

History of The Grymer / Sterner Toggles Suture

The Grymer/Sterner toggle suture LDA repair method was introduced in 1982 to bridge the gap between the blind stitch method (early '70's) and the full laparotomy abomasopexy method ('50's). The main advantage of the Grymer/Sterner method over the blind stitch method is that it allows the surgeon to accurately identify that the abomasum has been correctly stabilized. It employs the speed and minimal invasiveness of the blind stitch method, coupled with the accuracy and effectiveness of the full laparotomy. The Grymer/Sterner toggle suture method has been performed successfully on hundreds of thousands of cows diagnosed with LDA's since its inception, with comparable success rates achieved by the full laparotomy.

Meet the Doctors - co-inventors of the Grymer / Sterner Toggles Suture Method of LDA Repair

Jorgen Grymer, DVM,PhD Galten, Denmark

Dr. Jorgen Grymer, a third generation veterinarian, is a graduate of the Royal Veterinary and Agricultural University in Copenhagen, Denmark. He completed his D.V.M. degree in 1977 and his P.h.D. in 1979. From 1980-1983, Dr. Grymer served as an assistant professor in Food Animal Surgery and Medicine at Michigan State University. While working at MSU, Dr. Grymer and Dr. Sterner designed the original Grymer/Sterner toggle suture for use in LDA repair.

After leaving Michigan State University, Dr. Grymer worked on large Dairy Units in Saudi Arabia and Libya (1984-1987) before returning to Denmark. He entered private practice in Galten, Denmark, and currently works in a mixed practice employing 4 veterinarians and 4 veterinary nurses.

Keith E. Sterner, DVM Ionia, Michigan

Dr. Keith E. Sterner is a graduate of Michigan State University in East Lansing, Michigan. He completed his D.V.M. degree in 1969. Dr. Sterner served in the U.S. Army Veterinary Corps from 1970-1972, then entered private practice in Ionia, Michigan with his father, the late Dr. Edward F. Sterner. In 1982, Dr. Sterner collaborated with Dr. Grymer in developing the Grymer/Sterner toggle suture method of LDA repair. Currently, Sterner Veterinary Clinic, P.C. is a mixed practice and employs 11 full time veterinarians.

Dr. Sterner has been active in organized veterinary medicine, serving as both officer and committee member in the AABP, NMC, and AVMA, and FDA. Dr. Sterner continues to actively practice dairy and production medicine, and is committed to strengthening organized medicine through his involvement in professional organizations.

Diagnosis of Left Displaced Abomasum (LDA)

Diagnosis of left displaced abomasum (LDA) is well described in veterinary literature. The diagnosis is often based on the following criteria:

- Symptoms

Off feed or off milk production

- History

Recent history of calving, but may also occur at any time, particularly with any circumstance that puts the cow off feed.

- Concurrent Problems

Ketosis, diarrhea, calving complication, or retained placenta

The presence of an LDA is characterized by a distinct 'pinging' sound, or resonance, on striking the abdominal wall along and on either side of an imaginary line drawn from the wing of the ilium (hipbone), to the caudal end of the xiphoid (breastbone). For an excellent animated depiction of the LDA occurrence, visit Dr. Wolfgang Klee's site at the University of Munich. [*Note: The text of this article is in German. Scroll down to the animated drawing on the first page of the article.

<http://www.vetmed.uni-muenchen.de/med2/skripten/b5-15.html>

After diagnosis is made of LDA in the bovine, it may be a candidate for repair using the Grymer/Sterner Toggle Suture method, as described in JAVMA - September 1982. The decision to employ this method of repair should be based upon the facilities and help available, and a careful evaluation of the concurrent medical conditions of the cow. It is advised that the owner/herdperson be consulted as to their assessment of the animal's condition, and as to their preferred method of repair. It is better to fully understand the concerns from both the management and the surgeon's perspective BEFORE an LDA repair is started, rather than to proceed under a wrong assumption.

