Practical Analgesia and Anesthesia of Exotic Pets

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Anesthesia and analgesia for birds, reptiles, and exotic small mammals has many similarities to that of other companion animals, although there are a few key differences that must be addressed to provide the safest, most effective anesthesia for these animals. The Bain's or non-rebreathing circuit is used for most of these species because of their smaller tidal volume. This type of system uses higher flows of oxygen such as 200-400mL/kg/min when the patient is entubated and 1L/kg/min when using a mask. There are a variety of systems available that vary in length, weight, and location of ventilator valve. Care must be taken with these systems as they often weigh more than the patient and can extubate or pull a patient off the table if moved too quickly. A sandbag works well to hold the circuit in position to prevent this from occurring.

Except for the ferret, all these mammals and the pet birds are prey species and the physiology associated with prey species is significantly different from that of predatory species such as dogs and cats. In prey species, stress must be kept at an absolute minimum because of their well-developed fright or flight response. If prey animals are subjected to stressful situations they will attempt to escape, perhaps harming themselves, and if they cannot escape they will release large quantities of catacholamines. Excessive catacholamines can predispose these animals to increased heart and respiratory rate, increased blood pressure, and myocardial hypoxia and arrhythmias. Stress can be reduced by the choice of anesthetics, particularly premedications, and the manner in which the animal is anesthetized. Rabbits and rodents should be given premedications that cause relaxation and have a calming effect. These include the benzodiazathines and opioids. These animals should be induced and recovered in very quiet, calm areas away from noise, especially barking dogs. Using familiar smells can be calming and minimizing visual and auditory stimuli while the premedicants are taking effect is helpful. Pain can have a similar effect and must be managed appropriately. Analgesics given before surgery (and thus pain) are much more effective because the formation of substance P is inhibited. Analgesics used in all these species include buprenorphine and butorphanol, as well as meloxicam, ibuprofen and carprofen. Multimodal pain relief is very beneficial in these situations.

The surface to body mass ratio in these species is much greater than dogs and cats and because of this, hypothermia can occur very quickly. Heated water blankets, warm water gloves, and heated air blankets can all be used to maintain body temperature. The use of conductive heating pads also seems to work well in these species. These animals should be recovered in an incubator until they have reached normal body temperature. Be careful when heating the animals up after surgery as hyperthermia can occur much more easily because of the vasodilatory effects of most anesthetics. Digital thermometers should be used by inserting into the cloaca or rectum during surgery to monitor body temperature during prolonged anesthetic periods (>15 minutes).

Anesthetic monitoring of these animals depends primarily on their size, in that the smaller the patient the more difficult it can be to monitor anesthesia. The anatomy of reptiles and birds also makes many monitoring devices difficult to use. For birds and reptiles, the ECG and Doppler are the most common monitoring devices used. For ferrets and rabbits, the majority of monitoring devices used in dogs and cats can be used. Ultrasonic Dopplers can be used to monitor heart rate, rhythm, and blood pressure. In birds, the Doppler crystal is placed on the ventral surface of the proximal ulna and radius or the medial aspect of the hock. For reptiles the crystal is most commonly placed over the heart. For ferrets and

rabbits, the crystal is placed over the metatarsal or metacarpal bones. The brachial artery can also be used on the medial surface of the distal humerus. For ferrets and rabbits, the cuff is placed just proximal to the probe to determine blood pressure. Small size and high heart rate can make blood pressure monitoring difficult and the Doppler is often used simply to monitor pulse rate and character. It can be placed on any peripheral artery that can be palpated, such as the auricular artery in rabbits and the femoral artery in many species. In very small mammal species the probe can simply be placed on the chest over the heart.

EKGs can be used in most patients to give information on heart rate, rhythm, and contractility. The leads are placed in a manner similar to other pets. In birds the leads are placed at the patagium and cranial thigh folds. For all species the teeth of the leads should be blunted or flattened to reduce tissue trauma. Alternatively, small gauge needles or wire suture can be passed through the skin and the leads clamped to the metal. Be judicious in your use of alcohol on the leads to avoid any hypothermic effect. Small squares of alcohol-soaked gauze can also be helpful in protecting the skin and limiting the amount of alcohol placed on the animal.

