The Technician's Role in Working with Exotic Companion Mammals

Peter G. Fisher, DVM Pet Care Veterinary Hospital Virginia Beach, VA

Goal: to familiarize veterinary technicians with the husbandry and care of common exotic mammals including

- Nutrition and nutritional support
- Bedding
- Behavior and environmental enrichment
- Restraint
- Venipuncture
- IV catheter placement
- Laboratory analysis
- Fluid therapy
- Dental care
- Anesthesia/analgesia
- Perioperative supportive care

Key points

- Nutrition and nutritional support
 - Ferrets have a very high metabolic rate and require multiple meals throughout the day to sustain themselves. Ferrets are true carnivores; their diet must consist mainly of meat and animal products. They possess a very short intestinal tract that lacks a cecum and ileocolic valve, resulting in a rapid GI transit of ingesta in as little as 3-4 hours. As a result, their digestive system cannot adequately handle diets high in fiber or carbohydrates. Also because of this rapid transit time, ferrets need to be fasted no longer than 5-6 hours prior to surgery. A quality ferret diet should be 30 to 35% crude protein and 15 to 18% fat. When reading the pet food label, the first several items listed should be animal proteins such as meat or poultry, or meat or poultry meals or their by-products
 - Rabbits and guinea pigs are hind gut fermentors meaning they digest much of their food in the cecum and colon. The cecum is about ten times as large as the stomach and makes up approximately 40% of the digestive tract. Within the cecum, bacteria and protozoa aid in digestion. Fiber is needed for these bacteria and protozoa to stay in balance and function properly. Fiber also stimulates motility of the gastrointestinal tract and allows the rabbit or guinea pig to keep ingested food moving properly so that normal digestion can take place. Since hay is the primary source of fiber; recommend grass hay (timothy, oat, meadow, orchard) be fed free-choice to all adult rabbits and guinea pigs.
 - Nutritional support is a key element in the therapy of ferrets, rabbits or rodents that are recovering from anorexia, debilitating disease or surgery. Many exotic mammals can be syringe fed. Oxbow Animal Health (Murdock, NE) makes a powdered Critical Care formula for both herbivores and carnivores. You can usually achieve 15-30 ml per feeding over a period of time. If necessary esophagostomy tubes can be placed with relative ease in ferrets. Nasogastric tubes are used on occasion in rabbits requiring nutritional support.
- Bedding- Bedding should be dust free such as aspen shavings, shredded paper, wood chip pellets, or recycled newspaper products. Do not use cedar shavings as they contain resins that are noxious to the respiratory tract.
- Behavior and environmental enrichment
 - Much can be understood about the ferret by observing and recognizing its behavior patterns and interactions displayed as it plays and communicates with humans and animals within its home environment. They are very playful and curious pets that require a lot of attention from their owners and anecdotally require one to three hours of play daily.
 - Vocalizations are an important part of guinea pig behavior. Some of the most common are: "grunting" as a greeting, "squealing" in anticipation of feeding, "churr" and "purr" when they like something, "chattering" of teeth indicating fear and is used as a warning
 - In general, rabbits are very affectionate and enjoy human interaction as well as the company of other rabbits. In fact, if paired with the right mate, a rabbit can form a close bond for life. Rabbits are most active at dawn and twilight (crepuscular) and seek a quiet corner for a nap during the midday.
 - Environmental enrichment objects for exotic mammals are commercially available. Owners and technicians can create enrichment toys. Do not under estimate the value of food treats.

