

## COMMON SOFT TISSUE SURGERIES IN RABBITS AND RODENTS

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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 interested in better quality veterinary care, surgical procedures on companion small mammal patients are now becoming routine practice.

The most common surgical procedures performed on companion small mammal species involve the reproductive system (both elective and therapeutic), urolithiasis, dental and the integument. The same general principles used for similar procedures in canine and feline species can be applied to smaller mammal species, with some specific considerations.

Key points to promote a positive surgical outcome:

- Familiarize yourself with the anatomy
- Address any underlying medical issues before attempting the surgical procedure
- Gain experience and knowledge before attempting a new procedure
- Minimize time under anesthesia
- Minimize tissue handling
- Avoid obvious skin sutures
- Apply adequate perioperative patient support (hydration, analgesia, feeding)

**Routine neutering** – indications for the procedure are usually elective to prevent unwanted breeding and also to reduce dominant male behavior, but testicular issues from trauma, hernias and testicular neoplasia also exist. Male rabbits have an obvious scrotum but male rodents may show different degrees of inguinal bulging without an obvious scrotal sac. Open inguinal rings and short inguinal canals increase the chance of postoperative abdominal visceral herniation from the surgical incision if the correct surgical approach is not used. A mixture of 1:1 lidocaine-bupivacaine 0.01-0.03ml/kg can be administered intra-testicularly before the beginning of the procedure. Skin preparation should be fast and minimal while the hair is carefully clipped to avoid damaging the delicate skin. A single or double “pre-scrotal” skin incision with further

subcutaneous approach to the inguinal tunic is recommended. Both open and closed techniques can be used when removing the testicles, leaving behind as much soft tissue as is practical to act as a natural anatomical stopper to prevent evisceration. The inguinal canal, the vaginal tunic and the subcutaneous incisions should be closed without excessive tightening. The skin can be closed with a surgical adhesive. Apply deterrent paste and E-collar as necessary to prevent post-surgical trauma.

**Routine spaying** – indications for the procedure are usually elective to prevent unwanted breeding, to reduce likelihood of reproductive tract-related diseases (ex. uterine neoplasia, ovarian cysts, and mammary neoplasia) and also to reduce dominant female behavior. Female rodents have a bicornate uterine system and female rabbits have a duplex reproductive system (2 x ovary-uterus-cervix) that needs to be removed in its entirety. Older multiparous female rabbits can have a grossly enlarged vagina that can also hold a backflow of urine and will need careful handling and ligation to prevent urinary leakage and uroabdomen formation. The procedure should be performed in females around 5-6 months of age, before the development of uterine changes and the accumulation of excessive fat in the broad ligament of the uterus that can add some challenges to the procedure. The surgical approach is mid-to-caudal abdomen as a cranial approach can lead to more GI exposure and handling. The urinary bladder is exposed and the reproductive tract is easily located just anatomically dorsal to it. The ovaries are found and either suture or hemoclips (faster, safer) are applied to the ovarian vessels. In female guinea pigs, ovarian cysts of variant size can show and can be aspirated before the ovary is removed. The broad ligament is carefully severed by either blunt or electrocautery dissection. Depending on the size, the uterine stump can be secured with either suture or hemoclips. Suture edges should be trimmed short as post-surgical abdominal viscera adhesions (bladder, colon) often occur from serosal irritation. The abdomen is closed routinely in a 3-layer fashion using a simple continuous pattern with a fine absorbable suture. The skin is closed with an intradermal suture pattern and a surgical adhesive. Apply deterrent paste on the skin and E-collar as necessary to prevent post-surgical incisional trauma.

**Cystotomy** – indications for the procedure are usually for cystic calculi removal but other bladder disease can also show (neoplasia). The bladder anatomy is similar in its location and structure to other species. Some male rodents can have large seminal vesicles that can be confused with a urinary bladder. The surgical approach is caudal abdomen as a more cranial approach can cause more GI exposure. This might be challenging in some male rodents due to the presence of the os penis. The urinary bladder is exposed and carefully isolated from its surroundings by protective sponges. The urine is aspirated from the bladder with a 3-5ml syringe and a 25G needle and kept for later urinalysis. Stay sutures can be placed in the ventral aspect of the bladder by passing a fine suture material from both sides of the planned bladder-wall incision and held in place by fine mosquito forceps. The bladder wall is incised

in its ventral aspect, in an avascular part of it, using either a #15 scalpel blade or sharp-sharp fine scissors. Any spilled urine from the incision should be carefully absorbed to prevent leakage into the abdomen. The size of the incision is based on preliminary radiography that tells the size and number of the bladder calculi to be removed. A small spoon or surgical forceps can be used to remove the calculi from within the bladder to be later submitted for mineral analysis and bacterial culture testing. A small section of the bladder wall is trimmed from the incision and submitted for bacterial culture and susceptibility. The inside of the bladder is gently rinsed using warmed saline. It is advised to pass a temporary red-rubber urinary catheter in males that show excessive amount of blood clots coming from inside the bladder, as these can cause postoperative urinary outflow obstruction. The bladder wall is closed in either a simple interrupted or a continuous pattern using a fine synthetic absorbable suture. Although challenging, it is advised to bury the suture in the bladder wall without penetrating through the bladder mucosa as the exposed suture material might become a nidus for repeat calculi formation. Once the bladder wall is tightly closed, the closure is checked for leakage by moderately inflating the bladder with injectable warmed-saline. It is best to avoid excessive abdominal visceral manipulation and lavage if no obvious signs of other diseases or urinary leakage are suspected. The abdomen is closed routinely in a 3-layer fashion using a simple continuous pattern with a fine absorbable suture. The skin can be closed with an intradermal suture pattern and a surgical adhesive. Apply deterrent paste to the skin and E-collar as necessary to prevent post-surgical incisional trauma. Carefully monitor the patient's urination for the next 48 hrs. Provide postoperative supportive fluids to allow good dilution and flow of the urine from the bladder, as some bleeding is still expected from the incised bladder wall. Minimize handling, and prevent excessive pressure on the abdomen for 7-10 days after the procedure.

**Abscess removal** – Rabbits and rodents often present with abscesses that require surgical removal. A key difference from dog and cat abscesses is that rabbits and rodents usually have a thick abscess capsule that walls off the infection from spreading elsewhere in the body but also prevents antibiotics from penetrating in. The rabbit and rodent pus is thicker and does not usually lance or irrigate well. In order to promote complete resolution of the problem, it is best to approach abscesses in rabbits and rodents as if this was a neoplastic mass that needs to be removed in its entirety. It is also advised to address all underlying or contributing factors to the abscess formation (like dental disease). Depending on the size of the abscess, it may or may not be drained of its pus before the surgical removal. Intact masses might be easier to follow and remove completely. A piece of the abscess capsule should be submitted for an aerobic and anaerobic bacterial culture and susceptibility testing. Abscesses that cannot be completely removed should be left open or the edges marsupialized to the skin to allow continuous irrigation with antiseptic solutions or application of antibacterial products.

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