Esophageal stethoscopes can be used in large birds, ferrets, rabbits, and reptiles. The smallest size stethoscope head is passed down the esophagus until the heart sounds are heard. This method does not have any advantage over the Doppler except that they are less expensive.

Pulse oximetry uses a probe and a light source to continuously measure oxygen saturation of the hemoglobin as it passes through the tissue. For mammals, when oxygen saturation gets below 90% the animal is experiencing tissue hypoxia and steps should be made to correct this, such as intubation, lowering the anesthetic concentration, repositioning the animal, and assisted respiration. These instruments are not calibrated for the nucleated red blood cell of birds and mammals and so they are less useful in these species. The pulse oximeter also gives a heart rate as part of the read out. The probe should be placed on a non-pigmented, hairless tissue such as the tongue, lip, rectum, ears, and toes.

Visual examination is perhaps the most important method of monitoring patients, although this can be limited by drapes, size, and other factors. The depth of anesthesia can be monitored by the amount of muscle relaxation, reflex response, and response to stimulation (toe pinch, surgery). The palpebral response is lost early in a surgical plane of anesthesia; so more painful stimuli may elicit a response. Rabbits may maintain a palpebral response throughout surgery, even at appropriate depths of anesthesia. If possible, always maintain a clear view of the chest so that respiratory rate and depth can be monitored. Respiratory rate will decrease with deeper anesthesia and will increase with painful stimuli if the anesthetic plane is too light during surgery. Some drugs may cause apnea, such as propofol, and intubation is recommended with such drugs. Heart rate will decrease with deeper planes of anesthesia and increase in response to painful stimuli in animals that are too light.

Emergency drugs should be available and doses calculated for animals undergoing anesthesia. A chart with common doses for common species or varying weights can be made and placed within an emergency box containing syringes, needles, and emergency drugs.

BIRDS

Pre-anesthetic fasting is recommended as follows: 1-2 hours for small birds($\leq$100g), 2-3 hours for medium sized birds(100-500g), and 4-6 hours for large birds($\geq$500g). Birds should be induced in a quiet,

calm area away from the sights and sounds of predators. Once induction drugs are given, the bird should be placed back into a small cage that is well-padded for their protection. A low perch can be provided if it will minimize stress, but keep in mind many drugs (especially benzodiazepines) can reduce the perching reflex and birds may fall from the perch.

Premedicants used in birds vary with species, temperament, procedure to be performed and personal preference. For anxious or easily stressed birds, which include macaws, African greys, raptors and many wild birds, midazolam at 1.0mg/kg IM is used. This will cause mild sedation and relaxation. Doses as high as 6mg/kg have been reported resulting in considerable sedation. Butorphanol has been shown to be most effective in parrot species and is used for sedation and analgesia. The dose range is 1.0-2.0mg/kg depending on the depth of anesthesia required and the pain associated with the procedure. Butorphanol and midazolam together produce good sedation for pre-anesthesia and for non-painful procedures such as radiographs and bandage changes. For longer abdominal procedures or orthopedic surgeries, ketamine can be added at 5-10mg/kg to the butorphanol and midazolam combination.

For short procedures where no premedicant is used, birds should be held comfortably and a face mask placed over the head. The bird should be kept in an upright, perching position. This reduces stress and maximizes air sac volume. A towel may be used restrain the wings in fractious patients. Pre-oxygenating birds is debatable as high oxygen levels will reduce respirations. I recommend starting the oxygen and placing the inhalant on the lowest possible setting for 20 seconds, then turning the anesthetic flow rate up slightly every 15 seconds. This allows the bird to accommodate to the mask and the smell of the inhalant. It also gives finer control of anesthetic depth. As the anesthetic depth increases, the patient can be moved to recumbent position and intubated if desired.

