LDA Surgery Tips and Aftercare for Recent Grads

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Abstract

Correction of Left Displaced Abomasum is one of the most common surgical procedures performed by livestock veterinarians. As a recent graduate, you can expect your surgical abilities and outcomes will be scrutinized by your clients. High quality outcomes start with a thorough physical examination, consideration of prognosis and future value to the dairy operation. Good restraint and sedation are paramount to patient and surgeon safety. Careful surgical prep and technique must be married to efficiency to maintain high surgical standards in a compromised environment. Aftercare and record keeping ensure a full recovery and followup communication with clients will verify outcomes and build your credibility.

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Diagnosis and Restraint

Successful left displaced abomasum (LDA) surgery outcomes depend on the a thorough and accurate initial physical exam. Be systematic in your approach, be comprehensive and record your findings.

Cows should be well restrained for a physical exam and certainly so for surgery. If you need to catch an unwilling cow, one trick I have found most helpful is to toss a few handfuls of dry hay in the feed bunk. If not dry hay is available, a piece of paper towel is equally enticing to a curious cow. Either way, place it far enough ahead that she'll have to reach for it and thereby lock herself in the headlocks.

Whenever I examine fresh cows, whether an individual animal or a pen of 250 head, I palpate along the left paralumbar fossa and press in behind the last rib. Cows that are eating well should have filled their abdomen within a few days of calving. A firm left flank (rumen pressed tight against the body wall) gives a quick summary of how the cow has been eating for the past few days. It is easy to detect an LDA with this quick flank palpation as well. An LDA will often feel like a balloon squished between the rumen and the last rib. This is a 5-10 second exam along with observing udder fill, manure, and vaginal discharge behind the cow. I also try to observe the cow's eyes as there is a subtle change in many cows with toxic or metabolic challenges, in addition to the obvious changes in dehydrated animals. For any cow that does not feel full or fails on another of my quick observations, I will use my stethoscope to listen for the strength and frequency of rumen contractions +/- rectal exam to check for the presence and consistency of manure and for rumen fill. Variable tone pings vs monotonous pings. Not all left side pings are LDAs. And not all LDAs will ping. It's important to differentiate between rumen pings, empty abdomen pings, and LDAs. To my ear, LDA pings are variable in tone as you flick different spots across the musical area. Rumen and abdomen pings, in contrast, will often be monotonous across the entire flank and paralumbar fossa. If she pings way up near the transverse processes of the lumbar vertebrae, it's unlikely that is caused by an LDA.

Another useful diagnostic technique is ballottement of the left flank. While holding your stethoscope against the flank in the area of the suspected LDA, use your fist to push assertively in and out on the lower flank of the cow just cranial to the stifle. Metallic tinkling or sloshing sounds are consistent with an LDA.

The Liptak Test can be performed to differentiate an LDA from rumen gas as well. Fluid is aspirated from just below the tympanic area and checked using a pH strip or meter. Rumen

fluid has a pH of 5.5-7 whereas abomasal fluid will be <4. The practical limitations of this test are the requirement for a long (3-4") needle and indication for a sterile prep prior to abdominocentesis.

In many cases if I am suspicious of an LDA but cannot confirm it with my physical exam I will increase abdominal fill and pressure by pumping alfalfa meal drench and water into the rumen. A few gallons is usually sufficient to elucidate a recalcitrant ping. More than that will make your potential surgery more difficult.

If you are proceeding to surgery a second form of physical restraint is advisable. A halter, even if tied loosely will keep a cow close should the headlock or stanchion become open. If you do tie a cow's head during surgery I recommend turning her head to the same side you will be operating on. That way if she happens to lie down during surgery her incision should be on the up side.

Establishing Prognosis

Duration off feed or down on production provides an estimate of how long an LDA may have been present. Cows that have been struggling for a longer period of time should be scrutinized for potential complications that may impact your ability to correct an LDA or the cow's ability to thrive post-surgery. These include abomasal ulcers, adhesions, vagal indigestion, and chronic ketosis.

