Taking the mystery out of food animal surgery for the new graduate

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Abstract

Throughout veterinary school we are instructed on the ideal technique for a number of surgical procedures. You may even consult some of the many good references that are readily available. Unlike my time in veterinary school, you even have internet videos to watch. All of this will do a lot to help you prepare for life after graduation. However, none of your food animal patients will have sat through lectures, read books or watched those same videos so things may not be exactly as you expect when YOU get on the farm. Our goal in this presentation will be to discuss some common procedures and prepare you to do them uncommonly well, even when it is not exactly like the book. Come prepared with questions and we will make this an interactive session.

This is not a presentation on antibiotic use. We must certainly be aware of all the changing regulations on appropriate use of antibiotics and never abuse or overuse antibiotics. However, there is a decrease in post-operative complications in many procedures when peri-operative antibiotics are used. Remember these are most effective when first given pre-operatively to reach blood levels prior to making an incision.

Key words: bovine, surgery

Résumé

Lors de notre passage à l'école vétérinaire, une technique idéale nous est proposée pour plusieurs procédures chirurgicales. Vous pouvez même consulter certaines des meilleures références qui sont facilement accessibles. Contrairement à mon expérience à l'école vétérinaire, vous avez même accès à des vidéos sur l'internet. Tout cela vous servira bien pour la vie après vos études. Toutefois, aucun de vos patients d'animaux destinés à l'alimentation n'a suivi les cours, lu les livres ou regarder les mêmes vidéos. Il est donc possible que les choses ne se passent pas comme prévu lorsque VOUS arrivez à la ferme. Notre but dans cette présentation sera de discuter de certaines procédures courantes et de vous préparer à les accomplir exceptionnellement bien même si cela ne suit pas exactement les règles. Préparez vos questions pour en faire une session interactive.

Ce ne sera pas une présentation sur l'utilisation des antibiotiques. Nous devons certainement être au courant des nouvelles réglementations sur le bon usage des antibiotiques et ne jamais abuser ni surutiliser les antibiotiques. Toutefois, le taux de complication post-opératoire pour plusieurs procédures diminue lorsque des antibiotiques péri-opératoires sont utilisés. Il faut se rappeler que ces antibiotiques agissent plus efficacement lorsqu'ils sont administrés avant l'opération ce qui permet d'atteindre une bonne concentration sanguine avant l'incision.

Laparotomies

A laparotomy is commonly done either for exploratory purposes or for a specific purpose when a clinical diagnosis has already been made. Flank laparotomy through the left paralumbar fossa is commonly used for exploratory laparotomy if a problem is suspected with the rumen or for Cesarean section. The right paralumbar approach is used for exploratory laparotomy if a problem is suspected on the right side or to perform a more complete exploration of the abdominal cavity. A right-flank approach may also be used for Cesarean section when ruminal distention or right-sided positioning of the fetus causes the surgeon to consider the right side a superior approach to the left side. Typically, the flank laparotomy is performed with the animal standing, and anesthesia is provided by a line block, an inverted L block, or a paravertebral block. For surgery of the small or large intestinal tract, pain and shock associated with both the condition itself and the tension on the mesentery created by surgical manipulation may cause the animal to become recumbent during surgery, but with care standing procedures are very useful.

Left Displaced Abomasum Surgery

There are several surgical techniques described in the literature for correcting abomasal displacements. We will discuss the pyloro-omentopexy technique which has several advantages over other techniques but has not been as well described as many other procedures. There are several modifications of pyloropexy techniques used in veterinary practice. We will describe a pyloro-omentopexy technique that the author has used successfully without complications. First, the flank incision is shifted cranioventral to the middle of the paralumbar fossa. This may require additional local anesthetic infusion immediately caudal to the last rib, if a paravertebral block is used, to desensitize the more cranioventral aspect of the flank. The standard incision is made through the

slightly shifted location and the abomasum is repositioned as described. The skin is undermined for approximately 5 cm dorso-caudal and dorso-cranial from the dorsal most aspect of the skin incision. This allows placement of #2 absorbable suture through the muscular body wall into the abdominal cavity where a bite is taken into the omentum and back through the body wall to be tied in the subcutaneous space. The first suture is placed in the dorso-caudal undermined space. A second one is placed similarly dorso-cranial to the proximal aspect of the skin incision. These sutures serve to hold the omentum in place dorsally while sutures are placed to secure the pyloric antrum to the body wall. The pyloropexy is done with # 1 non-absorbable suture.