Vascular access is an important part of successful avian anesthesia. Intravenous catheters can be placed in the median metatarsal vein in birds over 300g and works especially well in galliformes and anseriformes. Cathers can also be placed in the superficial ulnar or basilica veins of the wing but are more difficult to maintain, especially after surgery. The jugular vein in birds is quiet mobile and may result in extravasation of fluids if the vein moves away from the catheter with head and neck movement. IV catheters can be taped or sutured in place depending on location and duration of placement. Intraosseous catheters are fast and convenient in birds, especially small birds. The proximal ulna is the most common site of placement. The proximal tibiotarsus can also be used but will cause lameness following placement. Fluids should be given at a rate of 10ml/kg/hour for the first hour and 5ml/kg/hr after that. The bird should be making urine during the procedure, so check the cloaca for urine production and adjust the fluid rate accordingly. The fluids should be warmed to help maintain body temperature.

Intubation in birds is generally very easy. The avian glottis is easily visualized at the base of the tongue in moderate to large parrots and raptors. The beak can be held open by hand or straps of tape or gauze and a pen light or room light used to visualize the glottis. In chickens and water birds the glottis may rest ventrally further in the mouth and can be more difficult to visualize. Gentle pressure with a fingertip under the chin can help elevate it for easier intubation. In smaller parrots, the tongue may be large enough to limit the view of the glottis and will need to be pulled out of the mouth using forceps. The beak may be held open with small strips or paper clips for better viewing.

The endotracheal tube size will vary according to species as well as size. Large parrots usually require 3.5-4.0mmID tubes, while smaller species such as cockatiels and lovebirds require a 1.0 – 2.0mmID tube. 18-22G intravenous catheters can be used in very small birds. Any tube below 2.0mm is at a greater risk of being plugged from tracheal secretions and should be monitored closely. Soft, uncuffed tubes should be used when possible. Cuffed tubes can be used when the risk of aspiration is high but should be inflated gently to avoid excessive pressure on the trachea. The trachea of many large birds (macaws, cockatoos, egrets, cranes) can narrow abruptly so narrow tubes or Cole tubes should be used to avoid pressure on the tracheal mucosa. The area around the glottis and ET tube should be swabbed just before recovery to prevent aspiration of any mucus that has accumulated in the area.

In small birds or birds undergoing surgery that interferes with the upper airway, an air sac cannula may be placed for respiration. This is placed in the caudal thoracic air sac and bypasses the upper respiratory system. A skin incision is made in the triangle formed by the last rib, cranial thigh muscles and vertebrae. Blunt dissection through the muscles is performed with a hemostat. The air sac membrane is gently punctured and the hemostats opened to pass a tracheal tube or red rubber tube to be used as the cannula. A cuffed endotracheal tube is ideal because condensation from respirations are easily visualized and the cuff can be inflated to help maintain the cannula. The tube is sutured in placed with a purse-string then finger-knot suture. The tube should be cut short to decrease resistance of respiration.

Isoflurane or sevoflurane are the inhalant anesthetics of choice and are often used as the sole anesthetic agent for short procedures. These drugs can be give via mask alone for short procedures (<10 minutes). The mean alveolar concentration for these drugs is 1.3% and 2.2% respectively. Birds are typically maintained at 2-2.5% isoflurane and 2.5-3.5% sevoflurane in my experience. All anesthetics delivered via oxygen cause respiratory depression in birds because of the effect of the oxygen on the carotid bodies and intrapulmonary chemoreceptors. Because of this, assisted ventilation is required on all birds under anesthesia for more than 10 minutes. Two to six breaths per minute is usually adequate depending on the anesthetized bird's respiratory rate and depth. There are several ventilators that can be used in birds. These machines allow breath volume and frequency to be set at the variation needed in avian practice. The bellows are often visible, making monitoring of the respirations easier. Inhalant anesthetic levels may be decreased gradually towards the end of a procedure to allow more spontaneous respiration and smoother recovery.

Analgesia in birds is best provided with butorphanol (1-2mg/kg q6h) which is often given during or after surgery to prevent respiratory depression. Buprenorphine (0.03-0.06mg/kg q12h) has also been used but may not provide as much analgesia . NSAIDS can also be used with meloxicam (0.5-1.0mg/kg q12-24h) being used most commonly. Ketoprofen or carprofen (1-2mg/kg q12h) are also given, especially in larger birds but have been linked to subclinical renal damage in one study. Tramadol has been anecdotally reported to be helpful in birds. A published dose of 4-11mg/kg has produced effective concentrations in bald eagles for 10 hours. A multimodal approach to pain relief should be provided using opiods and NSAIDs especially before or early into a painful procedure. Topical anesthetics of mixed lidocaine and bupivicain (0.5-1mg/kg of each) can be applied directly to nerves or as a block to provide further analgesia.