- Restraint
 - Most ferrets are docile and can be easily handled for routine procedures. For very active animals or those that may bite an assistant can scruff the animal's skin over the back of the neck while supporting the back legs. With this hold most ferret become very relaxed and the veterinarian can proceed with an oral exam, ear exam and cleaning, nail trim or other procedures that require some restraint.
 - A well supported rabbit is less likely to resist restraint. Most rabbits can be grasped behind the front legs with one hand while the other hand lifts the rear end and supports the body against the chest of the handler. The rabbit or rodent presented for examination should be provided with at towel or mat for traction.
 - Bath towels can be wrapped firmly around the body as a form of comforting support and restraint, esp. when anesthesia is being induced.
- Venipuncture
 - Ferrets- cephalic or saphenous vein for small samples. Vena cava stick for larger blood draws.
 - o Rabbits- lateral saphenous vein, jugular vein
 - Guinea pig, hedgehog- lateral saphenous vein or vena cava stick
 - 0 27ga. ¹/₂ cc tuberculin syringe are available for smaller veins blood draws IV catheter placement
 - A standard 24 or 25 gauge IV catheter can be placed in the cephalic vein of the foreleg with relative ease. A 26 ga x ³/₄". cephalic catheter is a good choice for guinea pigs and rats
 - Intraosseus catheters can be placed in the guinea pig or ferret femur or rabbit humerus using a 22 gauge 1¹/₂" or 25ga X 1" spinal needle lined up parallel to the shaft of the bone.
- Laboratory analysis/ Imaging
 - In-house lab work performed by veterinary technicians on exotic mammals include: fecals, CBC's, Chemistry panels, blood glucose, cytology specimens
 - o Radiography positioning is similar to small animal. Digital radiology has revolutionized image quality.
 - A fluid:gas interface creates a highly reflective surface resulting in an artifact called reverberation. This makes imaging through gas/air difficult because it is impossible to distinguish these from real echoes. This fact along with the large size of the herbivore cecum makes abdominal ultrasonography more challenging in guinea pigs and rabbits.
- Fluid therapy
 - o Standard small mammal crystalloids (LRS, Normosol R, 0.9%NaCL); 75-100ml/kg/day for maintenance..
 - Colloids (hetastarch, dextran) are used to aid in maintenance of normal blood pressure and when indicated due to blood los or prolonged fluid therapy. 10-12 cc/kg given over one to two hours.
 - o Fluid pumps are essential in giving the low volumes IV fluids/hour
- Dental care
 - Signs of dental problems in rabbits and rodents include: reluctance to eat, preference for soft foods, drooling, grinding teeth, dropping food out of the mouth, and weight loss.
 - There are several types of dental problems that can affect rabbits and rodents; overgrown teeth, sharp dental spurs, infected teeth and dental abscesses.
 - o A significant cause of improper dental wear is not having enough roughage, especially hay, in the diet.
 - Overgrown teeth may be trimmed and sharp points filed. This often requires anesthesia. Trimming is usually done every 2-4 months as needed.
 - Dental instruments designed for rabbits and rodents are essential. (Shipps dental lab, Sontec Surgical Instruments)
- Anesthesia/analgesia
 - Excited or nervous patients are given pre-anesthetic sedation upon admission to the hospital for routine out patient surgeries. Otherwise pre-anesthetics are given one-half hour prior to surgery. The sedative effect allows for patient relaxation and makes mask induction with inhalant go more smoothly. Some examples of pre-anesthetic drugs or combinations used in the authors practice are in the table below.
 - Isoflurane or Sevoflurane are used to induce anesthesia via facemask. Most ferrets can be readily intubated using a 2.0-4.0 mm endotracheal tube. Many rabbits can be intubated using a 2.0-3.0 mm uncuffed endotraceal tube using a "blind" approach or with the aid of a semi-flexible Micro-E endoscope (MDS, Inc, Brandon, FL). The tracheal opening is difficult to visualize due to the rabbit's oropharyngeal anatomy. The thick tongue, small mouth opening, and laryngeal spasm all add to the difficulty of intubation without the visual aid of endoscopy. A lidocaine gel (Xylocaine® 2% jelly) swabbed on the epiglottis aids intubation. I tell my technicians that if they are not successful at rabbit intubation within five minutes then to maintain anesthesia with use of a facemask. A dog muzzle or tape can be used to secure the mask to the rabbit's head and care is taken to make sure that the rabbit's head and neck are not over extended which compromises the airway. Facemasks are used routinely in guinea pigs and rodents due

to the extreme degree of difficulty in intubating. A 12 cc syringe case with the end cut open for an anesthetic attachment makes a good small rodent facemask. A non-rebreathing system such as the Ayres T piece is used for delivery of anesthetic gases. The human pediatric ones are inexpensive and can be re-used numerous times. Oxygen flow with these systems should be two to three times the patient's minute ventilation (approximately 200-350ml/kg/min).

