return of cool fluids to the body core and worsening of condition when external warming is used alone.

SEDATION AND GENERAL ANESTHESIA FOR CRITICAL PATIENTS

The introduction of a number of sedatives and anesthetics with wider margins of safety has greatly increased success in exotic companion mammals. It should be kept in mind that any anesthetic procedure in a critical patient should be planned carefully, with evaluation of the risk of anesthesia vs. risk of attempting a potentially stressful or painful procedure without anesthesia. Anesthetic agents are discussed fully in Dr. Marla Lichtenberger's articles in these proceedings.

The author prefers the use of midazolam as a sedative agent in critical patients. This drug has a relatively wide margin of safety, and often greatly facilitates diagnostic and therapeutic procedures such as venipuncture, collection of radiographs and administration of medications. This drug combined with local infusion of lidocaine and an analgesic (butorphanol, buprenorphine) often facilitates placement of an intraosseous catheter. Additional anesthesia can be provided with an inhalant agent such as isoflurane or sevoflurane.

Most exotic animal practitioners are familiar with the use of isoflurane and sevoflurane in practice. It should be kept in mind, however, that both have dose-dependent vasodilation properties, which lead to hypotension. Therefore, the risk of adverse anesthetic outcome is greater when these drugs are used at higher flow rates, which is often necessary when they are used alone. Isoflurane and sevoflurane also require higher flow rates to avoid a pain response, and provide no residual analgesia when discontinued. The use of preanesthetic agents and analgesics provides a more balanced anesthetic approach, and reduces the risk associated with higher dosages of any one drug.

Drugs such as ketamine and medetomidine should be avoided in critical patients, especially those with cardiovascular compromise. The author and several others (Lichtenberg) have been using intravenous etomidate in critical patients with success. More information on these drugs, plus recommended dosages is presented in Dr. Lichtenberger's articles in this proceedings.

REFERENCES

1. Lennox AM. Emergency and critical care in sugar gliders (*Petaurus beviceps*), African hedgehogs (*Atelerix albiventris*) and prairie dogs (*Cynomys spp.).* Vet Clin North Am Exotic Pet Pract 2007;10(20).
2. Lichtenberger M. (ed). Emergency and critical care. Vet Clin North Am Exotic Pet Pract 2007;10(20).