REPTILES

Early work with reptiles mentions cooling them for added anesthetic benefit but newer work shows that maintaining them at the mid to high end of the preferred optimum temperature zone (POTZ) allows

better metabolism of the anesthetic drugs and results in better recoveries and fewer peri-anesthetic problems. These animals should be recovered in an incubator set at the mid-portion of the POTZ. Digital thermometers can be inserted into the cloaca during surgery to monitor body temperature during anesthetic periods.

The respiratory anatomy varies between classes of reptiles. The glottis is normally in a closed position and you may have you slide the endotracheal tube in gently to open the glottis. The trachea is incomplete in snakes and lizards but complete rings in chelonians (turtles and tortoises). The lungs of snakes and most lizards are large and sac-like with an avascular air sac on the caudal end. The epithelium is very thin and overuse of pressure can cause rupture of the lungs so don't inflate the lungs to more than 12mmHg. Air movement in reptiles generally involves skeletal muscle movement of the limbs or ribs, so anesthesia requires assisted ventilation to inflate the lungs. Additionally, respiration is triggered by decreasing oxygen tension, thus 100% oxygen is a respiratory suppressant in reptiles. For the anesthetist, that means switching to room air as soon as possible during recovery to stimulate the animal to breathe voluntarily.

Pre-anesthetic fasting in reptiles is generally indicated and the length of time depends somewhat on the metabolism of the animal. Medium to large animals are usually fasted for 8-12 hours, while smaller species may only be fasted for 2-4 hours. Another way to look at it is to skip one meal, so animals that eat once daily are fasted for 24 hours, animals that eat twice daily are fasted for 12 and animals that eat weekly or less are anesthetized 24-48 hours after the last meal. Pre-medications are routinely given in these species because breath-holding is common if mask induction is attempted. Ketamine doses vary widely between species so check the dose with an exotic animal formulary. Ketamine can be used alone (10-80mg/kg IM) or in combination with medetomidine (0.15mg/kg IM) or midazolam (1-2mg/kg). Ketamine causes prolonged recovery, especially when used alone so be prepared for more intense recovery monitoring. When using the drugs in combination, use the lower doses of ketamine to help avoid the prolonged recovery. Also, dexmedetomidine and midazolam can be reversed using atipamazole (0.75mg/kg) and flumazenil (0.1mg/kg) to help speed recovery. I occasionally use ketamine (10-20mg/kg) with dexmedetomidine (0.1-0.15mg/kg) intramuscularly in lizards and turtles. This gives sufficient anesthesia to easily intubate the animal so that anesthesia can be maintained using isoflurane. Tiletamine/zolazepam (Telazol: 4-40mg/kg) can also be used but also causes prolonged recovery. The ketamine/medetomidine combination and Telazol often provide enough anesthesia for minor procedures, provided analgesia is used. Respiratory suppression may occur with these drugs therefore ventilation with room air may be required. Propofol (5-10mg/kg IV) is safe and easy to use in many species and provides approximately 20-30 minutes of anesthesia with a single dose. Apnea is common with this drug and intubation and ventilation with room air is recommended.

Vascular access is important for longer procedures (>30 minutes). Intraosseous catheters are generally placed in the distal femur of lizards. Short-term butterfly catheters can be placed in the ventral tail vein of larger lizards but can be difficult to maintain. A cut-down can be performed for a cephalic catheter in lizards as well. Chelonians require an IV catheter in the jugular vein. For snakes, a catheter can be placed in the palantine vein or jugular vein via cut-down. Warmed fluids are given at 10ml/kg/hr.

