

THERE'S MORE THAN ONE WAY TO DO IT: SURGICAL CASTRATION TECHNIQUES

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Castration techniques for exotic mammals include scrotal, prescrotal, and abdominal approaches. These can be further classified as open or closed. Technique depends on the anatomy of the patient, and in many cases, is largely surgeon preference. Familiarity with alternatives will allow the surgeon flexibility to select the most appropriate technique when faced with an unfamiliar species or an anatomical peculiarity.

FERRETS

Few veterinarians in the US castrate male ferrets, as the majority arrive in the pet store already neutered. The urogenital anatomy of the male ferret is similar to that of other canids, with the penis situated cranial to the scrotal sac. Both scrotal and prescrotal techniques are described, with the use of suture, hemostatic clips, or even "self-tying" the vas deferens to the vessels. In the scrotal approach, the incisions are left to heal without suture; while the pre-scrotal skin and subcutaneous incision is sutured with 4-0 or 5-0 absorbable suture.

In the ferret, indications for castration include prevention of pregnancy, and reduction of very strong odor and aggression. It should be noted that neutering of both male and female ferrets is linked to adrenocortical neoplasia.

RABBIT

The urogenital anatomy of male rabbits presents a peculiarity unique among placental mammal species but common in marsupial species. The penis is located caudal to the testicles, which lie cranial to the penis in two separate hemiscrotal sacs. Another very important anatomical peculiarity, similar to rodent species, is that the inguinal canal remains open throughout life, and the testicles are free to move from the hemiscrotal sacs to the abdominal cavity, making rabbits (and rodents) "functional cryptorchids." Position of the testicles depends on many factors including body position, body temperature, breeding activity, gastrointestinal tract filling, and the amount of abdominal fat. The testicles are elongated and not round. The epididymis is clearly visible at the caudal pole of the testicle, but not as developed as in rodent species. There is fat surrounding the testicles, but much less than in rodent species. The glans of the penis is not well developed, is point shaped, and covered by a prepuce.

The two main anatomical peculiarities of male rabbits have important implications in regard to surgical techniques. The open inguinal canal is breached during surgery, and must be closed in order to prevent open communication between the hemiscrotal sac and the abdominal cavity, and potential herniation of abdominal viscera (intestine, bladder) into the hemiscrotal sac. The position of the penis caudal to testicles allows the

surgeon to choose a prescrotal approach and a single incision on the midline as an alternative to a scrotal approach

Castration in the rabbit is indicated for prevention of pregnancy, and reduction of urine spraying, social aggression, and unwanted sexual behavior. It should be kept in mind that many owners maintain single intact male rabbits who do not exhibit undesirable behaviors. Therapeutic castration is indicated in cases of testicular disease including infection and neoplasia, and for correction of hemiscrotal herniation and true cryptorchidism.

Prescrotal Approach

The rabbit is placed under general anesthesia in dorsal recumbency, and the prescrotal area shaved. For this technique, it is not necessary to attempt to shave and prepare the thin, delicate skin of the hemiscrotal sac. The surgical site is prepared for surgery. A 1.5- to 2-cm skin incision is made on the midline, just cranial to the base of the hemiscrotal sacs. Blunt dissection of the subcutaneous tissue, fat, and inguinal fascia reveals the vaginal processes caudal to where they enter the abdomen through the inguinal canal. In mature rabbits with abundant subcutaneous fat, identifying the vaginal processes may be slightly difficult. The surgeon can easily identify these by gently massaging the testicles back and forth from the hemiscrotal sac to the abdomen and visually identifying them as they pass through the transparent vaginal processes. The vaginal process is bluntly dissected from surrounding soft tissues and isolated.

At this point the procedure is continued by opening the vaginal process, or leaving it closed, thus proceeding as an "open" or "closed" technique. In the open technique, the vaginal process is exteriorized and 3-0 to 4-0 absorbable suture material passed around it and tied loosely or secured with a hemostat. The vaginal process is incised with blunt scissors to prevent iatrogenic damage to the vessels of the spermatic cord. The testicle is exteriorized through the incision, and the spermatic cord and vessels sutured. The remaining suture used to pass around the vaginal process is tied securely proximal to the incision in order to close the vaginal process. The procedure is repeated on the contralateral vaginal process, and skin incision closed routinely.

For the closed technique, the isolated vaginal process is bluntly dissected caudally while pulling gently, which inverts the scrotal sac. The vaginal process containing the testicle, deferens and vessels are ligated. A hemostat or blunt probe is used to replace the inverted scrotal sac, and the incision closed as above.