The cranial body wall is reflected cranially so that interrupted sutures can be placed near the ventral aspect of the incision approximately 5 cm cranially. The suture is placed from caudal to cranial through the peritoneum, transverse abdominus muscle and part of the internal abdominal oblique muscle. The seromuscular layer of the pyloric antrum can then be "pinched" to separate it from the mucosal layer for placement of the next bite of suture from cranial to caudal into the seromuscular layer. Generally three such sutures are pre-placed before any are tied. These sutures will place the pyloric antrum immediately adjacent to the body wall. The omentum is then included in the closure of the peritoneum and transverse abdominus muscle from dorsal to ventral in a continuous pattern. The inclusion of omentum is discontinued at the level of the pyloropexy sutures. The remainder of the incision is closed in routine fashion. Our experience has found a significant decrease in reoccurrence of abomasal displacement after pyloro-omentopexy when compared to omentopexy. While one should avoid penetration of the lumen with suture, the "pinching" of the seromuscular layer away from the mucosa simplifies proper suture placement.

Cesarean Section

Cesarean section in the cow may be performed with the cow either standing or recumbent. The left and right flank standing approaches have inherent risks, such as rumen prolapse with the left flank approach and small intestine evisceration through the right flank approach. The recumbent approach is preferred in many instances because it allows the uterus to be better exteriorized, is more advantageous for extracting oversized fetuses, and is associated with a lower incidence of abdominal contamination. A left oblique flank approach in the standing cow has been described that may be useful for extracting large calves or for when the uterine contents are contaminated. Following entrance into the peritoneal cavity, the surgeon manipulates a portion of the uterine horn containing the fetus and attempts to exteriorize an area for hysterotomy (exteriorization is often not possible). Often it is helpful to grasp a leg within the uterus and to use it as a handle to lift

the uterus. The uterine incision is usually made over a limb, but in certain malpositions, the area over the head may be incised. The uterus should not be incised over a limb that is in the body of the uterus, but rather, as close to the tip of the horn as possible. This technique allows the uterine horn to be exteriorized for suturing (incisions near the body of the uterus must be sutured within the abdominal cavity). When the uterus is positioned satisfactorily, it is incised. The incision needs to be long enough to allow removal of the fetus without further tearing or extending of the uterine incision. The incision should be made parallel to the long axis of the uterus and on its greater curvature because this area has the fewest large vessels. An attempt should also be made to avoid incising caruncles. As the fetus is removed; the surgeon (or assistant) maintains the uterus outside the incision so the fetal fluids do not fall back into the peritoneal cavity. Chains are commonly attached to the limb(s) of the calf to assist in its delivery from the uterus. These chains should be place around the cannon bone just proximal to the fetlock and a half hitch placed over the pastern to minimize orthopedic trauma to the fetus. The fetal membranes should only be removed if they can be separated from the uterus without undue traction or if they are lying free within the uterus.

The uterus is closed with a continuous inverting pattern (such as the Utrecht) using absorbable suture material. The starting knot is placed using oblique bites to bury the knot within the inverted suture. Similarly, the continuous suture pattern is inserted using oblique bites, so there is minimal exposure of suture material but close apposition of the wound edges. With this technique, it is important that each suture be pulled tightly following its insertion; otherwise, the wound edges may gap, and the contents of the uterus may leak. Regardless of the suture pattern used, the rapidly shrinking uterine wall will leave less tissue in each bite of the suture material and may thereby loosen the suture. The knots are the last portion of the suture line to be absorbed, probably because cellular invasion is more difficult. Therefore, burying the knots at each end of the incision should always be the goal with this suture pattern.

Once the uterus is closed, it is replaced in position and the body wall is closed in routine fashion.

Cosmetic Dehorn

Cosmetic dehorning permits closure of the skin over a normal defect created by the amputation of the horn at its base. Ideally, this results in primary-intention healing, a lower incidence of frontal sinusitis, and less hemorrhage. It is generally reserved for show animals and expensive breeding livestock in which postoperative appearance of the poll is important. The method is best suited for cattle under 1 year of age because there may not be enough skin to close the defect after horn removal in older animals.