Be sure to consider potential concurrent conditions including RP, metritis, uterine tears, peritonitis, lameness or mastitis. Be sure you don't advise surgery on a cow with significant concurrent disease that carries a poor prognosis. A cow's ability to recover her lactation curve is also somewhat dependent on stage of lactation. It is also easier for a late lactation cow to fly under the radar prior to detection, potentially increasing your risk of complications. Be sure to

consider and note significant defects especially those that involve the udder, feet and legs. These factors have the potential to hamstring an otherwise perfect LDA repair.

Records Review

Your assessment of a surgical candidate should include consideration of her future economic value to the farm. While her past production does not guarantee her future performance it is a good metric of what her potential future lactations may yield. Think about components in addition to raw pounds of milk, since energy corrected milk is a closer approximation of economic value to the farm. Relative Value in Dairycomp is another metric to consider but it has its limitations. In addition to future milk yield, potential future daughters may factor into a farm's perception of cow value.

I'd recommend against surgical correction on cows with chronic cell count issues or chronic mastitis, especially if a contagious pathogen is implicated. Many farms now have their records in the cloud so you can check dairycomp or DHI events or metrics from your phone.

I try to keep track of herd stocking density, heifer inventory flow, and cull cow prices to help inform my recommendations. A herd that is struggling to keep the barn full will likely want a DA done on a less ideal cow compared with a herd that has ample replacements especially if cull price is high. In rough terms replacements cost $1800-1900 to raise and cull cows are bringing around $700 at present. In a herd inventory that is well balanced there is plenty of room for surgery and treatment costs to keep a good cow in the herd.

Surgical Prep

I favor the "Ket Stun" sedative cocktail for my standing surgeries. 40mg Ketamine, 4mg Butorphanol and 20mg Xylazine given IV. I use this with great results on Holstein cows and heifers. For Jerseys I will reduce the xylazine dose according to size. While I don't have

scientific proof, anecdotally I would say a cow is more likely to stay on her feet with this cocktail vs 20mg of xylazine alone. It seems to keep their feet planted and I rarely have had a cow lie down. I frequently give this IV via the coccygeal vein but I always pull back several times as I inject to see a flash and ensure proper placement. Perivascular administration won't help you much. If the cow is haltered I'll use the jugular vein.

I clip the right flank with a 40 blade. It's a little bit slow but with a few tricks it works well and you get a much tighter clip than other blades. One pet peeve - keep your sterile bucket away from the cow while you clip. It's better if you don't have a pound of hair floating in it later. I find it helps to grab a handful of hide below where you're clipping and pull some tension across your field. I hold the clippers so that the heel of the blade is about 30 degrees off the skin. Keep some clipper lube close, especially in sand bedded barns. I am very particular about clipping 100% of the hair in my field and I like nice straight edges to the clip job. If your work looks professional you are more likely to be valued as a professional. While straight clipper margins don't improve outcomes, they can impact client perceptions about the quality of your work.

Scrub with chlorhexidine scrub. Typically three times prior to blocking and three times after blocking. I rinse with warm soapy water (chlorhex solution) between scrubs and rinse the last scrub off with alcohol. The alcohol should run clear and a sterile 4x4 should wipe no perceptible debris or color off the cow should you test it. There is no such thing as "more sterile" or "less sterile". Sterility is binary. It is or it isn't. Surgeries should be.

I use a distal paravertebral block. I find it to be fast, effective and safe to perform. I like the regional block because I don't have lidocaine distorting the tissue around my incision. I prefer the distal over proximal paravertebral block because I can stand a safe distance from the

cow while performing it. I use a syringe gun with a bottle of 2% Lidocaine attached and fan out 3-4 injections of 4cc each at the 6 landmarks for this block. My left hand is typically on the cow's right hook with my arm fully extended so that if the cow takes a swing at me I move away from her as she comes towards me. The only occasion where I do a line block is in obese cows where the landmarks are too blurry to trust. Then I'll do a line block with a 18x1.5" needle.

