REPRODUCTIVE SURGERY OF SMALL EXOTIC MAMMALS

James K Morrisey, DVM, Diplomate ABVP (Avian)
Cornell University
Ithaca, NY

Castration and ovariohysterectomy of small exotic mammals such as ferrets, rabbits, and rodents is a common practice and can easily be incorporated into the routine procedures offered to these clients. This article reviews these two procedures in the most common species, and offers advice for small mammal surgeries in general. Anesthesia is beyond the scope of this article but care should be taken in terms of maintaining body temperature using convective heating pads, warm water heating pads, or similar devices. Surgical time should be kept to a minimum to help prevent hypothermia and low blood pressure. Alcohol should be avoided when preparing the animal for surgery as it also decreases body temperature. Blood loss is usually minimal with these procedures but the surgeon should keep a strict eye on how much is lost to know if replacement methods are necessary.

For all species, the same instruments used in cats and dogs work well for neuters. Debakey forceps are useful for grasping the ovarian structuresatraumatically within the deep abdomen of these species. Fine surgical instruments are helpful but not necessary, especially when dealing with the rodents. Small suture material such as 3-0 to 7-0 will be used so it may be helpful to have fine needle drivers. All suture mentioned is on a nylon core. A small taper needle and is a synthetic absorbable suture such as polydioxanone (PDS®) or polyglactin (Vicryl®) unless otherwise mentioned. Magnification can be beneficial by using either hobby loupes or head loupes.

FERRETS

Most ferrets are spayed or neutered and descended at 3 to 6 weeks of age; however, the number of private breeders is increasing so it is possible to see unaltered ferrets. These animals should be neutered by 6 to 8 months of age. Castration of ferrets is very similar to cats. The testicles are located ventral to the anus and caudal to the penis. The area is aseptically prepared for surgery and a short, linear incision is made in the center of each scrotal sac. The castration can be performed closed or open. The ‘self-tie’ technique used in cats doesn’t work in ferrets because the testicle cannot be extracted very far from the scrotum. I prefer a closed technique so will clamp and double ligate the spermatic cord using 3-0 to 4-0 suture. Chromic gut sutures can be used for ferrets but not other small mammals. Closure of the incisions is not usually necessary.

Female ferrets should be spayed between 6 and 8 months of age before their first heat. Ferrets are induced ovulators and can develop severe anemia secondary to bone marrow suppression from hyperestrogenemia if not bred during their first heat or spayed before this time. The ferret uterus is bicornuate similar to that of the cat and the surgical procedure is likewise similar to the cat. A ventral midline incision is made and the ovaries identified. There may be significant fat around the ovaries, making it difficult to view the vasculature; so care should be taken when exposing the vessels to avoid the ureters, which course medial to the ovaries. In young animals or animals in estrus, the vessels may be too friable to clamp with hemostats so ligatures can be placed without clamping. The ovarian vessels are double ligated using 4-0 suture. The suspensory ligament is usually slack and easily torn with blunt dissection. The uterine arteries and uterine body can be double ligated with 3-0 sutures. Closure of the abdomen is routine with 4-0 suture in the linea and then a subcuticular suture using 4-0 or 5-0 suture. Skin sutures are not necessary.

RABBITS

Routine castration of rabbits should be performed between 4 and 6 months of age to avoid urine spraying and other secondary sexual characteristics. The testicles are found in separate, hairless scrota on either side of the perineal mound at the level of the penis or slightly cranial to it. The testicles descend at about 12 weeks of age. Sexing rabbits before this time can be difficult, but look for a vertical genital opening in females and a round opening in males. Rabbits have open inguinal rings so the testicles may easily retreat into the abdomen, especially during surgery. If this occurs, place the flat of your hand on the ventral abdomen and gently roll it towards the tail to push the testicles back into the scrotal sacs. The area is aseptically prepared for surgery, taking care with the clippers not to lacerate the thin skin of the bunny. A ventral incision is made over the testicle from about the center of the testicle to the palpable head of the epididymis. The castration can be performed open or closed, again I prefer closed. A small towel clamp can be used to grasp the ligament of the head of the epididymis so that tension can be placed on the testicle as it is dissected from the surrounding fascia. There is a large epididymal fat pad located in the inguinal tunic that can be removed if performing an open castration or left intact if doing a closed technique. A hemostat can be used to clamp the testicle and 3-0 or 4-0 suture can be used to ligate in the crushed band of tissue. This is repeated and the testicle then removed. If an open technique is used, the superficial inguinal ring should be closed using 4-0 suture. The scrotum can be left open or tissue glue can be used to close the incision site.

