

**Efficient Spay/Neuter Surgery**  
**Philip A. Bushby, DVM**  
Mississippi State University, Miss State, MS, USA

### **Introduction**

Most veterinary schools teach students how to perform spays and neuters at a point in their education when they are very inexperienced surgeons. Therefore, students are taught many techniques that are simply designed to compensate for poor surgical skills and lack of knowledge. Students are taught to double ligate everything because instructors don't trust their ligatures. They are taught interrupted patterns because instructors don't trust their knots. They are taught long incisions and extensive exposure because instructors believe students don't fully understand abdominal anatomy. As veterinarians gain experience in surgery they become much more efficient, but often veterinarians fail to abandon those techniques that were simply designed to compensate for lack of experience? Many of those techniques can be replaced by ones that are much more efficient. As you consider spay/neuter surgery always ask why you are doing a particular technique a particular way and consider if there is a better, more efficient approach.

### **Patient Positioning**

In a spay, position the patient with the front legs along its side rather than pulled forward past its head. Pulling the legs forward, which is commonly done, tightens the muscles of the back and tightens the suspensory ligaments of the ovaries. Positioning the limbs to the side the patient's thorax will relax the suspensory ligaments and make delivery of the ovaries through a small abdominal incision easier. V-tables, V-troughs or a simple home-made restraint device allows this positioning of the patient and helps prevent tilting of the patient to one side or the other.

### **Surgical Techniques**

#### **Placement of incisions**

One key to efficient ovariectomies is making appropriately placed small incisions. While most surgery instructors promote long incisions and maximum exposure; lengthy incisions are considerably more time consuming to close. Small incisions, obviously, can be closed much more rapidly. The proper location of the incision varies with species and with age of the patient and should be determined based on which reproductive structures are more difficult to exteriorize. In a cat spay the tissue that is more difficult to exteriorize is the uterine body. In the adult dog, it is more difficult to exteriorize the ovaries. Puppies are intermediate. Vary the location of your incisions accordingly. In the cat spay the midpoint of the skin incision should be located on the ventral abdominal midline at the midpoint between the umbilicus and the anterior brim of the pubis. In the adult dog, the skin incision is on the ventral abdominal midline just caudal to the umbilicus. In the puppy spay (6 months or younger) the caudal-most part of the skin incision should be at the midpoint between the umbilicus and the anterior brim of the pubis.

In the adult dog the ovaries are the most difficult to exteriorize and since the right kidney and the right ovary are located further cranial in the abdomen than the left kidney and left ovary it is more difficult to exteriorize the right ovary than the left ovary. To equalize the difficulty of exteriorizing the two ovaries make the entry into the abdomen through a right paramedian incision. Incise the skin on the ventral abdominal midline just caudal to the umbilicus, undermine slightly on the right side of the linea alba and, depending on the size of the dog, incise the rectus sheath 1/2 to 2 cm to the right of the linea alba. To prevent hemorrhage from the rectus abdominis muscle incise only the fascia. Enter the abdomen by bluntly separating the fibers of the rectus abdominis muscle and cutting the peritoneum.

Castration incisions in the cat, the puppy and in the adult dog can be made through the scrotum.

#### **Ligation techniques**

Most of you were probably taught to double ligate ovarian pedicles and uterine stumps and to ligate before transecting the tissue, but why? As stated above, you were, most likely, taught how to perform spays when you were very inexperienced at surgery. Accordingly, at that stage of development it was not wise to trust your tissue handling or your ligations. Both of these techniques, however, can slow you down considerably. It is much more efficient to transect the ovarian pedicles prior to ligation and to single ligate each pedicle. The most efficient technique is to place 3 hemostats, the first most proximal, the second several millimeters distal to the first, but still proximal to the ovary, and the third between the ovary and the uterine horn. Close the first hemostat one click of the ratchet, the second two clicks and the third three clicks. The purpose of the 1, 2, 3 clicks is to avoid completely crushing the tissue at the most proximal clamp. Complete crushing would predispose the pedicle to tearing. Before ligating, transect the ovarian pedicle just distal to the second hemostat. Ligate with a square, surgeon's or Miller's knot depending on the size of the ovarian pedicle. If you are skilled at hand ties that, too, will improve your efficiency.

#### **Cord ties**

The cord tie is a method of ligation in which the spermatic cord (within the tunic when doing closed castrations) or the vas deferens and spermatic vessels (when doing an open castration) is/are tied to themselves around a hemostat. The cord tie can be used in cat, puppy and very small adult dog castrations. Hold the testicle in your non-dominant hand and gently pull the testicle and spermatic cord towards you. Using the dominant hand, a curved hemostat is crossed over the spermatic cord and the curved tip of the hemostat is passed underneath and behind the spermatic cord. The hemostat should be held closed with the tip of the hemostat facing away from you. The tip of the hemostat is then directed above the spermatic cord as the hemostat is rotated counter-clockwise to end up facing you. The hemostat is opened and used to clamp the spermatic cord. The cord is cut between the hemostat and the testicle and the knot is gently pushed off the tip of the hemostat. The knot should be pulled tight before releasing the hemostat.