Inhalant anesthetics are, such as isoflurane and sevoflurane, are commonly used in reptiles. Assisted ventilation is required whenever inhalant drugs are used. Generally 1-4 breaths per minute is adequate. If using Injectable anesthesia alone and during recovery, always ventilate the patient with room air to

prevent the respiratory suppression seen with oxygen. The anesthetic gas should be turned off about 15 minutes before the end of longer surgeries and the patient switched to room air at this time. This will speed recovery and return of spontaneous respiration.

Analgesia in reptiles can be provided with NSAIDS or opiods. The data for opiods in reptiles varies considerably between species. In iguanas, morphine at 1mg/kg IM or butorphanol at 1.5-8mg/kg IM can be used. For the bearded dragon, morphine at 10-20mg/kg can be used. For the corn snake, buprenorphine at 0.1mg/kg IM or butorphanol at 20mg/kg appear to be efficacious. NSAIDS are often used predominantly because of this varied data. Meloxicam at0.3-0.5mg/kg q 24h is used for most species. Ketoprofen and carprofen can be given at 1-2mg/kg once daily. The use of topical anesthetics such as lidocaine and bupivacaine can be given at 0.5-1.0mg/kg topically or as a block.

FERRETS

Anatomically and physiologically ferrets are the most similar of the small exotic mammals to other companion animals such as dogs and cats. Because of this, the anesthesia of ferrets is very similar to dogs and cats. Ferrets are generally induced in a calm, quiet environment and recovered in an incubator. Overheating is very easy in these animals so monitor post-op temperatures frequently.

Vascular access is warranted in ferrets for any procedure lasting more than 15 minutes. Short, small catheters (24-26G) can be placed in the cephalic or lateral saphenous veins. Numb the area with topical lidocaine cream or sedate the ferret first to make catheterization easier. Nick the skin over the vein with a needle so the small catheters don't burr when being pushed through their thick skin. Tape the catheter in place securely and wrap with cast padding and vet-wrap. Fluids are given at 10ml/kg/hr and can be dropped in half after 1-2 hours if body temperature and blood pressure are maintained.

Short procedures, such as radiographs, venipuncture, catheter placement, and very short surgeries may be performed using isoflurane via facemask. This can be irritating to the ferret so always start with the gas at the lowest setting for 30 seconds to allow the animal to get used to the smell, then slowly turn up the gas incrementally every 15 seconds. Also, keep in mind that isoflurane can cause artifactual decrease in many red blood cell parameters so if blood is taken using isoflurane is should be done as soon as possible after induction of anesthesia. Sedation can also be achieved for short procedures with midazolam at 0.5mg/kg IM or butorphanol at 0.3-0.5mg/kg IM.

For longer surgeries, induction should be performed using any of several drugs, the choice of which depends on the health status of the patient and the clinician's choice. Injections are given in the thigh or epaxial muscles. My favorite protocol for most ferrets is ketamine (5-7mg/kg IM), midazolam (0.5mg/kg IM), atropine (0.04mg/kg), and buprenorphine (0.03-0.06mg/kg SC). Other drugs that can be used include acepromazine (0.1-0.3mg/kg IM), xylazine (1mg/kg SC), diazepam (2mg/kg IM), and butorphanol (0.1-0.5mg/kg SC,IM). Acepromazine and xylazine can cause hypotension and should be used with another agent that counteracts these effects. These drugs also have a longer recovery time than other drugs.

Intubation of ferrets is generally performed with a 2.0 or 2.5 uncuffed endotracheal tube. Topical application of lidocaine is helpful. Spontaneous respirations are usually maintained throughout surgery

in ferrets, although periodical full ventilations can be helpful. Isoflurane or sevoflurane should be used in ferrets as the gas anesthetics of choice.

Hypotension is a common occurrence in ferrets during anesthesia. Prevention is the key, this can be done by maintaining body temperature and with fluid administration and judicious use of pre-medications. Changing isoflurane levels and fluid administration during surgery should also be done. The use of dopamine in ferrets has caused severe renal dysfunction in my experience, and I recommend avoiding it whenever possible. Dobutamine does not seem to cause this problem and can be given at standard cat doses. Colloids are also helpful to maintain blood pressure during surgery at 5-10ml/kg boluses.