Scrub up hands and arms and glove up. I use a sterile palp sleeve on my left arm and sterile gloves. I've never needed to be in more than hand deep with my right hand on a DA. (By contrast, I do sleeve both arms for C-Sections.)

I use a disposable paper drape approximately 3'x4'. I recommend placing 4 blebs of lidocaine where you plan to place your towel clamps when you do your block. When you hold the drape up you'll see a spot of blood soak through where you blocked - clamp your edna towel clamps on in those spots. This is a great time to get kicked if you don't block for your clamps. During surgery I like to hang my needle drivers and C curve needle on the upper right towel clamp, so I place it six inches or so in from the edge of the drape.

Surgical Details

I make my incision vertically 3-4 inches caudal from the last rib down at the bottom of the paralumbar fossa. My incision is much shorter on a small skinny cow than a large fat one. Just depends how thick I expect the omentum to be. If I need to extend later I can but incisions usually look best if they're done full length in one pass.

I incise the external abdominal oblique (EAO) to match my skin incision. Once I'm through the EAO I can see the change in the muscle fiber direction (EAO runs caudoventral like your fingers when you put your hands in your jacket pockets. IAO runs cranioventral). I pop my thumb through the IAO midway down my incision and spread my thumb and middle finger to

separate a gap in the fibers without cutting them. On all but the fattest of cows this will give you plenty of space to work and it is far less trauma for the cow to heal. I do the same thing with the transversus abdominus, splitting dorsal to ventral. If a cow is obese you likely will need to incise all three layers dorsal to ventral. But when possible I prefer the grid technique.

On most surgeries I simply rupture through the peritoneum with my thumb. If it doesn't give with moderate pressure pick up a tent with rat tooth forceps and incise. Use extreme caution here as it's easy to nick the duodenum during a careless entry. You'll never cut the duodenum with your thumb.

Check the margins of the liver. If markedly rounded, consider fatty liver / chronic metabolic issues. Don't specifically palpate the uterus but gently assess its size. Note any free fluid or fibrin present in the abdomen. Reach into the dorsal abdomen. The right kidney should be obvious directly medial from your incision. Pass your left hand caudal to the kidney and past the dorsal attachment of the omental sling. Continue along they caudodorsal aspect of the rumen until you reach the left body wall, then proceed cranioventral to the displaced abomasum. Assess the size of the DA.

Some DAs can be easily swept under the rumen without deflation. If sweeping under I reach around the caudal aspect of the rumen, place an open palm on top of the DA and push it down and under until it slides up on the right side. The pylorus will frequently float up and appear at the incision on its own. If great force is required you should deflate the abomasum first. It isn't worth traumatizing the viscera to save 2 minutes.

With a larger cow, shorter arms, or a very large DA it is important to deflate before correcting the DA. I use a large bore needle made for Encore implants which I have pressed into a length of plastic tubing. If there's a second person around you can use a vacuum to deflate

faster. If you use a deflation hose kink it off before removing so any fluid in the hose doesn't drain back into the abdomen.

Before I reach under to sweep a deflated abomasum up to the right, I place a bite of suture bottom right of my incision through the IAO, TA and peritoneum. I put my needle drivers and the C curve needle attached to that first bite in the upper right towel clamp so it's easy to reach one handed once I have my pylorus up.

The pylorus is a brighter white color than the intestines, firm, and is a bit more three dimensional. You should palpate the pyloric sphincter to confirm you're in the right place. Do not mistake the duodenum for the pylorus. The duodenum is far more vascular, less raised from the omental surface and does not have a palpable sphincter.