Materials Needed to Repair a LDA Using the Grymer / Sterner Toggle Suture Method

- Restraint and Casting Ropes
- Tranquilizer/Sedation (xylazine/Rompun, BAYER) (xylazine/AnaSed, Lloyd Laboratories)
- Surgical Site Preparation (Scrub and Disinfectant)
- Trocar, Cannula, and Push rod (Jorgensen Laboratories, Inc.) <http://www.jorvet.com>
- 1 pair (2) Toggle Sutures (Jorgensen Laboratories, Inc.) <http://www.jorvet.com>
- 2 needle holders
- Stethoscope

* In the United States, the use of xylazine constitutes extra-label usage, and as such, must be used within the context of a valid Veterinarian Client-Patient Relationship (VCPR) in order to comply with the provisions of the Animal Medicinal Drug Use Clarification Act (AMDUCA).

Helpful Tips for Successful LDA Repair

Do's

- Do have all cows vaccinated well ahead of the LDA repair for clostridial diseases.
- Do give beta-lactam antibiotics 1-2 hours before anticipated surgery.
- Do always have adequate assistance.
- Do perform the LDA procedure on a deeply bedded surface or on a soft earth surface.
- Do place weight on the abdominal wall BEFORE forcing the trocar/cannula through the abdomen. This will help to ensure that the abomasum is in its proper anatomical location and tight against the abdominal wall.

Don'ts

- Don't perform this procedure where there is a likelihood of adhesions or preexisting peritonitis.
- Don't perform this repair method on animals with compromised respiratory capacity.
- Don't perform this repair method without adequate assistance...the safety of the practitioner and the cow is paramount.
- Don't tranquilize when it is not essential for the safety of the cow or the practitioner. Best results occur when the cow stands following repair and is ready to resume normal feeding.
- Don't pull too hard on the toggle string after it has turned perpendicular to the cannula. The edges of the needle are very sharp and could sever the toggle string.

How to Order Materials for LDA Repair

Restraint and Casting Ropes - Order Item: C03234 (Lariat)

NASCO
901 Janesville Avenue
Fort Atkinson, WI 53538-0901

Phone: 920-563-2446
Phone: 800-558-9595
Fax: 920-563-8296
www.eNASCO.com

Trocar, Cannula, and Push rod - Order Item: J-191 TM

Jorgensen Laboratories, Inc. (JorVet)
Loveland, Colorado

Phone: 800-525-5614
www.jorvet.com

I pair (2) Toggle Sutures - Order Items: J-191 Grymer/Sterner DA Toggle Suture

Jorgensen Laboratories, Inc. (JorVet)
Loveland, Colorado

Phone: 800-525-5614
www.jorvet.com

Tranquilizer/Sedation (xylazine/Rompun, BAYER) (xylazine/AnaSed, Lloyd Laboratories)*

Bayer Animal Health
P.O. Box 390
Shawnee Mission, KS 66201
Phone: 800-633-3796
Order Item: Rompun (xylazine)

PVP Ltd.
10077 South 134th St.
Omaha, NB 68138
Phone: 800-228-0077
Phone: 420-331-4440
Fax: 402-331-8655
Order Item: VMAS100 AnaSed (xylazine)

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The F.A.Q. page has been divided into 3 general categories, which address the following topics: (1) Pre-Toggle Considerations/Observations, (2) Suggestions for Improved Technique and Results, and (3) Post-Toggle Concerns/Observations.

Pre-Toggle Considerations/Observations

1. Q: What do I do if I have the cow in dorsal recumbency and I cannot hear a 'ping' with my stethoscope?

A: Apply pressure in front of the cow's udder. You might even let a person stand on the cow's belly. If you have a gas filled abomasum, it will move cranial and you should be able to hear the abomasal 'ping'. Based on our experience, we often trocarize a cow without checking for a 'ping'. In cases with little detectible gas in the abomasum, and concurrent poor rumen fill due to an off feed diagnosis, the percussion/auscultation of the abdominal wall does not produce much 'ping' or resonance. We recommend that you trocarize the cow anyway, but only insert the toggle if gas is then detected.

2. Q: I have a 6 month pregnant cow with an LDA. Can I do the toggle suture procedure on her?

A: It is best not use this technique on mid to late state pregnant cows. We rarely perform the toggle repair after the 5th month of pregnancy.