RABBITS

As discussed earlier it's very important that rabbits are kept calm and quiet before anesthesia and during induction and recovery. Many hospitals have special areas set aside for these species. You must also be careful when handling rabbits, especially for injections, so that they do not cause themselves harm. Intramuscular injections can be given in the cranial or caudal thigh and lumbar muscles. Gastrointestinal stasis is common in rabbits following general anesthesia, especially abdominal procedures. Fecal output and appetite should be monitored closely following an anesthetic event. Offering food or force feeding soon after surgery, especially food high in fiber, can help keep GI tract motility normal. Motility modifiers such as cisapride or metoclopramide can be used if rabbits are showing signs of stasis and are not eating well. Rabbits do not vomit and pre-anesthetic fasting is only recommended for abdominal procedures to reduce the size of the stomach. A short period of fasting can also help to keep the mouth clean to make intubation easier. Rabbits, and other hind-gut fermentors such as guinea pigs and chinchillas, have large abdominal cavities and relatively small thoracic cavities. Because of this, positioning the animal with the head and thorax tilted above the abdomen can increase lung volume and decrease respiratory effort.

Intubating rabbits is very difficult because of their long soft palate, small oral opening, large incisors and thick, muscular tongue. Rabbits also have a tendency for laryngeal spasm. Many facilities do not intubate rabbits, even for abdominal procedures because of the problems associated with this procedure. Intubation should always be performed for oral, facial, and thoracic surgery. Intubation can be performed by several methods; direct visualization, blind intubation, nasal intubation, and the use of a tracheal catheter. Direct visualization is best done by inserting the laryngoscope on the side of the mouth and then pushing the base of the tongue down to reveal the glottis. Intubation in this situation is similar to other species. Intubation can be performed blinding by passing the endotracheal tube along the tongue until the glottis is encountered. Condensation can be seen in the tube with each exhalation when the tube is positioned appropriately. Once the tube is in place, wait until the beginning of inspiration and attempt to pass the endotracheal tube through the glottis. A coughing response and continued condensation on the inside surface of the tube indicates success. Nasal intubation is actually quite easy in larger rabbits. A small endotracheal tube, 2.0 to 3.0mm I.D., is passed into the nose at the ventromedial meatus. The tube is passed until the glottis is encountered and then passed through the glottis on inspiration. A small amount of nasal bleeding may occur, but is usually not a problem. This method of intubation has the disadvantage of using a tube which is significantly smaller than the tracheal diameter, which can affect anesthetic depth and the possibility of inspiration pneumonia. The final method involves passing a jugular catheter into the tracheal lumen through the skin of the neck and passing the soft catheter portion into the trachea and out the mouth. An endotracheal tube is then placed

over the catheter and passed along the catheter into the trachea. The catheter is then removed from the neck. An important thing to remember about tracheal intubation in rabbits is that repeated attempts may cause trauma to the larynx resulting in laryngospasm and respiratory arrest following extubation. For this reason, direct visualization of the glottis is the recommended method. If using one of the blind techniques be extremely gentle and do not attempt intubation more than 2 or 3 times. Additionally, always use topical lidocaine before attempting intubation to prevent laryngospasm.

Vascular access is important for longer procedures. Small, short catheters (24-26G) can be placed in the cephalic or lateral saphenous veins using the technique outlined for the ferret previously. The marginal ear vein can also be used during surgery using a small catheter. This catheter is more difficult to maintain after surgery but can be capped and covered with Tegaderm® for intermittent use after surgery.

Sedation in rabbits can be performed using IM or IV injectable medications. Midazolam, given IM at 0.5-1.0mg/kg works well for light sedation for radiographs, ultrasound and non-painful dental procedures. Midazolam can also be combined with dexmedetomidine (0.1-0.15 mg/kg IM). Dexmedetomidine has the benefit of being reversible using atipamazole (0.5mg/kg IM). Ketamine (10mg/kg) and diazepam (0.5mg/kg) given in combination intravenously also gives excellent sedation for short procedures such as tooth trims, skull radiographs, and treating minor wounds. Some drugs have been shown to be efficacious in rabbits if given intranasally, such as xylazine (3mg/kg) and ketamine (10mg/kg). Glycopyrrolate can be used at 0.01-0.1mg/kg