I use No 3 catgut suture for my pexy and body wall closure. Some advocate the use of non-absorbable suture such as supramid for the pexy. This is typically fine but be aware that is provides a potential for fistulation should an infection arise in your incision, especially if you mistakenly take a full thickness bite in the wall of the abomasum. Since I have my first bite of suture in place before I retrieve the pylorus it is easy to tack once i have it up in my incision. I place three bites partial thickness in the wall of the abomasum 1-3" proximal to the pyloric sphincter, right to left, left to right right to left. Then I take an inside to outside bite in the body wall same layers as the first bite and tie that off. Tie your first square knot and then check that the pylorus is well apposed to the body wall. If not, you can pull on one tail of your knot to convert the square knot over to two half hitches. Slide the knot to tighten that throw and then pull on both tails to convert back to square knot. A few more squares and you're set. So you've got the pylorus tacked in your first throw. I use this to anchor a continuous suture line up the IAO, TA and pylorus, including omentum with each successive throw (3-4 bites of omentopexy).

I like to close the internal layers bottom to top because the last bite or two are typically blind. Less likely you'll pick up a viscera near the top vs the bottom. It's important to remember that you are suturing living tissue. Don't strangulate it. You are just looking for good apposition. The wound healing process will do the rest.

When I suture the EAO I like to take deep bites periodically in the center to kill dead space between the EAO and IAO. Without this you invite a seroma to form.

I use No 3 supramid suture for skin. I want my skin sutures as tidy and regular as possible. This, along with your clip job, are all that the client will see of your work. You could be absolutely meticulous inside where it matters but if your sutures look like they were done by a three year old that's how the client will assume all your work is done. Make sure to use sharp S curve needles. They're not expensive. If you direct the needle perpendicular to the hide rather than obliquely through it, you'll have a much better time of it. On the left side of my incision I use my left thumb and index finger to brace the skin adjacent to where my needle will pass through and pop it through with a flick of the right wrist. I see many fourth year students struggle to suture bovine skin. It's a technique issue, not a strength issue.

Aftercare and Record Keeping

I treat most of my DAs with 3-5 days of Ampicillin, 25-30cc IM once daily. Some get ceftiofur or no antibiotic. Most cows with a DA have a concurrent metritis so they're often on antibiotics anyways. Don't give the antibiotics until after you've brought the DA over. If you get one that has adhesions you'll regret having just slapped a meat withhold on her.

Pump with an alfalfa meal/electrolyte/probiotic/proprionate drench. I typically use 5 gallons unless for a very large, very empty or severely dehydrated cow, then 10 gallons. Oral fluid therapy should be continued daily if cow is not back on feed and water the next day.

If the cow presents as ketotic I recommend 3 days of propylene glycol after my initial pump, with the option to omit if the farm can recheck her BHBA and confirm resolution.

Banamine is a reasonable option for post surgical pain & inflammation. Remember it is contraindicated if you suspect abomasal ulceration.

Client Feedback

I recommend you follow up with your clients on surgical cases, especially early in your career. Here is a list of follow up questions I would encourage:

1. Appetite - The cow should be back to eating once her sedation wears off. Some will go to the bunk as soon as they are released. Ask your client about her appetite and fill in the days after surgery.
2. Temp - checking temp in the days after surgery is recommended, especially if there is incisional swelling or the cow is not eating well
3. Milk trend - anecdotally or via parlor weights - is daily milk production increasing? This is a very sensitive monitor of cow wellbeing.
4. Condition of incision - there should not be any swelling or pus on the majority of your incisions. If you have ugly incisions, consider whether you are breaking sterility during your surgery. Most commonly I see sterility breaks when the surgeon reaches deep into the abdomen and touches the field with their shoulder above the sterile sleeve. This is especially problematic if you preg checked earlier in the day and have manure stains on your shoulder. Shorter practitioners may want to wear a sterile shoulder shroud or gown to prevent contamination.

Retrospective Analysis

You may find it beneficial to review your outcomes and benchmark with your peers. Don't hold cows with known complications against your surgical record, but if you missed a complication on PE you should look for ways to prevent that in the future.

My practice has a policy of providing a gratis post-mortem exam for any animal that unexpectedly dies after a routine surgical procedure. This demonstrates integrity to your clients, allows you to learn from any potential mistakes, and observe the condition of your surgeries after the healing process has begun. I like to have the client present and show them complications like stomach ulcers, uterine tears or peritonitis so they better understand the significance of these diagnoses when we make them in the future.