### **Pedicle ties**

The pedicle tie is a method of ligation in which the structure is tied to itself around a hemostat. The pedicle tie is essentially the same as the cord tie and is used in ligating the ovarian pedicles in cat spays. There are several variations of the pedicle tie in the cat spay. In the technique I use, deliver the ovary through the abdominal incision, cut the suspensory ligament and tear a hole in the broad ligament just caudal to the ovarian vessels. Hold the ovary in your non-dominant hand and gently pull the ovary towards you. Using the dominant hand, a curved hemostat is crossed over the ovarian vessels into the hole in the broad ligament and underneath and behind the vessels. The hemostat should be held closed with the tip of the hemostat facing away from you. The tip of the hemostat is then directed above the vessels as the hemostat is rotated counter-clockwise to end up facing you. The hemostat is opened and used to clamp the ovarian vessels. The vessels are cut between the hemostat and the ovary and the knot is gently pushed off the tip of the hemostat. The knot should be pulled tight before releasing the hemostat.

### **Modified Miller's knot**

The modified Miller's knot is a very secure, self-locking knot that can be placed either with an instrument or with a hand tie. The modified Miller's knot can be used on spermatic cords, on ovarian pedicles in dogs and uterine bodies of dogs and cats. To place a modified Miller's knot, pass the suture under the tissue to be ligated, bring the suture back over the tissue and under the tissue one more time. This creates a small loop of suture above the tissue to be ligated. Position the needle holder through that small loop, wrap the long strand once around the needle holder, grasp the short strand of suture with the needle holder and pull the needle holder towards you while pulling the long strand of suture away from you. Gentle upward tension while pulling this knot tight facilitates placement of the ligature. Complete the knot by place three or four more square knot throws.

### **Abdominal Closure**

There are two key factors in closure of the abdominal wall. The first is that the holding layer is the rectus abdominus fascia. There is no need to close the peritoneum and you do not want to incorporate rectus muscle in your closure. If your incision is on the linea alba, wide bites of the linea are sufficient. If your incision is paramedian, wide bites of just the rectus fascia avoiding the rectus muscle is sufficient. If the abdominal wound is short it can be closed with one or two cruciate sutures. If it is too long to close with one or two cruciate sutures use a simple continuous pattern. The subcutaneous tissue and skin can then be closed with continuous patterns.

### **Tattoo or ear tip**

The most difficult spay you will ever do is the spay in a large breed, obese dog that was spayed years ago. The search for a uterus and ovaries that are not there can be very time consuming and frustrating. In an ideal world ALL VETERINARIANS would tattoo dogs and cats when they are spayed or castrated. The only exception being feral (or community cats) that should be ear tipped.

### **Scrotal Castrations in Adult Dogs**

Scrotal castration is rarely ever taught in veterinary school, in fact, for decades veterinarians have been taught to avoid making incisions in the scrotum of dogs. Scrotal castrations appear, however, to offer several advantages over the prescrotal approach including, smaller incisions, less surgical time, and less tendency for scrotal hematomas. The justification for avoiding scrotal castrations in dogs had been to prevent self-mutilation. As long as no external skin sutures are placed in the scrotum there appears, however, to be no greater risk of self-trauma in a scrotal castration than in a prescrotal castration.

Position the patient in dorsal recumbency. Grasp one testicle and position it in a manner that elevates and exposes the median raphe. Make an incision through the skin and subcutaneous tissue along or near the median raphe over the displaced testicle. Continue the incision through the spermatic fascia to exteriorize the testicle. In the closed castration technique care is taken not to incise the parietal vaginal tunic and tunica albuginea. Use gentle traction to exteriorize the testicle and reflect fat and fascia from the parietal tunic of the spermatic cord using a gauze sponge. Place three hemostats on the spermatic cord and transect the cord distal to the third hemostat. In smaller dogs (under 18 kg) a single ligature tied with a modified Miller's knot and placed in the crushed area of the most proximal hemostat is sufficient for hemostasis. In larger

dogs (18 kg and above) a transfixation ligature is placed in addition to and just distal to the Miller's knot. The second testicle is exteriorized through the same scrotal incision. A second incision in spermatic fascia is made over the second testicle to allow exteriorization, transection and ligation of the second spermatic cord is accomplished in a manner identical to the first testicle.

The technique for closure is the surgeon's preference. Incisions can be left open to heal by second, can be partially closed with one buried subcutaneous suture of absorbable suture material, or can be closed fully with skin glue. All three of these techniques are considered acceptable. But if you leave the incision open, or partially open, communicate to the owner that there will be drainage for a few days post-op.

### **Age at which surgery is performed**

As a general rule the larger the animal is (dog or cat), the more obese the animal is, and the older the animal is, the longer it will take to perform a spay or neuter surgery. Even though most of us were taught to wait until a dog or cat is sexually mature (six to nine months) before sterilization surgery there is growing evidence that there is no reason to wait until the animal is an adult, this is especially true in cats. Pediatric spay neuter is much easier and quicker than that in the sexually mature patient.

### **Conclusions**

Becoming efficient at spays and neuters is a combination of many factors. One of which, of course, is the skill and comfort level of the surgeon. Adoption of specific techniques that are used commonly in high-volume spay neuter clinics is a key factor in improving efficiency. Being willing to question why you were taught specific manipulations in veterinary school and recognizing that it is acceptable to abandon some of them (such as always double ligating pedicles) will improve surgical efficiency greatly.

### **Videos**

All surgical procedures will be demonstrated by video. All videos shown during this presentation can be viewed or downloaded from:

<http://mymedia.msstate.edu/outputset.php?id=25524>