Isoflurane delivered via mask may be used in rabbits as the sole anesthetic agent for short procedures. There is recent evidence that isoflurane alone can cause severe hypotension and increased catacholamine release so the addition of anxiolytics like midazolam may be warranted. Isoflurane delivered via endotracheal tube is used for abdominal surgeries and prolonged procedures by many clinicians. My preferred protocol uses midazolam (0.5-1mg/kg IM), ketamine (7-10mg/kg IM), and butorphanol (0.5mg/kg IM) for induction and then isoflurane via mask or intubation for maintenance

Analgesia in rabbits is done with buprenorphine at 0.3-0.6mg/kg SC. This causes minimal opiod-related GI stasis. Butorphanol can also be used at 0.1-0.5mg/kg but may cause more sedation and GI effects. Meloxicam at 0.3-0.5mg/kg twice daily is my preferred NSAID although carprofen, ketoprofen, and ibuprofen can also be used at 1-2mg/kg q12-24h.

GUINEA PIGS AND CHINCHILLAS

These animals are very similar to rabbits except that they are smaller, making certain monitoring devices more difficult to use. These animals are only occasionally intubated because of the difficulty associated with viewing the glottis and the small size of the oral opening. Guinea pigs often have gastric reflux with anesthesia and should be positioned so that the head and chest are raised above the abdomen, this will also make breathing easier. GI stasis is also a concern in these species and should be treated as in the rabbit. Pre-anesthetic fasting for short time periods, such as an hour, may be helpful in reducing reflux and keeping the mouth clean.

Injectable medications are commonly used in these species as part of the anesthetic protocol so that the levels of isoflurane can be minimized. High levels of isoflurane for long periods can cause hypotension and respiratory depression. Injectable medications used in guinea pigs and chinchillas include midazolam, ketamine, medetomidine, and buprenorphine. Doses are similar to rabbits.

RATS, MICE, AND OTHER SMALL RODENTS

Anesthesia in these animals is similar to that of guinea pigs and chinchillas although their smaller size can make monitoring anesthesia more difficult. Often, simply viewing the patient once the drapes have been placed can be difficult. Clear drapes can be very helpful for this reason. These pets do not vomit and so pre-anesthetic fasting is not recommended. Also, their high metabolic rate can make hypoglycemia a problem if they are fasted for any length of time. Heat loss is also faster in these species because of their small size. Fluid loss during anesthesia can be an important point and it is often helpful to give them SQ fluids during.

Because of their higher metabolic rate, drug dosages are considerably higher in these species. Ketamine doses as high as 100mg/kg have been recommended either alone or in combination with dexmedetomidine (10mg/kg IP). I don't tend to give doses that high but wanted to report what is possible. Midazolam can be used in these species at a dose of 1-2mg/kg IM or IP. Many drugs are given IP in these animals because of their small size, this can cause a more rapid induction and slightly prolonged recovery.

The inhalant anesthetic of choice is isoflurane and it is often used as the sole anesthetic. I usually recommend using an injectable drug along with isoflurane to smooth the anesthetic event. Midazolam at 1mg/kg and butorphanol at 0.5-1.0mg/kg are my choices for this. Commercially made face masks are often too large for these animals and the anesthetist will often have to find innovative ways to deliver the anesthetic gases, such as using small syringe cases as face masks.

ANESTHETIC RECOVERY

The length of recovery obviously depends on the drug(s) used and the metabolism of the animal. It is important that the patient be kept warm and hydrated during recovery. A dark, quiet place is often preferred, especially for animals that burrow. Birds should be held gently using a towel to prevent injury during the initial phases of recovery. Be careful, especially when using heat lamps, not to burn or overheat the patients. Analgesics should be given before surgery, but may need to be repeated every 4-12 hours after surgery, depending on the drug used. Pain relief is particularly important in the prey species. It is important not to move or lift these small animals quickly during the recovery period as orthostatic hypotension is a serious concern and can cause cerebral ischemia and result in peri-anesthetic complications.