3. Q: One of my colleagues and I have discussed the toggle suture procedure and he proposed that the technique could also be used for RDA cows. Do you have any experience with this idea?

A: We do not recommend the toggle suture repair for RDA cows because many cases involve a torsion of the abomasum. We have heard of cases of RDA dilatation treated with the toggle, but no systematic evaluation of the results exists.

4. Q: What is the most common reason for a failure when performing an LDA toggle suture repair?

A: For us, the most common failure is lack of gas in the abomasum, which makes penetration of the abomasum impossible when the cow is in dorsal recumbency.

5. Q: In your opinion, which cow would be the prime candidate for an LDA toggle suture repair?

A: In our practice, we consider any cow in the herd a potential candidate for LDA toggle suture repair. However, cows with suspected peritonitis, hardware disease, fatty liver, or pregnancy beyond 5 months gestations are not generally recommended for the procedure.

6. Q: Could you describe the characteristics of some LDA cows that you would not recommend for a toggle suture repair?

A: Long term pregnant cows, cows with severe ventral edema, cows with fatty liver, cows with severe respiratory problems, and cows with extremely poor body conditioning with several concurrent diseases, do not make ideal candidates for the toggle repair.

7. Q: When reading the instructions for performing the LDA toggle suture repair, it suggests that the surgical area be clipped and scrubbed, and also a local anesthesia be administered. I have done that in the past, but by the time I am ready to do the toggle, I can no longer hear the 'ping' and find the abomasum. Is it really necessary to do all of the presurgical preparations?

A: It is left to the discretion of the surgeon as to how much presurgical preparation is done. Many surgeons just make sure that the incision site is clean and disinfected. We do not really feel that the abomasal gas escapes after 4-5 minutes with the cow in dorsal recumbency. Remember that prolonged time in dorsal recumbency may increase the chance of regurgitation and respiratory compromise.

Suggestions for Improved Technique and Results

1. Q: Over the past 3-4 years I have done about 10-15 toggle suture LDA repairs, but I am not really satisfied with the results? What can I do to become more successful?

A: Two factors might explain your situation. You might be placing the suture in too far caudal or you might also be pulling the sutures too tightly. Both factors can greatly influence the outcome. It is also important to select your toggle candidates well. Best results occur when the LDA is detected and corrected early, as soon as she goes off feed.

2. Q: Over the years I have tied many toggle sutures really tight, but a colleague told me that if I leave a few fingers of space between the cow and the knots that the cow will do much better. Is there any explanation for this?

A: Your colleague is right. Cows do better if the sutures are pulled lightly, and adequate space is left between the knots and the cow. The explanation is that the abomasum "floats" easier to its normal anatomical position in the abdominal cavity. Fibrous adhesions are formed around the sutures, holding the abomasum in place.

3. Q: Sometime when I perform the toggle suture repair I am confused because I can hear the abomasal 'ping' over a large area when I have the cow in dorsal recumbency. Where would you recommend that I place the toggle suture under these conditions?

A: I insert the toggles in the cranial portion of the 'ping' or at the recommended site for trocarization as described in the Step-By-Step LDA Repair. The toggles will then be placed in the greater curvature of the abomasum, which is the correct anatomical position, and not too close to the pyloric area.

4. Q: I had a real problem today while attempting a toggle suture repair. The first toggle went in very well, but I just couldn't get the second toggle in and I couldn't detect any abomasal gas. What should I do in this situation?

A: This is a difficult situation. It has also happened to us over the years. If you can not get the second suture in place, one option is to leave it in the abdominal cavity as if it were tied in. Tie the two suture strings together and you will still have the abomasum in place as a result of the first suture. If you are uncomfortable with this situation, then you have to cut the first suture, return the cow to standing position, and then proceed with a flank laparotomy.

5. Q: Personally, I have great success with the toggle suture method of LDA repair, and I don't treat my cows post surgically with antibiotics? Do you think this is alright?

A: We always recommend postsurgical antibiotics, but we are also aware that some practitioners do not follow these guidelines, because they consider the procedure 'non-invasive'. We strongly recommend postsurgical antibiotic treatment, however, it really depends on the comfort level of the attending surgeon.

