

SURGERY OF THE ABOMASUM, THE OLD WAY

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Introduction

Various surgical techniques for abomasal fixation have been described. The most popular techniques are: right flank omentopexy, paramedian abomasopexy and toggle pinning. In Germany, Belgium and Netherlands, a transfixated omentopexy by the right or left flank has been described (Utrecht's method).[1-3] Recently, laparoscopic abomasopexy has been introduced as a novel technique for correction and repositioning of left displaced abomasum. [4] Each technique has their advantages and their inconveniences. In my opinion, it is important to master more than one surgical technique in order to solve different surgical conditions of the abomasum.

Most DA surgeries in practice are straightforward and are performed without complications. However, some clinical findings should alarm the surgeon and influence his surgical approach. This is quite true if your primary pexy technique is by laparoscopy.

Chronic history of DA, melena, bilateral distension and scars from previous surgery required further exams before going in surgery. Abomasal adhesions, ulcers, peritonitis could be found during surgery. The choice of the surgical approach is crucial if adhesions or ulcers are suspected. Cattle affected with concurrent abomasal displacement and perforating ulceration had a short term survival rate of 38% and a long term survival rate of 14%. [5]. Ultrasonography of the ventral abdomen as well as the low right and left flank should be performed if possible. Anytime you suspect another abdominal condition or complication, laparoscopy should be avoided and right flank approach has to be considered.

Table : Suitable DA fixation techniques for different conditions

DX or clinical signs	Laparoscopy	RF omentopexy	LF or RF abomasopexy	Ventral abomasopexy	Toggle
LDA (high)	++	++	++	++	++
LDA (low)	±	++	-	++	±
RDA	±	++	+	+	-
LDA +Melena	±	+	++	++	-
Suspected concomitant abdominal disease	-	++	RF	-	-
Previous surgery	-	++	RF	++	-
Floating DA	±	++	RF	++	-
Advanced pregnancy	±	±	++	±	-

Right paralumbar fossa omentopexy

Advantages

- The animal is standing
- Correction of left and right displacement and volvulus
- Thorough exploratory laparotomy
- Manipulation and fixation do not involve the abomasum = less trauma
- Easier to identify viscera involved in the volvulus

Disadvantages

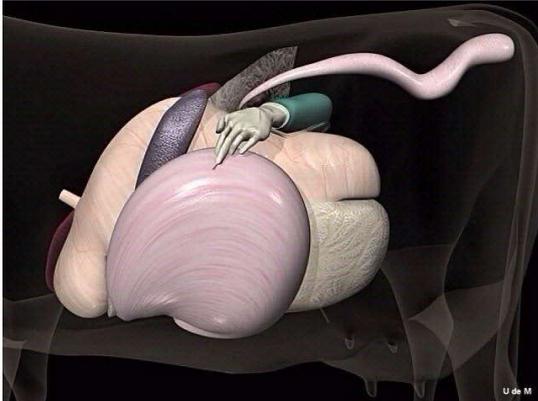
- Technically more difficult
- Difficult for newcomer to pass the abomasum from the left to the right and recognize the pyloric antrum
- Recurrence more frequent if pexy is performed too far caudal and dorsal of the pyloric antrum.
- Stay suture and pexy may tear apart in excessively fat and friable omentum
- It is difficult to see and evaluate the abomasum for potential disease
- Possible abdominal contamination during decompression process of the abomasum
- Omentopexy places the abomasum in an abnormal anatomical position

Important points

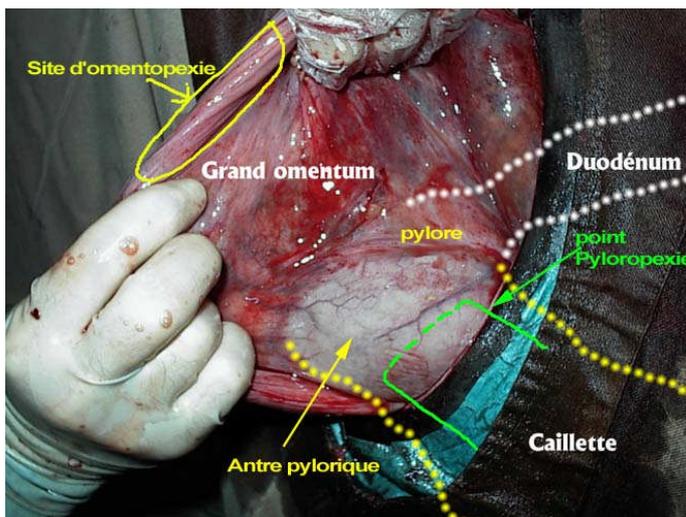
- Manipulate the greater omentum with care
- Pexy should be done at 5-7 cm caudal and dorsal to the pyloric antrum
- 'Pyloropexy' (abomasopexy of the pyloric antrum) if the omentum is friable
- Prognosis: 86-93%

