

GASTROINTESTINAL SURGERIES:

RUMENOTOMY/RUMENOSTOMY



BASICS

OVERVIEW

- A rumenotomy is performed to examine contents and internal structures of the rumenoreticulum, the cardia of the esophagus, and reticulo-omasal orifice.
- A rumenostomy allows examination of the same anatomical structures as above; however, the external ruminal opening remains patent after surgery for the treatment of chronic disease or in cases where ruminal access is needed.

SYSTEMS AFFECTED

- Digestive

SIGNALMENT

- All ruminant species

CAUSES AND RISK FACTORS

- Indications for a rumenotomy include removal of a foreign body in cases of traumatic reticuloperitonitis (TRP); evacuation of the rumen in severe grain overload; relief of a rumen impaction, distal esophageal obstruction, or reticulo-omasal obstruction; or retrieval of other rumen foreign bodies such as ingested plastic bag(s), bale wrap, baling twine, or placenta.
- A rumenostomy may be indicated to alleviate chronic bloat, provide access for rumenal feeding (animals with inability to prehend feed: CN deficits, esophageal injury, etc.), ruminant nutrition research, teaching rumen anatomy and physiology, or creation of a rumen fluid donor.



DIAGNOSIS

Clinical Signs

- TRP can be divided into acute local peritonitis, chronic local peritonitis, and diffuse peritonitis. Signs range from decreased production and rumen motility in the acute local stage to signs of toxicity with diffuse peritonitis. Chronic local peritonitis is characterized by non-specific signs such as poor production, poor body condition, low-grade fever, and vagal indigestion.
- Ruminal obstruction/impaction will present with firm ruminal distension, decreased motility, decreased manure production and anorexia.

- Esophageal obstruction will present with free-gas bloat and there may be feed material present at the nostrils.
- Grain overload cases classically present with lethargy, severe dehydration, tachycardia, tachypnea, a static and fluid distended rumen, and loose manure.

Laboratory Tests

- TRP is characterized by a regenerative neutrophilia in the acute phase, progressing to a mature neutrophilia with chronicity. If diffuse, acute peritonitis will result in leukopenia. Hyperfibrinogenemia and in chronic cases, hyperglobulinemia, will occur.
- Any ruminal outflow obstruction (functional or mechanical) paired with anorexia may cause a metabolic alkalosis (increased total CO₂) and hypokalemia. In addition, a pre-renal azotemia may occur secondary to dehydration.
- Abdominocentesis and peritoneal fluid analysis may aid in diagnosis of TRP. However, ruminants tend to produce small volumes of peritoneal fluid, and omental and forestomach anatomy limit the number of sites available for fluid collection.
- If fluid is collected, a nucleated cell count of >6,000 cells/ μ L and total protein >3g/dL is consistent with peritonitis.

Imaging

- Transabdominal ultrasonography using a 3-5 MHz probe can be used to assess reticular motility and define any reticular or peri-reticular abscesses and fibrin in the cranial peritoneal cavity. Esophageal foreign bodies may also be visualized.
- Radiography of the reticulum may be helpful in visualizing metallic foreign bodies.



TREATMENT

Rumenotomy

- Rumenotomy is an incision through the rumen wall to facilitate access to rumen contents or structures.
- The procedure is usually performed standing with the animal restrained in a cattle chute or head catch.
- Regional anesthesia of the left paralumbar fossa is achieved using 2% lidocaine in a proximal or distal paravertebral nerve block, inverted-L block, or line block.
- A line block is not advised because the lidocaine infiltrates the peri-incisional tissues and may inhibit healing.
- It is helpful to hold the animal off feed for at least 24 hours before surgery to decrease rumen fill and make rumen tissues more tractable during surgery.

Surgical Procedure

- A vertical incision is made in the left paralumbar fossa midway between the 13th rib and the tuber coxae and approximately 2 to 3 inches (5 to 7.5 cm) ventral to the lumbar transverse processes. The incision should be of sufficient length to allow the surgeon to place his/her whole arm through the incision. Skin is incised followed by subcutis, external abdominal oblique muscle, internal abdominal oblique muscle, transversus abdominis muscle, and peritoneum. The peritoneal cavity is systematically explored to determine if there is evidence of peritonitis or reticulitis.

- Following exploration of the peritoneal cavity, the dorsal sac of the rumen is exteriorized and the seromuscular layer sewn to the skin using a continuous inverting suture pattern that rolls the rumen over the skin edge. The rumen is incised and explored.
- The rumen incision should be of sufficient size to allow complete exploration of the rumenoreticulum but should be shy of the rumen-to-skin sutures to allow closure of the rumen wall without releasing the skin sutures.
- When exploration of the rumen is complete, the seromuscular layers of the rumen are closed using monofilament absorbable suture in an inverting pattern such as a Cushing's or Utrecht pattern.
- The surgery site is irrigated with a dilute solution of povidone-iodine in saline and when clean the rumen-to-skin sutures are removed and the rumen returned to the peritoneal cavity. The paralumbar fossa incision is closed in three layers: 1) peritoneum, transversus abdominis and internal abdominal oblique, 2) external abdominal oblique, 3) skin.
- Alternative approaches to using a continuous inverting suture pattern to temporarily affix the rumen to the skin include interrupted stay sutures, rumenotomy board, rubber rumenotomy shroud, or rumen fixation ring. These techniques are more prone to spillage of rumen contents into the peritoneal cavity.