6. Q: Sometime when I do toggle suture repairs I have a hard time getting the air flow out of the abomasum. Could you please provide me with some explanation for this?

A: Some cows have very little gas in the abomasum, and even when you apply pressure on the abdominal wall, the area for trocarization is rather small. In these cows, only a little gas will escape through the cannula. Another explanation for no air flow is the skin plug which could block the cannula. Occasionally, ingesta can block the cannula. Always keep the push rod in the cannula when you penetrate the abdominal wall.

7. Q: You might find this a silly question, but does it matter which toggle suture you put in first, the anterior or the posterior?

A: The first toggle suture should be the most posterior. When the first suture is in place, it is easier to move forward with the second suture because the trapped gas in the abomasum 'floats' upward and forward. Remember to apply pressure in front of the udder to ensure the gas filled abomasum moves forward.

8. Q: Sometime when I am doing the toggle procedure the abomasal 'ping' will not move to the right position...right side and anterior. Would you recommend that I do the toggle suture procedure anyway if the 'ping' is to the left of the midline, or very much posterior and on the right side?

A: In most cases you can move the cow from side to side and get the 'ping' to be to the right of the midline. Try to put a lot of pressure in front of the udder. You might even let a person stand on the cow's belly to push the abomasum forward. We have had cases where we have trocarized the abomasum very caudal, and the cows have recovered satisfactorily. However, it is better to place the first trocar perforation in the correct anatomical location, 10-15 cm caudal and 4-6 cm to the right of the midline.

9. Q: What is the significance of letting the gas off from the abomasum when you do the toggle repair?

A: Let the gas off after the second toggle suture is in place. The significance is to try to minimize or to avoid the sutures pulling on the abdominal, as well as the abomasal wall, when the cow is allowed to stand. With a lot of gas accumulated in the abomasum, the organ will float up higher and the sutures will put pressure on the abomasal mucosa.

10. Q: I am a little reluctant to do a toggle suture repair because I feel it takes too much help to get the cow into dorsal recumbency. How many assistants are necessary to safely perform this procedure...1 or 2 helpers, and do you tranquilize the cow prior to treatment?

A: It is easier to perform this procedure if 2 persons are helping, but for many practitioners, only one assistant is necessary. If the cow is depressed, we never use a tranquilizer. When tranquilization is given, we prefer to use 20-50 mg of xylazine to sedate the cow. The decision to tranquilize is often based on the disposition of the cow. The more fractious she is, the more likely she is going to be a candidate for tranquilization.

11. Q: Why do toggle sutures work so well? Is it the holding power of the sutures, or is it a result of local peritonitis with adhesions holding the abomasum in place?

A: The sutures create small adhesions or ligaments between the abomasum and the ventral abdominal wall, holding the abomasum in its normal anatomical position.

12. Q: My problem on the farm is getting help when we pull the cow down to perform the toggle suture repair. 50% of the cows lie down on the right side and 50% lie down on their left side. Can I just roll the cow into dorsal recumbency from either side, or is it a must that the cow should be on her right side and then rolled in a clockwise manner to dorsal recumbency?

A: It is absolutely essential that you cast the cow on her right side and then roll her to dorsal recumbency in a clockwise manner. Otherwise the abomasum will not float to its normal anatomical position and you will not be able to toggle the abomasum.

13. Q: How sure can you be that you hit the abomasum when toggling a cow? Could the air coming from the cannula not be rumen or intestinal gas?

A: After performing very few abomasal surgeries you will know the distinct smell of abomasal gas. If you are uncertain, you can check the pH of the abomasal fluid by aspirating some of the fluid with a catheter.

Post-Toggle Concerns/Observations

1. Q: I did a toggle on a cow two days ago, and today the cow is doing poorly? What could the problem be?

A: The cow could be sick due to concurrent diseases such as ketosis or metritis. If the cow has been off feed for an extended period, decreased rumen function could be the problem. The toggle pins could also be the explanation. The cow could have a local peritonitis. The pin could be in too close to the pyloric area, giving ingesta flow problems. If no diagnosis can be established, we recommend that you remove the sutures and perform a flank laparotomy on the cow to establish a precise diagnosis and/or correction if possible.

