THE CRITICAL RABBIT: HOW TO KEEP THEM ALIVE

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Although the principles for emergency and critical care are universal in all species, the small size and predisposition to stress creates a unique set of challenges when dealing with rabbits, ferrets, and other small mammals. This article provides basic nutrition, restraint, physical exam, blood collection, diagnostic and therapeutic procedures for the rabbit. Guidelines for monitoring and treatment of hypovolemic shock in small mammals will be discussed.

PHYSICAL EXAM AND HISTORY

Timothy Hay should be fed ad libitum. The rabbit can be fed fresh greens, such as dandelion greens, parsley, mustard greens and collard greens at 1/2 cup per day of packed greens. The maximum amount of pellets (fiber content greater than 19%) should be 1/8 cup per 5 kg body weight per day and fed at night.

Physical Examination

Critically ill rabbits may not tolerate excessive handling and should be observed in the carrier before physical exam. General attitude, respiratory pattern, and fecal and urine output can be assessed. The veterinarian can determine respiratory rate by observing nasal movements. The rabbit is a prey species and conceals any signs of illness to escape predation.

Examine rabbits on a skid-free surface and place a towel under the body or wrap a panicky rabbit in a towel. Keep a hand under the rabbit at all times, even if recumbent. Normal body temperature is 101–104°F (38.3–39.8°C). Avoid heat lamps in rabbits since they can determine respiratory rate by observing nasal movements. The rabbit is a prey species and conceals any signs of illness to escape predation.

Venipuncture

Although several sites are available for venipuncture (ie, ear vein, jugular vein, cephalic vein, and lateral saphenous), the author prefers the lateral saphenous. Vessels in the ears are easily visualized but collapse and have an increased risk of thrombosis and sloughing in small rabbits. Jugular venipuncture may be difficult in obese rabbits and those with large dewlaps. The cephalic vein is maintained for catheter placement. The saphenous vein is most commonly used for collection of blood. The rabbit can be restrained in lateral recumbency and the rear leg is held off above the hock. A 25-gauge needle and 1-cc syringe are used to withdraw the blood sample.

Intravenous catheters of either 24- or 26-gauge can be placed in most small rabbits, and 22-gauge catheters can be easily placed in rabbits over 3 kg. The cephalic or saphenous veins are well suited for indwelling catheters. When intravenous catheterization has failed or the veins are too small or fragile to place an intravenous catheter, then an intrasosseous catheter is extremely beneficial. The proximal femur or the proximal tibia is recommended sites to place a 20-gauge, 1.5-inch spinal needle. The greater trochanter of the femur or proximal tibia is preferred.

GASTROINTESTINAL PROBLEMS IN THE RABBIT

- Nearly all the disease problems in rabbits are directly or indirectly related to diet. The two most common rabbit emergency problems that result in anorexia are gastric stasis and malocclusion involving the incisors, cheek teeth, or both.
- Gastric stasis is one of the most common syndromes in rabbits and is characterized by anorexia, decreased or no stool production, and a large stomach filled with dough-like stomach contents and hair. Nearly all of the important disease problems that rabbits experience are directly or indirectly related to diet. Rabbits that are fed a high-carbohydrate, low-fiber diet cause a disruption of gastrointestinal motility and frequently leads to gastric stasis. There is a loss of liquid from the material in the stomach and the resultant dehydrated mass of gastric ingesta may not be passed by the rabbit. The material in the stomach usually consists of ingested food with or without hair.
- Malocclusion of either the incisors, the cheek teeth, or both is common in rabbits. Incisor malocclusion is usually apparent to the owner, while malocclusion of the cheek teeth is rarely obvious to the owner. Rabbits usually present with a history of anorexia and weight loss.

Pathophysiology

- Rabbits are herbivores, and hindgut fermenters. Their digestive system is driven by the presence of fiber in the diet, which allows efficient digestion of the nonfiber portion of food. High-fiber diets stimulate cecocolic motility, and have a low level of carbohydrate and thus decrease the risk of enterotoxemia caused by carbohydrate overload of the hindgut. Frequently, a reduction in the amount of fiber in the diet, an increase in carbohydrate consumption, and disruption of gastroenteric motility lead to alterations in the cecal pH and disruption of the complex bacterial flora of the hindgut. The spore-forming anaerobes, consisting mostly of...