Permanent Rumenostomy

- A rumenostomy is the creation of a long-term or permanent external ruminal opening.
- Surgical preparation is the same as stated above for rumenotomy.

Surgical Procedure

- A permanent rumenostomy is created in a similar fashion to a rumenotomy. However, the skin incision is circular. The circle of skin within the bounds of the incision is completely removed and the muscular layers are bluntly dissected in a vertical manner. The rumen seromuscular layers are sutured to the skin as above or using interrupted horizontal mattress sutures followed by suturing the incised edge of the rumen to the skin with simple interrupted sutures. Suture material should be a non-absorbable monofilament suture.

Drainage of Reticular/Perireticular Abscess

Reticular and peri-reticular abscesses can be drained via a percutaneous incision, preferably using ultrasound guidance.



MEDICATIONS

- Peri-operative antibiotics are warranted because of the potential for spillage or leakage of rumen contents into the peritoneum. The duration of administration should be based on the post-operative condition of the patient and surgery site.
- Supportive medical care beyond antibiotics will depend on the reason for performing the rumenotomy/rumenostomy (see chapters on TRP and acidosis for specific medical treatments).

Precautions

- Appropriate milk and meat withdrawal times must be followed for all compounds administered to food-producing animals.
- Goats are extremely sensitive to the effects of lidocaine. Care should be taken with the use of this drug to avoid overdosage (dose should not exceed 5mg/kg).



FOLLOW-UP

The surgery site should be monitored for redness, heat, swelling, and drainage. Skin sutures should be removed in 10 to 14 days.

Possible Surgical Complications

- The most likely complication following a rumenotomy/rumenostomy is peritonitis secondary to spillage of rumen contents into the peritoneal cavity.
- Infection or dehiscence subsequent to infection of the surgery site may also occur.
- Subcutaneous emphysema may develop, particularly in cases in which a permanent rumenostomy is performed.

Prognosis

- Prognosis will depend on the initial reason for the surgery and the degree of asepsis afforded during the procedure.
- Outcomes for animals with severely debilitating disorders (e.g., grain overload, vagal indigestion secondary to traumatic reticuloperitonitis, or chronic bloat) will have a less favorable outcome than cases in which the procedure is elective.
- In cases of TRP, surgical intervention is reported to have a recovery rate of 80 to 90% compared with 60% in untreated animals. Recovery rates for conservative medical therapy of localized disease also appear to be quite favorable. A poor to grave prognosis is expected when acute diffuse peritonitis occurs or there is involvement of the pleural and pericardial cavity.

Prevention

- For TRP, administration of a magnet orally at weaning or pre-breeding is reported to have decreased the incidence by 90 to 98% in dairy herds. Minimizing the potential for metallic foreign bodies in feed by using string instead of baling wire and having magnets in feed processing equipment to remove metallic objects can also reduce the risk of exposure.
- Other common foreign bodies can be avoided by conscientiously removing baling twine and silage wrap from bales, removing fetal membranes from pens post-calving, minimizing trash on the property, and avoiding feeding of root vegetables that may cause esophageal obstruction and trauma (i.e., fodder beet, potatoes etc.)
- Grain should be stored in locked or elevated grain bins/silos and adequate fencing should be in place to keep animals away from cereal crops to prevent grain overload.



MISCELLANEOUS

ASSOCIATED CONDITIONS

- Peritonitis
- Infection or dehiscence
- Subcutaneous emphysema

SEE ALSO

- Anesthesia: Local and Regional Analgesia
- Gastrointestinal Surgeries: Laparotomy (www.fiveminutevet.com/ruminant)
- Indigestion
- Rumen Dysfunction: Alkalosis
- Rumen Transfaunation (www.fiveminutevet.com/ruminant)
- Ruminal Acidosis
- Traumatic Reticuloperitonitis
- Vagal Indigestion

ABBREVIATIONS

- BW = body weight
- NSAIDs = nonsteroidal anti-inflammatory drugs
- SC = subcutaneous
- TRP= traumatic reticuloperitonitis

Suggested Reading

- Radostits, O.M., Gay, C.C., Hinchcliff, K.W., Constable P.D. Veterinary Medicine. 10th ed. Philadelphia: Saunders Elsevier. 2007:298, 337-345, 522.
- Hendrickson, D.A., Baird, A.N. Turner and McIlwraith's Techniques in Large Animal Surgery. 4th ed. Ames: Wiley Blackwell, 2013:215-221.
- Hartnack, A.K., Niehaus, A.J., Rousseau, M., Pentecost, R.L., Miesner, M.D., Anderson, D.E. Indications for and factors relating to outcome after rumenotomy or rumenostomy in cattle: 95 cases (1999-2011). J Am Vet Med Assoc. 2015;247:659-664.

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