The rabbit uterus is bicornuate but has two cervices, no uterine body, and a long vaginal vestibule. Spaying rabbits is recommended because of the very high incidence of uterine disease, including adenocarcinoma, pyometra, and endometritis, in unspayed females. Rabbits should be spayed between 3 and 6 months of age. The mesometrium is the primary site of fat storage in rabbits so it’s beneficial to perform the surgery before significant amounts of fat accumulate. A ventral midline incision is made from 1cm cranial to the brim of the pelvis and 1cm caudal to the umbilicus. The aponeuroses of the abdominal muscles can appear to be linea, so make sure you are on the midline before incision the linea alba. Take care when cutting the linea

1861
as the cecum is large and is often pressed against the body wall. The reproductive tract is easily visualized in rabbits just cranial and dorsal to the bladder. The bladder should be emptied before surgery for better visualization. The reproductive tract can exteriorized easily but is more fragile than other species. The ovaries are surrounded by a long, dark red oviduct that is somewhat friable. The vessels can be difficult to visualize because of the fat surrounding them and should not be crushed with a hemostat before ligation as they easily tear. Instead, make a window through the fat on either side of the vessels and pass your ligature through these windows. There will be vessels that connect to the ovary from the dorsal body as well as a vessel within the ovarian ligament. Once the vessels are double ligated with 4-0 suture, a hemostat can be placed at the base of the oviduct to prevent hemorrhage from the tract when the ovarian vessels are transected. Once the ovarian vessels are ligated the tract can be flipped caudally and the large uterine vessels exposed. These vessels lie a few centimeters from the vagina and cervices and will need to be double ligated separately using a 4-0 suture. Then the cervices can be removed together by ligating across the distal vagina. There should be two ligatures placed here, one circumferential and one transfixing suture. The cervices can also be left intact and separate ligatures placed distal to each cervix and the uterus removed in two separate pieces. The linea is then closed with simple interrupted sutures because of the weight of the cecum on the incision. Subcuticular sutures are also placed to avoid the animal chewing out any skin sutures.

HYSTRICOMORPH RODENTS

Hystricomorph rodents such as guinea pigs and chinchillas are more easily neutered than spayed. The testicles lie on either side of the perineal area in pouches called post anal sacs. Both species have open inguinal rings so the same precautions should be taken in rabbits to either perform a closed castration or close the inguinal ring. A closed castration is easier and allows for a smaller incision. Guinea pigs reach sexual maturity as early as 3 months in males so castration should be done between 3 and 6 months of age. The boars are placed in dorsal recumbency and the area around each sac is prepared for surgery. Careful palpation is necessary so the penile body is not confused with a testicle. The incision should be made at the cranial aspect of the scrotal sac and the testicle pushed into view. As with rabbits, grasp the ligament of the head of the epididymis using towel clamps and free the testicle from the surrounding fascia with blunt dissection. Be gentle to the tissue to avoid post-operative swelling and inflammation. The spermatic cord is crushed using a hemostat distal to the epididymal fat body and the cord is double ligated using 3-0 or 4-0 suture. I have had problems with Monocryl® in guinea pigs, although other clinicians have used it routinely without problems. Once the testicles are removed the skin should be closed with a subcuticular pattern using 4-0 or 5-0 suture. It’s more important to close these incisions since the testicles tend to lie or drag on the ground more than other species. Both species are prone to sterile abscess after surgery and should be placed on anti-inflammatory for 7 to 14 days (meloxicam 0.3 mg/kg PO q24h).

Spaying guinea pigs and chinchillas is somewhat difficult because of the deep abdomen and short ovarian ligaments. Breaking these ligaments, as with a dog spay, is not possible as it is likely to rupture the vessels. Chinchillas have two cervices like the rabbit but a shorter uterine body so the cervices are usually left intact and the uteri removed separately. Both species accumulate fat in the mesometrium making it difficult to visualize vessels around the ovaries. Again, a ventral midline incision is made from the umbilicus to the pubis. Care should be taken in incising the linea to avoid the underlying cecum and bladder. Ovaries are located by following the uterus cranially. Ligatures should be placed around the ovarian vessels without crushing them by making two windows in the fat. The vessels are more easily visualized on the medial side of the mesovarium. Double ligate the vessels using 4-0 or 5-0 suture. The suspensory ligament is easily broken down to visualize the uterine vessels. The uterine vessels can be double ligated with the uterus, or separately like the rabbit using 3-0 or 4-0 suture. In guinea pigs the entire uterus and ovaries are removed together but in chinchillas each side can be removed separately. Closure is similar to the rabbit mentioned above.

MYOMORPH RODENTS

Spaying and neutering small rodents like rats, mice, hamsters and gerbils is a less common practice although recent evidence demonstrated that spaying rats greatly reduced the incidence of mammary tumors. The testicles of males are generally large and they have open inguinal rings. These species have a well-defined scrotal sac that is located caudal to the anus under the tail. There are three approaches to castration, a single midline incision at the base of the testicles, two incisions over each testicle or removing the caudal end of the scrotum. I prefer a closed castration that is performed by an incision in each scrotum. The incisions can be made on the caudal-dorsal portion of the scrotum to avoid damage to the incision from dragging it along the ground. The technique is the same as the guinea pig and chinchilla with the tunic and skin being closed with 4-0 or 5-0 suture. Tissue glue can be used to close the incision if it is less than 1 cm.

The rat is the only myomorphic rodent that is spayed with any regularity. The rat has a long bicornuate uterus with well-developed uterine horns and a short uterine body. The long suspensory ligaments make ligation of the ovarian vessels easier using 4-0 or 5-0 suture. There is less fat in the mesometrium as well so visualization is also easier. The small size of the structures makes the use of a head loupé or other magnification beneficial but not required. The uterine vessels can be ligated with the uterine body. The linea is closed with 4-0 to 5-0 suture and the subcutis with 5-0 to 7-0 suture. Tissue glue can be used to close any defects in the skin but skin sutures should not be used as they are often chewed out.