Surgical technique

- Anesthesia : local, paravertebral, inverted 'L'
- Surgical preparation
- Surgical incision of 20 cm in the paralumbar fossa, 7-10 cm caudal to the last rib (width of a hand).
- The peritoneum is incised with care to avoid perforation of the abomasum if dilatation or volvulus is suspected.
- The abdomen is explored (kidneys, liver, gall bladder, omasum, reticulum, small intestines, spiral colon, caecum, uterus, lymph nodes, rumen wall)



- The abomasum is located and palpated on the left side
- Decompression with a 14 G needle attached to a plastic tube until the abomasum goes down and is not longer reachable. (Picture above).
- The abomasum is pulled/pushed back gently from the left to the right side
- If you can pull out and observe the pyloric antrum by the surgical wound, you are sure that the abomasum crossed from the left to the right.



Right flank omentopexy.

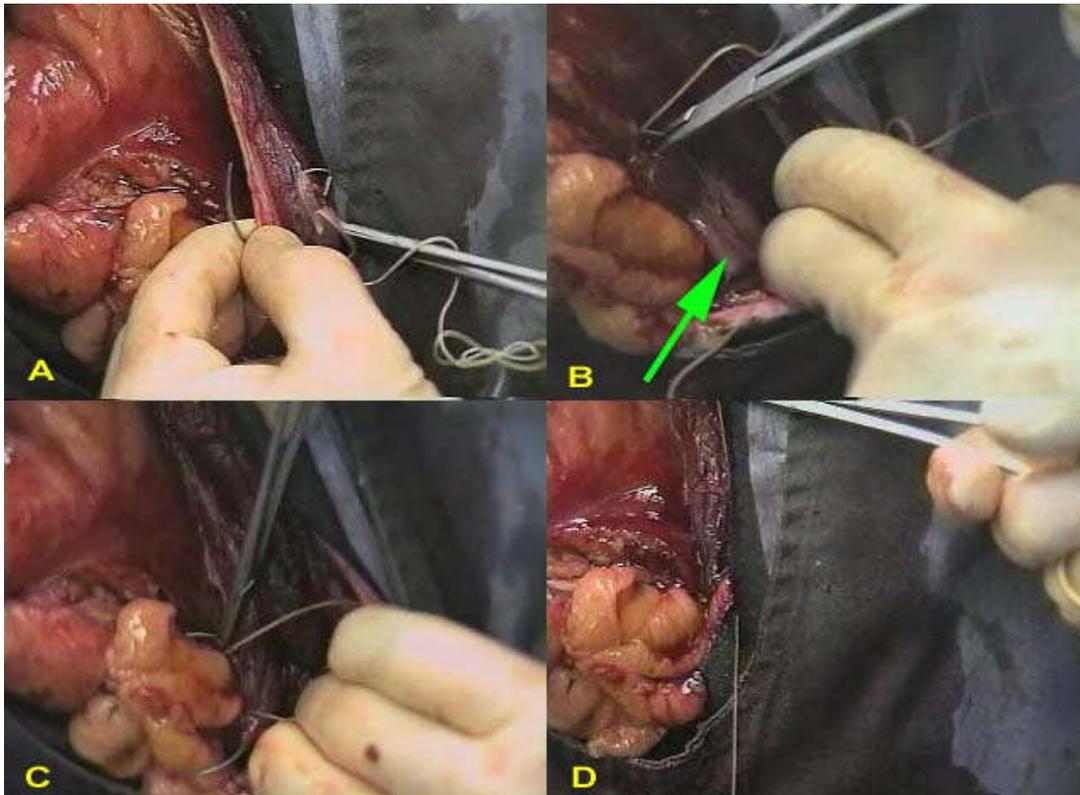
Pyloric antrum of the abomasum is exteriorized through the flank incision

- The greater omentum is then included while suturing the peritoneum and the transverse muscle. The omentopexy site is situated 7 cm caudal and 7 cm dorsal to the pyloric antrum (picture above). Stay sutures can also be use to increase adhesions surfaces.