Both techniques produce some degree of inversion of the scrotum, which should be manually restored to normal position with gentle traction at the conclusion of the procedure.

Scrotal Approach

Both open and closed scrotal approaches to castration of the rabbit have been well described. The

major disadvantage of the scrotal approach is challenging surgical preparation, as it is difficult to completely remove hair and adequately prepare the site for sterile surgery. However, most surgeons are familiar with this approach, and for experienced surgeons, complication rate is low.

Opening the vaginal process (open technique) allows direct visualization and ligation of the spermatic cord and vessels, but necessitates closure of the vaginal process at the end of the procedure. In the closed technique, the vaginal tunic is closed and spermatic cord and vessels simultaneously ligated.

Abdominal Approach

The rabbit under general anesthesia is placed in dorsal recumbency. The caudal area of the abdominal surface is surgically prepared routinely. Celiotomy is performed on the caudal midline 4 to 5 cm cranially to the hemiscrotal sacs. The urinary bladder is exposed, exteriorized and reflected caudally. The deferens are gently retracted, and testicles are exteriorized. Dissection of the tail of the epididymis from the caudal pole of the everted hemiscrotal sac and ligation of the spermatic cord are performed as shown before, through the celiotomy access. Suturing of the abdominal wall and the overlying soft tissues is performed routinely.

GUINEA PIGS

In general, techniques for the rabbit are similar to those for the guinea pig, with a few important differences. The penis of the guinea pig is positioned cranial to the testicles; therefore the prescrotal technique cannot be performed with a single midline prescrotal incision. Instead, two parallel incisions are made slightly lateral to the midline in order to access both vaginal processes.

OTHER RODENTS

Prairie Dog

The male prairie dog does not have a scrotal sac. During breeding season, the testicles are often palpable beneath the perineal skin and subcutaneous tissues; however, access is challenging. The author prefers a "scrotal" approach in mature animals during the breeding season. The testicles are located and isolated beneath the subcutaneous tissues, and ligated routinely.

The other most commonly described technique is an abdominal approach. The patient is prepared for caudal abdominal surgery under general anesthesia. Celiotomy is performed on the caudal midline 4 to 5 cm cranial to the perineum. The urinary bladder is exposed, exteriorized, and reflected caudally. The deferens are gently retracted, and testicles exteriorized. The tail of the epididymis is dissected from the caudal pole of the everted hemiscrotal sac and spermatic cord and vessels ligated. Closure of the surgical site is routine.

MARSUPIALS

Sugar Glider

Orchiectomy is performed in the sugar glider for prevention of unwanted pregnancy, to reduce territorial

aggression and for reduction of strong, objectionable musky odor. The anatomy of the male marsupial is unique, with testicles contained in a pendulous scrotal sac. Techniques described include a single scrotal incision and ligation with small hemostatic clips or fine absorbable suture (4-0 to 5-0); and scrotal ablation with the incision made along the pendulous stalk.

It should be noted that some breeders and distributors of gliders are castrating very young animals simply by clamping and cutting the scrotal stalk, or by applying various types of bands, all without benefit of anesthesia or analgesia.

Virginia Opossum

Orchiectomy is seldom performed in this species, and anatomy and technique are similar to that described above for the sugar glider, with the exception that the scrotal sac and testicles are much larger than in the sugar glider.

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Table 1. Techniques for Castration of Small Exotic Mammals

Class	Species	Approach	Comments
Carnivore	Ferret Skunk Fox	Scrotal Prescrotal	Techniques similar to that performed in dogs and cats
Herbivore	Rabbit	Scrotal Open Closed Prescrotal Open Closed Abdominal	True aseptic surgical preparation is difficult Can be performed with single incision Improved aseptic surgical preparation; avoids incision into delicate hemiscrotal sac. Procedure is generally longer than scrotal approach Indicated for true cryptorchids
Herbivore	Guinea Pig	Scrotal Open Closed Prescrotal Open Closed Abdominal	True aseptic surgical preparation difficult Improved aseptic surgical preparation: avoids incision into delicate hemiscrotal sac. Procedure generally takes longer than scrotal approach
Herbivore	Prairie dog	Scrotal Abdominal	No true scrotum or hemiscrotal sac; easier during breeding season Preferred approach is animal is immature, many prefer this technique routinely
Herbivore	Most rodents	Scrotal Open Closed Prescrotal	See comments above for guinea pig
Marsupial	Sugar glider Virginia opossum	Scrotal	Scrotum is pendulous; some prefer scrotal ablation