The animal is restrained in a squeeze chute with its head secured to one side with a halter. The hair is removed

from the poll, the base of the ears, and the face as far as the eyes; the ears can be wrapped with adhesive tape and secured to the halter to pull them back out of the way. Sedation will decrease stress to the animal. The tail vein is generally the most accessible route of administration and causes the least distress in this instance.

The area is then scrubbed and prepared for local anesthesia. A cornual (zygomaticotemporal) nerve block or local ring block around the horn is performed. When performing the ring block, one should appreciate that the skin on the rostral aspect of the horn is much thicker than that caudal to the horn. Therefore, care should be taken to ensure subcutaneous injection of local anesthetic. Having the needle too shallow will lead to intradermal injection while too deep may be subperiosteal. Either misplacement of the needle will make it difficult to inject anesthetic and may lead to dislodgement of the needle from the syringe. The surgical site is given a final scrub prior to commencing surgery.

An incision is made from the lateral limit of the nuchal eminence (poll) in a lateral direction toward the base of the horn. The incision curves rostroventrad around the base of the horn and along the frontal crest for about 5 to 7 cm. The incision should be no more than 1 cm from the base of the horn. A second incision is begun from a point about 5 to 8 cm from the origin of the first incision, near the nuchal eminence. This incision is continued around the caudal aspect of the horn, about 1 cm from the base, to unite it with the first incision ventrally. The incisions are deepened until bone is encountered, and the edges of the incision are undermined using sharp dissection. The rostral incision must be undermined in an area bounded by the ends of the incision. The caudal incision is undermined just enough to allow placement of the wire saw ventrally and deep to the base of the horn on the frontal crest. Care should be taken when the incisions are deepened not to divide the auricular muscles (located caudally and ventrally). Generally, bleeding is controlled by torsion of the cornual artery located rostroventral to the bony stump. Hematomas may occur if this is not done.

The stump is then removed using either an obstetric wire as a saw, a dehorning saw, or a Barnes dehorner, which is used like a rongeur. Many practitioners use a mallet and chisel to remove small, precise, cuts of bone after the horn is excised to reach the desired shape. The remaining horn is removed in an identical manner. Once the horns and attached skin are removed, the head is repositioned in preparation for the closure of the wound.

The surgical sites are flushed with a suitable physiologic solution, such as Ringer's solution, to rinse out any bone dust. Skin closure is usually performed in one layer using a heavy, nonabsorbable material in a simple continuous or continuous interlocking pattern. If there is still moderate tension on the closure after undermining the skin one may use towel clamps or a near-far-far-near suture to hold the skin edges in apposition for closure with the continuous interlocking suture pattern.

Enucleation

Although the operation is called an enucleation of the eye, it is, for all practical purposes, an extirpation because everything within the orbit is generally removed; there is no demand for cosmetic repair as in other species. Enucleation involves the removal of the globe, leaving adipose tissue and muscles, whereas extirpation involves removal of everything within the orbit: globe, muscles, adipose tissue, and lacrimal gland. Extirpation in cattle is indicated for neoplasia (usually squamous cell carcinoma) of the upper and lower eyelids, third eyelid, and cornea that is too extensive to be removed by other, less radical operations such as lid resections, H-plasties, or superficial keratectomies. Septic panophthalmitis, severe trauma beyond repair, and severe trauma with loss of globe contents are also indications for enucleation.

The animal, which is wearing a halter, should be adequately restrained in a chute and its head secured to one side. Prior to administering the retrobulbar block, the surgeon clips the hair around the animal's eyes, and prepares the surgical site aseptically. Local anesthesia is administered by infiltration of the retrobulbar tissues. The four-point retrobulbar block is performed by injecting through the eyelids, both dorsally and ventrally, and at the medial and lateral canthi. A slightly curved, 8- to 10-cm 18 gauge needle is directed to the apex of the orbit where the nerves emerge from the foramen orbitorotundum. About 40 ml of local anesthetic are injected, divided into 10 ml per site. Exophalmos, corneal anesthesia, and mydriasis indicate a satisfactory retrobulbar block.

Because this particular surgical procedure is performed for large, necrotic, ocular neoplasms or severe trauma, proper aseptic preparation of the surgical site may be impossible. Generally, draping is not performed for this procedure. If there are large amounts of necrotic, neoplastic tissue, then some of it may be trimmed prior to the surgical scrub.