Pyloropexy

The pyloropexy is a fixation of the pyloric antrum of the abomasum. The pylorus itself is not involved in this technique. It is frequently used as an additional mean of fixation while performing the right flank omentopexy. Some veterinarians will perform the 'pyloropexy' routinely, other only on special occasion.

We recommend using the pyloropexy on cows with extremely fatty or thin greater omentum. We also recommend the pyloropexy if the greater omentum was torn in the process of pulling it out while bringing back the abomasum from the left side to the right. The pyloropexy is performed before the omentopexy. The pyloric antrum is pexy at the ventral and cranial aspect of the ventral portion of the incision. (See figure above and below) One stay suture is sufficient if an omentopexy is performed afterward. While performing the pyloropexy, the needle should never go through the abomasal lumen. The pyloric antrum should be fixed as low as possible to avoid any kink.



Pyloropexy

- A- A swaged on needle goes through the most cranial and ventral aspect of the incision:through the transverse and peritoneum
- B- The needle is then passed transversely to the pyloric antrum (arrow)
- C- The needle comes back through the peritoneum and the transverse.
- D- The suture is tighten to allow the pyloric antrum to be close to the abdominal wall

Left flank abomasopexy

Advantages

- The animal is standing
- Best technique to use if the cow is in late pregnancy
- Abomasum is seen and palpation of the reticulum is easy

Disadvantages

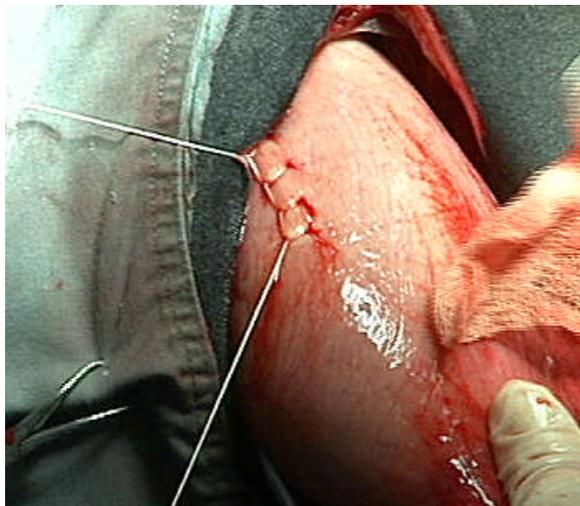
- Techniques used only for left displacement
- Abomasum should be situated high in the paralumbar fossa to place stitches
Need an assistant to guide the surgeon at the time of needle passage through the ventral abdominal wall
- Possibility of mammary vein perforation
- Chronic abomasal fistula if the lumen is perforated
- Having long arms is certainly an asset

Important points

- First application is LDA on a cow in advanced pregnancy (>8 m)
- If your assistant is inexperienced, mark suture exit sites before the surgery
- Double check that the sutures are not crossed when going through the ventral abdomen

Surgical technique

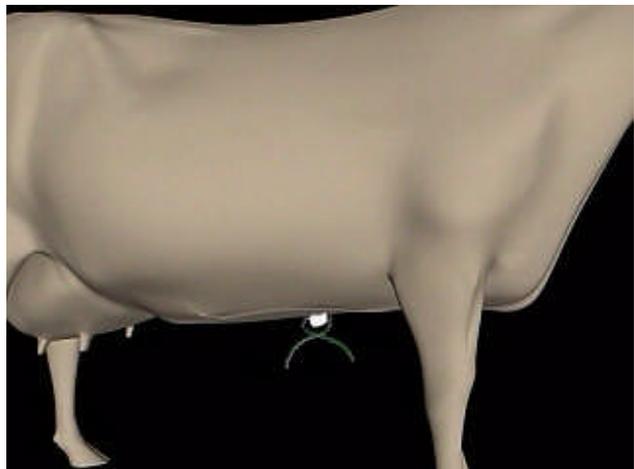
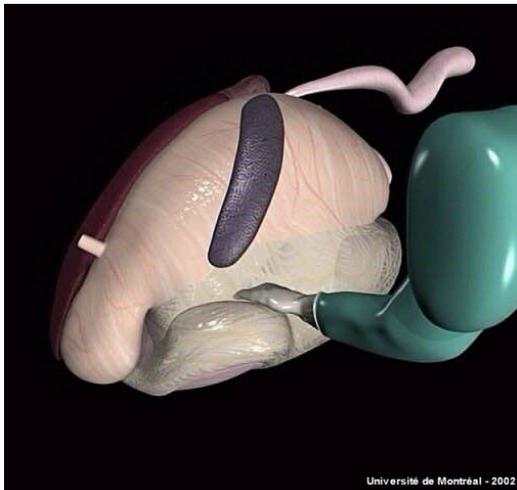
- The ventral anchor site is surgically disinfected and marked before the surgery. This site is on the right side of the ventral midline, 20 cm caudal to the sternum



