SOFT TISSUE SURGERY IN RABBITS AND RODENTS – TIPS

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With the increase in the popularity of exotic mammals, gained surgical knowledge, availability of professional resources, and as more pet owners are becoming more knowledgeable and interested in better quality veterinary care, surgical procedures on companion small mammal patients are now becoming routine practice.

Risks of anesthesia and peri-surgical complications might pose challenges to the inexperienced clinician. Some reports suggest a peri-anesthetic death rate that is 20-30 times higher for exotic small mammals when compared to dogs and cats. However, this should not be the reality and can be greatly improved. Understanding the anatomy and physiology of the exotic patient is imperative to promote a positive outcome for any surgical procedure. Many exotic small mammal species are not yet fully domesticated; knowledge of individual species behavior, anatomy, and physiology is critical when assessing the patient before a surgical procedure. The relatively smaller body size should be considered and adaptations are required for all para- and intra-surgical procedures including housing, blood sampling, diagnostic imaging, anesthesia, surgical skills and postoperative care.

A thorough review of the patient’s medical history and husbandry can reveal existing medical issues that can complicate the planned procedure and might increase the anesthetic risks. A complete physical examination and minimal data base (CBC, blood biochemistry panel, urinalysis and fecal analysis) might reveal a preexisting disease. For example, respiratory infection is common in rabbits and rats, and preventative antibiotics should be initiated until symptomatic resolution before any elective surgical procedure is performed.

Preoperative fasting is not required for rabbit and rodent surgical patients because they cannot vomit; because of their small size, higher metabolism and smaller liver glycogen stores, they (and ferrets with their common insulinoma and
fast GI transit time) are predisposed to hypoglycemia. A short (1-2 hours) pre-
anesthetic fast is considered adequate in small mammals.

Stress-free environment, minimal handling and sedation can aid in patient preparation before the procedure. Midazolam is a safe and effective sedative that can also be reversed with an antagonist (flumazenil) if needed. Perioperative pain management is critical, as painful animals will not recover well, would not move or eat, and critical metabolic changes and ileus can quickly develop. The same general principles used for analgesia and anesthesia in canine and feline species can be applied to smaller mammal species with some specific considerations.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Ferrets</th>
<th>Rabbits</th>
<th>Rodents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midazolam</td>
<td>0.25mg/kg</td>
<td>0.5-1.0mg/kg</td>
<td>0.5mg/kg</td>
</tr>
<tr>
<td>Butorphanol</td>
<td>0.25mg/kg</td>
<td>1.0mg/kg</td>
<td>0.5mg/kg</td>
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<tr>
<td>Buprenorphine</td>
<td>0.01-0.02mg/kg</td>
<td>0.03-0.05mg/kg</td>
<td>0.03-0.05mg/kg</td>
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<tr>
<td>Meloxicam</td>
<td>0.1mg/kg</td>
<td>0.5-1.0mg/kg</td>
<td>0.5-1.0mg/kg</td>
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</tbody>
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Post-procedural death is a real problem and good patient support and close postoperative monitoring can prevent a negative outcome. The large body surface: volume ratio of small mammals predisposes them to hypothermia. It is imperative that patients are provided constant heat support and body temperature monitoring around and throughout the surgical procedure.

Hydration of the patient is important perioperatively (100ml/kg daily maintenance). Placement of vascular catheters is advisable and IV catheter (24G) placement should always be attempted while the patient is already sedated. Constant infusion (5-10ml/kg/hr) of a crystalloid solution during the surgery can be done via a small syringe pump. The
intraosseous (IO) route is an alternative route to IV, using a 25G hypodermic needle placed in the proximal tibia using aseptic technique. However, bone perforation, fractures and infection are real risks for IOs. Subcutaneous fluid administration is easy and can also be used for administration of supportive fluids in simple cases and should suffice for short surgical procedures.

Airway control is also very challenging in small mammals and although endotracheal intubation is ideal, the use of a tightly fitted face mask will suffice in many cases. In rodent species that accumulate food in their cheek pouches (guinea pigs, hamsters), it may be advisable to clear out the oral cavity using cotton-tipped applicators to avoid accidental aspiration.

Standard aseptic principles should also be applied in small mammal surgery. Because of the increased risk of developing hypothermia during anesthesia, hair shaving should be minimal and limited to the surgical site only. All solutions for cleansing, scrubbing, or rinsing should be properly warmed, and alcohol-based products should be avoided to prevent hypothermia. Unless clearly indicated (example; open GI surgery, abscessation, etc.), extensive fluid lavage and irrigation of the abdomen is should be avoided in the small mammal to prevent hypothermia.

Intraoperative anesthesia monitoring of small mammals can be limited as the patients are completely covered under standard surgical drapes. The use of a transparent drape allows for better visualization while still providing a sterile surgical field. Vital signs should be monitored throughout the procedure using a basic stethoscope and a rectal thermometer, or instruments sensitive enough for the smaller patient size such as an ultrasonic Doppler (Parks Medical 801B), ECG, capnography and pulse oximeters.

As many small animal clinicians also see some exotic mammals at their clinics, specialized surgical instrumentation can help but most surgical procedures can utilize the surgical instruments available in the small animal practice. Ophthalmic instruments are also suitable for smaller patient surgery. Good visualization of the surgical site is critical and an adequate light source from an overhead surgery lamp should be available, with additional focal light sources attached to magnifying loupes or headbands as needed.

Blood volume of small mammals is approximately 7-8mL/100g/BW, and blood loss of 10% is considered safe in relatively healthy animals. Proper hemostasis is critical, because even minimal hemorrhage during the
surgery may adversely affect the patient’s hemodynamics, leading to a fatal outcome. Standard ligation technique is appropriate but can be time consuming. Small-medium sized hemostatic clips can provide effective hemostasis and are quick and easy to apply. Compression hemostasis can be performed with sterile cotton tipped applicators but hemostatic sponges enhance hemostasis, providing clot formation, are biologically inert, and can applied directly into a small bleeding site. Bipolar radiosurgery units are also highly recommended for hemostasis.

Synthetic absorbable sutures (sizes of 2-0 to 6-0 USP) are commonly used. Catgut should be avoided as it can induce abdominal adhesions in rabbits and rodents. Suture edges should always be trimmed as short as possible to allow safety of the suture ligation, as long suture edges can induce abdominal viscera adhesion and also irritate when placed under the skin. The majority of the smaller mammals have a tendency to remove obvious or irritating sutures so subdermal suture patterns and careful tissue handling are beneficial for the postoperative period. Surgical stapling of the skin is also acceptable as it is safe and quickly applied, but can also be irritating and more painful.

Depending on species, the use of Elizabethan collars is difficult or impossible, and can adversely affect the patient (e.g., increased stress, risk of entrapment, limited visual field, and prevents cecotrophy). Postoperative antibiotics should be provided only if indicated but with careful considerations of several species-dependent sensitivities (such as in rabbits, guinea pigs, chinchillas, hamsters and others).

References