Following surgical preparation, the patient's eyelids are grasped with towel clamps and are closed, to minimize contamination of the surgical field. An alternative is to suture the eyelids together and to leave the suture ends long. Sutures provide a better seal from necrotic debris than towel clamps. Using these methods, the instruments or ends of the sutures can be used to put traction on the eye throughout surgery. A transpalpebral incision is made around the orbit, leaving as much normal tissue as possible. The incision is generally 1 cm from the margin of the eyelid. The ventral incision and subsequent dissection are done first. Sharp or blunt dissection is used for 360º around the orbit continuing down to the caudal aspect of the orbit, but avoiding entrance through the palpebral conjunctiva. All muscles, adipose tissue, the lacrimal gland, and fascia are removed, along with the eyelids and eyeball. If the indication for enucleation is neoplasia, then one must make sure that all neoplastic tissue is removed. If the eye is enucleated for a non-neoplastic condition, such as irreparable trauma, then the practitioner can afford to leave

some of the retrobulbar tissue, to reduce the amount of dead space and intraoperative hemorrhage.

The optic artery may be ligated but most practitioners would consider that unnecessary as hemorrhage is controlled by tight skin closure and subsequent pressure as the orbit fills with blood in the dead space which is impossible to obliterate. The cavity fills with a blood clot that will organize during the healing period and will leave a large depression in the orbit.

Closure consists of a layer of continuous interlocking sutures in the skin using synthetic nonabsorbable suture material. Sutures are removed 2 to 3 weeks postoperatively. The tight seal with a skin suture seems to allow pressure to build up within the orbit and to create hemostasis through a tamponade effect. Some surgeons prefer to use an absorbable suture in the skin, to obviate the need for suture removal; this would be useful on the range, where it may be impractical to round up the animal for suture removal.

Complications of this procedure include extensive hemorrhage from the optic artery, infection, dehiscence, recurrence of disease, and convulsions due to inadvertent injection of lidocaine into the meningeal reflection of the optic nerve while performing the retrobulbar block. Orbital infections following enucleation in a field setting may be common but recurrence of squamous cell carcinoma has not been found to occur frequently. The prognosis for this procedure is generally good but varies with the presenting disease.

Teaser Bull

Several methods of creating heat detector bulls have been described. We will discuss CCP thrombosis which is performed with the bull standing in a chute with the aid of epidural anesthesia. The bull is restrained in a squeeze chute and epidural anesthesia is administered. The hair is clipped over the perineal region from near the anus to the base of the scrotum at least 10 cm wide. The area is prepared for aseptic surgery. A midline incision is made 10 to 15 cm long to approach the sigmoid flexure at approximately the middle third of the prepared region. Sharp dissection of the skin, subcutaneous tissue and thick fascia of the thigh will expose the paired retractor penis muscles and the penis. The connective tissue surrounding the penis is bluntly dissected to allow retraction of the proximal bend of the sigmoid flexure through the skin incision. Identify the urethral groove at or just proximal to the proximal bend of the sigmoid flexure. Place a 14 gauge 1 ½ inch needle through the tunica albugenia from lateral to dorsal into the CCP. Test inject sterile saline into CCP to be sure it flows easily and slight filling of the CCP is detected. This direction of the needle and test injection is to help insure one does not inject the corpus spongiosum penis or urethra with acrylic. Then mix a soft acrylic with minimal exothermic reaction at setting. Inject up to 10 ml of the acrylic into the CCP until filling of the tissue is appreciated. This creates an artificial thrombus within the CCP proximal to the sigmoid flexure which prevents the bull from achieving an erection. The penis will still extend (although not erect) when the bull mounts due to relaxation of the retractor penis muscles. To prevent this extension the distal bend of the sigmoid flexure is secured to the tough fascia of the thigh with # 2 non-absorbable suture by making a bite into the tunica abugenia of the penis on each lateral aspect. Take care to avoid the urethra. Also be sure when tying the suture knots not to retract the penis to the degree that urine flow is impeded. The skin incision is closed in a continuous pattern. An epididymectomy should then be performed to insure the bull is not fertile should the teaser procedure fail to prevent intromission for any reason. Skin sutures may be removed in 14 days.

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