- Incision of 20-25 cm in the paralumbar fossa. The incision should be more ventral and cranial if the cow is tall or the surgeon short! (close to the last rib)
- The greater curvature of the abomasum is partially exteriorised.
- With long non absorbable suture (USP 4-6), Ford interlocking suture are performed on the greater curvature, 5 cm from the junction with the greater omentum. The space between the two tags should be 7 cm (width of a hand) (Picture above)



- The abomasum is decompressed.



- A long straight needle (8 cm) is used to pass the suture through the ventral abdominal wall. Special care to avoid crossing the 2 tags.
- After the most cranial suture is passed, the assistant grab and pull gently on the suture until a certain resistance is felt. The second needle (caudal) is then passed through the wall 7 cm caudally to the first one, avoiding any crossover. Gentle tension is then applied by the assistant but without pulling on the abomasum.
- The abomasum must be pushed ventrally and toward the right to return it to its normal anatomical position while the assistant pull gently on the sutures. (Picture above)
- The surgeon double check if there is any crossover between suture tags.
- The assistant ties the suture with a roll of gauze to avoid the suture passing through the skin because of excessive tension. (Picture above)
- Sutures are removed 2-3 weeks later.

Paramedian abomasopexy

Advantages

- Excellent adhesion between abomasum and ventral abdomen
- Abomasum in anatomical position at the moment of the surgery, therefore less manipulation is required (time is trauma!)
- Abomasum is fixed in an anatomical position
- Excellent visualization of the abomasum
- Dorsal recumbency helps uterine drainage in case the cow is suffering of metritis
- Surgical incision not visible (show cow)