**Clostridium** **sp**, and coliform species as **E. coli** increases the population of normal organisms decrease. This will lead to enterotoxemia, sepsis and death.

- Hepatic lipidosis develops rapidly when a rabbit stops eating, and reversing this process can be difficult. The author uses the same principles as used in the cat for anorexia and gastric stasis. The etiology for gastric stasis in the rabbit is often a low fiber diet but is also commonly seen with stress (as occurs in the cat).
- The pelleted diets fed exclusively are high in calories (high in digestible carbohydrates), high in protein, and highly digestible, and designed to increase weight in growing rabbits raised for meat. These diets, when fed exclusively or in large quantities, cause gastrointestinal complications such as gastric stasis, obesity and malocclusion (decreased grinding action that keeps the occlusal surface evenly worn).
- Malocclusion of the incisors is frequently a genetic trait. Malocclusion of the premolars and molars is common in middle-aged to older animals and may result from many factors. It leads to overgrowth and sharpening of the lateral (upper arcade) and the medial (lower arcade) edges. Common causes of malocclusion are:
  - Genetic factors leading to a mandible that is too narrow or too short, resulting in misalignment of the teeth.
  - Decreased chewing action of rabbits fed an all pellet diet.
  - Trauma and infections can increase the risk of malocclusion problems.

**Clinical Findings**

- Anorexia for more than 2 days’ duration.
- Malocclusion identified on oral exam.
- Weight loss may be noted in some rabbits.
- Ptyalism and ocular discharge (upper cheek teeth are very close to the nasolacrimal duct) should make the clinician think of dental disease.
- When gastric stasis is present, a firm, dough like mass is often palpated in the cranial region of the abdomen. Gas may be palpable in the stomach or intestines. The number of fecal pellets is significantly reduced or absent. The stools passed are much smaller than normal or may contain hair.

**Differential Diagnosis**

- Gastric or intestinal obstruction can be caused by a large mat of fur or rarely by some ingested foreign material like carpeting or bedding. Rabbits present with an acute abdomen that is painful, bloated and with a tympanic stomach. The rabbit is usually in shock. Decompression of the stomach is required by passage of a nasogastric (NG) tube. Radiographs may show a dilated, fluid-filled stomach or cecum. Animals must be treated for shock and then taken to surgery. The prognosis for surgery is poor.
- Enterotoxemia from other causes as reproductive disorders, bacterial enteritis, or pneumonia
- Parasites

**Diagnostic Tests**

- Radiology may or may not be helpful in diagnosis of gastric stasis because the mass of food and hair appears similar to normal ingesta. However, visualization of a large, ingesta-filled stomach on a radiograph of a rabbit that has been anorexic suggests the presence of gastric stasis.
- CBC and serum chemistries are performed to evaluate the rabbit for other causes of gastric stasis as infections, hepatic, or renal disease. A minimum data base (ie, blood glucose, PCV/TP and azotick) should be performed immediately. This will alert the veterinarian for possible hypoglycemia secondary to anorexia, dehydration, azotemia, and anemia.

- Evaluation of the teeth:
  - Incisors are relatively easy to evaluate. The lower incisors should oppose the peg teeth and the four main incisors should have a beveled cutting edge as described above.
  - Cheek teeth are more difficult to evaluate without general anesthesia. Initially an otoscope is used to evaluate the cheek teeth for the presence of points. Palpate the ventral line of the mandible. It should be smooth along the ventral aspect of the mandible. If any bumps are palpated they likely indicate cheek tooth root disease. Skull radiographs under general anesthesia is required when dental disease is suspected. Four views are taken: dorsoventral, lateral, right lateral oblique, and left lateral oblique. Mask anesthesia with isoflurane and subsequent intubation is recommended. The author commonly uses propofol intravenously through a butterfly catheter (6 mg/kg IV) with or without gas anesthesia. Teeth specula and cheek dilators developed by Dr David Crosley (Jorgenson Labs, Loveland, CO). These are helpful in getting a good look at rabbit cheek teeth crowns. In most cases the upper cheek teeth develop spurs on the lateral aspect while the lower teeth develop spurs medially. These can cut into the cheek gingival or the tongue causing anorexia and a lot of pain.