- It should be noted that small exotic mammals do not require an overnight fast prior to surgery. Two to four hours
 fasting prior to surgery is generally adequate due to the ferrets rapid GI transit time and the fact that rabbits and
 rodents do not vomit. The 2-4 hour time frame allows for herbivores to clear their mouths of food particles, which
 may block the larynx during anesthesia.
- All vertebrates are assumed to have nocioceptors and therefore the ability to perceive pain. Nocioceptors and the response to pain are assessed by evaluating physiologic and muscular reaction to painful stimuli. Recall most inhalant anesthetics produce unconciousness but are poor analgesics. Therefore it is a good practice to incorporate analgesics into the preanesthetic protocol. Follow up with post op analgesia at the appropriate dose, frequency and duration as determined by the surgeon. See the chart below for some drug considerations.

Published doses of preanesthetics, anesthetics and analgesics.(1,2,3) Drugs highlighted in bold print are ones commonly used by the author.

Drug	Dosage (mg/kg)	Comment
Midazolam ^a	0.25-0.50 IM or IV	Anti-anxiety tranquilizer, pre-anesthetic; use in combination with an
	0.5- 2.0 IM	opioid or ketamine
h		When used alone
Butorphanol ^b	0.2-0.8 IM, IV, SQ	Opioid analgesic
Buprenorphine ^c	0.02-0.06 mg/kg IM	Opioid analgesic
Oxymorphone ^d	0.05- 0.2 SQ or IM	Opioid analgesic, preop with midazolam or for additional analgesia
Dexmedetomidine ^e	0.1-0.2 IM/IV	α-agonist, preop sedation and analgesia Preanesthetic; can be combined with ketamine
Malarian	0.2.0.5.50/00	NSAID a12h far anlagasia
Meloxicam	0.3-0.5 SQ/PO	NSAID, q12n for aniagesia
Lidocaine ^g 2%	1.0	Local anesthetic- rapid onset; can be used in combination with bupivicaine for longer analgesia
Bupivicaine ^h 1.25%	1.0	Local anesthetic-slower onset; can be combined with lidocaine for longer analgesia
Ketamine ⁱ	1 mg/kg (low dose)	Pre-anesethetic and for additional sedation

^aMidazolam, 5 mg/ml, Baxter Healthcare Corp, Deerfield, IL, USA.

^bTorbugesic, 10 mg/ml, Fort Dodge Animal Health, Fort Dodge, IA, USA.

^cBuprenex, 0.3 mg/ml, Reckitt Benckiser Pharmaceuticals Inc, Richmond, VA, USA.

^dNumorphan, 1 mg/ml, Endo Pharmaceuticals Inc, Chadds Ford, PA, USA.

^eDexdomitor, 0.5mg/ml, Pfizer Animal Health, New York, NY, USA.

^fMetacam, 5mg/ml, Boehringer Ingelheim VetMedica Inc, St Joseph, MO, USA.

^gLidocaine 20mg/ml, Agri Laboratories, St Joseph, MO, USA.

^hMarcaine 12.5mg/ml, Hospira, Lake Forest, IL, USA.

ⁱⁱKetaset, 100 mg/ml, Fort Dodge Animal Health, Fort Dodge, IA, USA

Perioperative supportive care

• The main goal of supportive care is to minimize the adverse physiologic effects of anesthesia, surgery and pre-existing disease. This begins with a thorough patient history and physical exam including the weight in grams or kilograms

(depending on the size of the patient). Recommended pre-surgical diagnostic tests vary with the case history and intended surgery. Complete blood count and serum chemistries are ideal prior to all surgeries, but size of patient (<100 grams) and owner financial constraints may not allow for these tests in every patient. Minimally, blood collection for PCV, total protein, and glucose is suggested.