2. Q: Do you have to remove the toggles (cut the knot off) 2-3 weeks post surgically like you would remove sutures from other surgical sites?

A: Personally, we do not remove the sutures. When we leave them in they might cause some tissue reaction, but it is usually normal. Practitioners who cut the sutures after 2-4 weeks have reported an occasional redisplacement of the abomasum. We recommend that the sutures should not be removed, unless they are causing an obvious problem.

3. Q: The other day I visited a farm and saw a toggle hanging under the belly of a cow that I treated for LDA 3 months ago. Is this something to be concerned about?

A: Now and then, the sutures come out after the abomasum has adhered to the abdominal wall. When it happens, we usually cut or pull softly on the suture to remove it. If it is left in place, dirt or manure could adhere around the toggle, although this is generally not a major concern.

4. Q: Occasionally I have a nasty swelling around the trocarization site on my toggled cows. What is the significance of this swelling, and should I be concerned?

A: Some swelling is acceptable and a normal consequence of the surgery. You could have a local cellulitis or an abscess could appear at the penetration site. It is also possible that a large vein was damaged, causing a hematoma or phlebitis. We recommend local and/or systemic antibiotic treatment.

5. Q: Last week I performed a toggle suture repair and the cow died 7 hours after the procedure. Did I fail to toggle the abomasum, or did I penetrate another structure such as the liver, an artery, or the intestine?

A: No, you did not do anything wrong. It is our guess that the cow died from a peracute clostridial intoxication. Over the years, we have experienced the same situation a few times. The cow might have diarrhea prior to surgery, or not be vaccinated against clostridia. We have never seen such cases in Europe; only farms in the USA have reported this complication. While not 'common' in the USA, it is not a 'rare' occurrence either. Clients should be warned ahead of surgery of this possible complication, even if the cow has a current clostridial vaccination.

6. Q: Is it possible to do a toggle repair and still have the abomasum displaced when the cow is standing?

A: Dr. Grymer has had one case where the abomasum was redisplaced the following day. A right flank laparotomy revealed the abomasum was sutured properly, but part of the fundic part of the abomasum was still able to dislocate due to severe atony of the abomasum. A right flank omentopexy was performed. Dr. Sterner has seen the same thing happen in a limited number (5 or 6) of cases.

7. Q: How soon after surgery would you expect to see the cow standing? Does it mean anything?

A: Cows that are pulled down by a rope will usually stand right after surgery. Cows that are given a tranquilizer will generally get up within an hour after surgery. We feel it is a good thing that cows get up slowly. While lying in sternal recumbency, gas in the abomasum will escape and there will be little or no pulling on the abomasum when the cow does get up. Similarly, the gas will escape within a few minutes if the preoperative tranquilizer was xylazine, and it was reversed post-operatively with tolazoline.

8. Q: How soon after doing a toggle suture repair can you slaughter the cow, if necessary?

A: We never recommend the slaughter of the cow sooner than 30 days after surgery. There will always be some tissue reaction around the sutures, creating adhesions, and that process is rarely finished in less than 30 days post surgically. This will also depend on the meat withdrawal times posted for the pharmaceuticals used to treat the cow in the first place for concurrent diseases.

9. Q: Would you recommend a toggled cow be bred back again, or should she be salvaged at the end of her lactation?

A: Studies have shown that toggle treated LDA cows breed back as well as 'controlled' cows. One study demonstrated that 50% of the LDA toggled cows calved again, and that results were equivalent to controls within the herd. Many farmers like to breed back their LDA cows because they tend to be good milkers.

Step By Step LDA Repair Using the Grymer / Sterner Toggle Suture Method

Step By Step Repair of LDA

Toggle repair of the LDA can be accomplished with or without tranquilization/sedation, depending on the disposition and size of the cow. Other considerations include the amount of help available and the type of facilities.

A minimum of 2 persons is recommended (veterinarian and assistant), however, 3 persons greatly facilitates the ease with which this procedure can be performed, particularly if the cow is large. It is best to perform this procedure in a pen of adequate size that allows for easy casting and complete roll-over of the cow.