**Treatment**

- Stop all inappropriate antibiotics as ampicillin, amoxicillin, or clindamycin.
- Fluid therapy. Perfusion and dehydration are corrected initially.
- Treat hypoglycemia when <70 mg/dL by adding 50% dextrose to the fluids to produce a 2.5% dextrose solution. When the animal is symptomatic with seizures and hypoglycemia, treat with a 1:1 solution of 50% dextrose with saline at 1 cc/kg BW IV. The author has also seen hyperglycemia in a stressed rabbit (up to 385 mg/dL) and hypoglycemia
Placement of a Nasogastric Tube

- Placement of a nasogastric tube for nutrition and rehydration of the stomach contents. The tube can be used for a primary gastric stasis, anorexia or after performing dental procedures.

  - The use of a 5-8 French Argyle® tube (The Kendall Co., Mansfield, MA) is chosen. The length necessary to reach the stomach is determined by measuring from the tip of the nose to the last rib. Do not use a stylet since the esophagus of the rabbit can be perforated with any additional force. A local anesthetic (2% lidocaine gel or ophthalmic anesthetic) is placed into the rabbit’s nostril. The rabbit must be properly restrained, protecting its back, and the head is ventrally flexed by an assistant. The tube is passed ventrally and medially into the ventral meatus. The end of the tube is advanced until it enters into the stomach.

  - Verification of placement is determined with a radiograph.

  - Feeding procedure. A 35-mL syringe is used for slow bolus delivery of a liquid diet. The liquid diet used for the rabbit is the enteral nutrition (Herbivore Enteral Nutrition, Walk About Farms, Pembroke, VA). The diet contains some fiber, though not enough to meet the needs of a rabbit requiring long term feeding (greater than 2–3 days). A 2-kg average adult rabbit requires approximately 175 kcal/d. The feeding schedule using the enteral herbivore diet consists of mixing 10 cc/kg of water with 7 cc/kg of fiber diet. The slurrey is given into the NG tube with a syringe every 6 hours. The tube should be flushed with 5–6 cc of tap water after each feeding. In the author’s experience most rabbits will start to eat and produce stools after 1–2 days. The tube can remain in place until the rabbit eats on its own and stool production begins.

  - Gastrointestinal motility is induced with cisapride 0.5 mg/kg liquid suspension into the NG tube every 8 hours.

  - Pain or discomfort may require the use of analgesics as butorphanol at 0.2–0.3 mg/kg IV, IM or SQ.

Treatment with Force Feeding

- Syringe feeding the critical care herbivore diet (Oxbow) may be optimal for the mildly ill patient with adequate perfusion parameters and normal hydration. These animals may be sent home with instructions for care by the owner. The directions for quantities to feed are written on the can. The syringe tip fits into the diastema, the large space between the incisors and premolars. The rabbit can be wrapped in a towel if it is uncooperative. This may be very stressful to a rabbit and therefore is not recommended in the moderately to severely ill patient.

Treatment of Dental Malocclusion

- A slow speed drill with a straight handpiece using a #8 HP bur is the instrument of choice to trim incisors and remove points form cheek teeth. Alternatively some authors recommend the use of a rongeurs (Jorgenson Labs, Inc., Loveland, CO). If there is radiographic evidence of mild root disease (increased lucency at the tips of the roots) but there is no evidence of infection, burring the crowns to the gum line may be all that is required. If there is evidence of osteomyelitis (lysis and proliferation of bone surrounding a tooth), the tooth should be removed. For more advanced dental procedures in the rabbit the reader is referred to other sources and should be carried out in a step-wise fashion.

- Broad spectrum antibiotics are used after invasive dental procedures:

  - Enrofloxacin 5–15 mg/kg PO q 12–24 hours.
  - Trimethoprim sulfa 15–30 mg/kg PO q 12 hours.

References are available from the author upon request.