Disadvantages

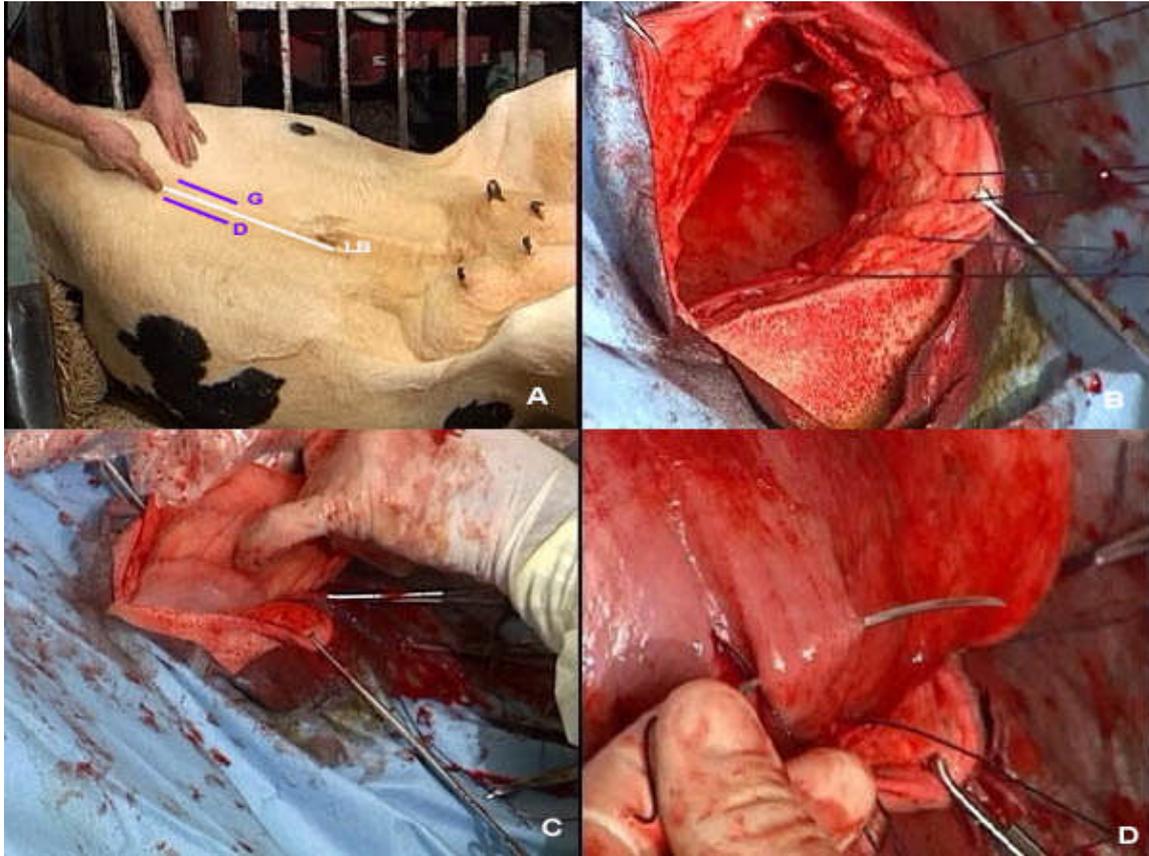
- Positioning of the animal difficult if manpower not available
- Possible rupture of the abomasum if the animal is put down brutally on her right side and she has an abomasal volvulus
- Not indicated if the animal is suffering from a pneumonia or is in shock
- Complete exploratory laparotomy is difficult
- Risk of seroma, wound infection, incisional hernia
- Enterocutaneous fistula if the suture when through the abomasal mucosa

Important points

- Suture does not go through abomasal mucosa
- Suture material best suited for abdominal wall closure is PDS #2 in a cruciate fashion
- Prognosis: 83 à 95%

Techniques

- The animal should be on dorsal or right dorsolateral recumbency. Recumbency can be achieved with sedation (xylazine 0,05-0,1mg/kg) and casting with ropes.
- The surgical site is prepared from the sternum to the umbilicus along the costal arches.
- Local anesthesia with lidocaine without epinephrine.
- Skin incision is 10 cm caudal to the sternum and 1 cm to the right (or left) of the midline. The surgical incision should be 15 cm long.
- The following tissue layers are incised: skin, subcutaneous tissue, external aponeurosis of the rectus abdominis, rectus abdominis, internal aponeurosis of the rectus abdominis, retroperitoneal fat, peritoneum.
- The abomasum is decompressed if necessary.



Paramedian abomasopexy

A- Ventral midline is identified

B- Three stay sutures are placed into the abdominal wall to the right of the linea alba.

C- The abomasum is exteriorised. The junction of the greater omentum and the abomasum can be seen on the picture.

D- Sutures are then passed into the abomasal wall avoiding penetration of the lumen.

- The stay sutures are attached to the abomasum by passing through its serous and muscular layers, parallel to and at several centimeters from the insertion point of the greater omentum. The abomasum is then fixed to the peritoneum using these three stay sutures. We use a monofilament absorbable USP #2 suture material.
- If the surgical incision is to the right of the ventral midline: stay sutures will go through the peritoneum and the internal aponeurosis of the rectus abdominis to the right of the incision.
- If the surgical incision is to the left of the ventral midline : beforehand, the three stay sutures for the abomasum are made by passing the needle through the peritoneum and the rectus abdominis muscle, exiting to the outside. Both ends of each of these sutures are held with haemostatic forceps. Afterward, the abomasum is exteriorised and then the stay sutures are attached to the abomasum by passing through its serous and muscular layers, parallel to and at several centimeters from the insertion point of the greater omentum.
- The abomasum is then fixed to the peritoneum using these three stay sutures.
- The optimal length of the abomasopexy should be 10 cm
- Monofilament absorbable suture material is used to close the abdominal wall in a simple or cruciate interrupted pattern.

- A simple continuous suture is performed on the subcutaneous tissue to avoid dead space.
- Skin is sutured with nonabsorbable material, interrupted cruciate or Ford interlocking.

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