1. The cow is cast on her right side (as viewed from the rear), and placed on her back. It is very helpful to do this on a deeply bedded surface or on a soft earth surface, since it is much more difficult to keep her in this position on a hard surface.
2. Depending on the comfort level of the surgeon and the amount of help available, the front and rear legs may be tied to an immovable object.
3. The operational site is identified about 4-7 inches (10-15cm) behind the end of the xiphoid (breastbone) and prepared according to the preference of the surgeon. (Cleaned, clipped, scrubbed, sanitized, etc.) At the surgeon's discretion, the abomasum may be auscultated in this area with a stethoscope. When auscultating, the cow should be positioned with the loudest 'ping' in the center of the operational site previously described.
It should be remembered that the abomasum will assume its normal anatomical position under most circumstances, except when concurrent adhesions or peritonitis might prevent normal movement to its correct anatomical location. Such cases are few, but occasionally cause failure to toggle the abomasum. This condition might merit a laparotomy for further evaluation.
4. Have an assistant place the pressure of a knee, hand, or foot, on the lower left abdominal quadrant ahead of the udder, or in lieu of an assistant, the surgeon may elect to place a knee or foot on the abdomen from the cow's right side. This will help to ensure that the abomasum is in proper position and as close to the ventral abdominal wall possible.
5. The trocar-cannula, with the push rod inside, is placed 4-7 inches (10-15cm) behind the end of the xiphoid (breastbone), and 2-3 inches (5-7cm) to the right of the midline.

Perforate the abdominal wall and the abomasum with a swift downward push of the trocar. **BE CAREFUL TO AVOID THE LARGE SUBCUTANEOUS ABDOMINAL VEINS IN THIS AREA!**

Pre-marking with a colored marking stick helps to locate the veins. However, should a vein be accidentally perforated, a simple interrupted suture can be placed at the site to minimize any bleeding.) The handle is removed from the cannula, and the push rod is run through the center of it to remove any skin plug, which often is present.

6. The distinct odor of abomasal gas may be identified at this time, and if desired, a small amount of fluid can be extracted via small diameter plastic tubing and checked for low pH (2-4).

7. After removing the plastic handle and push rod from the trocar needle, place the first toggle suture into the open lumen of the needle.

Use the push rod to move the toggle COMPLETELY through the length of the needle so that it will turn perpendicular to the long axis of the needle once in the abomasal lumen.

Tug lightly on the suture to ensure the toggle is clear of the trocar/cannula needle.

Remove the cannula and pull snugly on the suture, so that it lies firmly against the abdominal wall. Clamp the suture with the needle holder.

8. Place the second toggle 2-3 inches (4-7cm) anterior to the first toggle suture, forward toward the xiphoid (breastbone), in exactly the same manner described for the first suture. (Step 5, 6, and 7)

9. Before removing the trocar needle from the second suture site, place pressure on the external abdominal wall to force as much free gas from the abomasum as possible. This will reduce the tension on the sutures and help to reduce the chance of tearing the abomasal wall or leaking abomasal contents into the peritoneal cavity.

10. The two toggle suture ends are then tied together, using a number of square knots to suit the surgeon's preference.

It is suggested that a vertical distance of 3-4 inches (8-10cm) be left between the abdominal wall and the knots.

It is our clinical impression that cows respond better when the procedure is carried out this way, reducing the likelihood of fistula formation and pressure necrosis at the perforation site. Post operative medications are often easiest to administer at this point in the procedure.

11. The cow is then rolled clockwise and then to normal sternal recumbency. Remove the restraint ropes. If tranquilization/sedation has been used during the procedure, it may be reversed at this time. Allow the cow to rise if circumstances warrant.

12. Follow up care and treatment is at the discretion of the surgeon, and may include antibiotics and appropriate supportive therapy for other concurrent medical conditions (ketosis, metritis, dehydration, etc.)

*When possible and practical, pre-operative beta-lactam antibiotics (penicillin, amoxicillin, ampicillin, ceftiofur) are indicated to help reduce the chance of clostridial intoxication. It is highly recommended that all candidates for this method of repair have recent and routine vaccinations for clostridial disease, as this is an occasional (but if contracted, always fatal) sequela to the LDA toggle suture repair method.