- Ideally, all patients are physiologically stable before anesthetic induction. Fluid therapy to correct dehydration, electrolyte disturbances, hypoglycemia, and acid-base disturbances prior to surgery, if time allows, is ideal. Regardless, vascular access for perioperative, pharmacologic, and fluid support is important for any invasive procedure.
- Hypothermia is common in small anesthetic patients due to the large surface area: patient volume, the cooling effect of anesthetic gases, and suppression of thermoregulation by preanesthetic drugs and analgesics. The author uses incubated cages (Snyder http://www.snydermfg.com) for pre-op warming and post-op recovery. The author also uses a surgery table with conductive heat and the Bair Hugger® (Model 59577 or 500, Arizant Healthcare, Eden Prairie, MN) forced air warming system for long procedures and very small patients. The Bair Hugger is a convective heater that uses warmed forced air heat blankets and is a worthwhile investment.
- A veterinary technician is essential in managing the perioperative support and anesthetic depth of these small patients as physiologic status can change rapidly. Anesthetic depth depends on drug dosage, anesthetics/pre-anesthetics used, species, physiologic status and presence or absence of disease. Anesthetic depth toward a surgical plane of anesthesia is assessed by: evaluating for decreased muscle tone (jaw muscle or anal sphincter), a significant decrease in palpebral and corneal reflexes and when respirations become regular and even. Rate, depth and pattern of respiration are the most useful indicators of anesthetic depth. Respiratory depression (less than 4 breaths per minute) warrants concern and patient assessment. It should be noted that anal tone and corneal reflexes are not lost at surgical anesthetic levels, but may be difficult to assess in the small exotic mammal patient. Tools to aid the veterinary technician in monitoring patient's response to anesthesia include: electrocardiography, Doppler flow detection and pulse oximetry. ECG standard lead positions described for dogs and cats are used for small exotic mammals and in general the ECG tracings of small exotic mammals resemble those of dogs and cats in general form. Doppler flow detection (Parks medical Electronics, Inc, Aloha, OR) used for audible monitoring of blood flow, uses a probe placed as close as possible to the blood flow in an artery or the heart. The Doppler is used wherever major arteries are close to the skin and in small exotic mammals have been used at the ventral aspect of the tail base, the carotid or femoral arteries, the ulnar artery (in ferrets), the auricular artery (in rabbits) or directly over the heart. Equipment designed to aid in the assessment of patient anesthetic depth as well as the cardiovascular and respiratory systems while under anesthesia include electrocardiography, Doppler flow detection and blood pressure measurements, pulse oximetry and end-tidal CO2 determination. Utilize equipment that will give you the most information with least problems; ultrasound dopplers, end-tidal capnography and ECGs are often easier to use.
- Body temperature should be carefully monitored during surgery and recovery. Recovery in an incubated cage (75-80° F or 24-27° C) is ideal--monitor so patient is not overheated as ferrets are prone to heat prostration. Maintenance fluids delivered via an infusion pump should be continued. Post-op analgesia is recommended for 2-3 days. Due to the high metabolic rate of small exotic mammals, it is important to resume food consumption as soon as the patient is adequately awake. Ferrets can eat 6-8 hours post-op for most routine procedures. Herbivores should be offered grass hay within 2-3 hours post recovery from routine surgeries in order stimulate GI movement and prevent gut stasis.

Summary

The veterinary technician plays a critical role in the veterinary hospital. Many tools used routinely in small animal medicine can be incorporated into the practice that wants to work with exotic companion mammals. Knowledge of the exotic mammals unique and varied anatomy, physiology, husbandry, nutrition, behavior, and supportive care is essential to successful care and treatment.

References/Suggested Reading

Lichtenberger M, Ko J. Anesthesia and analgesia for small mammals and birds. *In*: Emergency and Critical Care (Lichtenberger, ed.), Veterinary Clinics of North America, Exotic Animal Practice 2007; (10) 1:293-315.

Lennox AM. Clinical techniques: small exotic companion mammal dentistry—anesthetic considerations. In: Dentistry of Exotic Companion Mammals (Capello V, Lennox AM, eds.), Journal of Exotic Pet Medicine 2008; 17(2): 102-113.

Brandao J, Mayer J. Behavior of rodents with an emphasis on enrichment. Journal of Exotic Pet Medicine 2011; 20(4): 256-269.

Brown CJ, Donnelly TM. Rodent Husbandry and Care In: Veterinary Clinics of North America, Exotic Animal Practice 2004;7(2):201-225.

Bixler H, Ellis C. Ferret Husbandry and Care In: Veterinary Clinics of North America, Exotic Animal Practice 2004;7(2):227255.

Bradley T. Rabbit Husbandry and Care In: Veterinary Clinics of North America, Exotic Animal Practice 2004;7(2):299-313.

Donnelly TM, Brown CJ. Guinea Pig and Chinchilla Husbandry and Care *In*: Veterinary Clinics of North America, Exotic Animal Practice 2004;7(2):351-373.

Cray C, Zaias J. Laboratory Procedures In: Veterinary Clinics of North America, Exotic Animal Practice 2004;7(2):487-518.

Girling SJ. Veterinary Nursing of Exotic Pets. Blackwell Publishing Professional, Ames, IA, 2003.

Ballard B, Cheek R. Exotic Animal Medicine for the Veterinary Technician. Blackwell Publishing Professional, Ames IA, 2003.