

Compound stomach in Ruminant

Anatomy

Stomach in ruminant can be divided into four compartments:

- 1- The rumen,
- 2- Reticulum,
- 3- Omasum,
- 4- Abomasum.

Disorder of Ruminant digestive system:-

1-RUMINAL TYMPANY:-BLOAT

Ruminal tympany (bloat) refers to over distention of the rumen and reticulum with the gases generated by fermentation.

These gases may be present in the form of a persistent foam mixed with the rumen ingesta (**frothy bloat**) or in the form of free gas separated from the ingesta (**free gas bloat**)

Frothy bloat or primary ruminal tympany is dietary in origin and occurs in cattle on legume pasture and in feedlot cattle which are fed diets containing high levels of grain.

Free gas bloat or secondary tympany is usually due to failure of eructation of free gas because of a physical interference with eructation.

In general, primary ruminal tympany is caused by some direct action within the rumen, whereas secondary ruminal tympany is caused by some condition elsewhere in the body with an indirect action on the rumen (**stenosis of the esophagus, etc**).

Primary Ruminal Tympany (Frothy Bloat):

Primary ruminal tympany or frothy bloat is due to the production of a stable foam which traps the normal gases of fermentation in the rumen.

The small gas bubbles which have mixed with the rumen contents do not coalesce, eructation cannot occur, and pressure within the rumen increases.

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Secondary Ruminal Tympany (Free Gas Bloat):

Secondary ruminal tympany or free gas bloat is usually due to some physical obstruction which prevents the gases of normal fermentation from escaping via the esophagus (**interference with eructation**).

Treatment in these cases consists of passage of a stomach tube or trocarization which results in the expulsion of large quantities of gas

Rumenotomy

Indication:-

- 1-Remove foreign object
- 2-Drain abscesses
- 3-Toxicity
- 4-Frothy tempany
- 5-Ruminal indigestion

Anesthesia:-

- 1-Paravertaberal Nerve block:- In most of the animals Paravertebral anaesthesia is used and for this T13, 1L and L2 nerves are blocked.
- 2-Linear block
- 3-Inverted L block
- 4-Field block.

Surgery

Upper flank laparotomy:

1. The skin is incised with a smooth but firm motion. The pressure on the scalpel should be adequate enough to ensure complete penetration of the skin.
2. Dissection of the subcutaneous fascia and oblique muscles continues to expose the glistening aponeurosis of transverse abdominis muscle.
3. Different muscles from outside to inside are incised one by one along with their fascia after grasping them with Allis tissue forceps.

In the last peritoneum is grasped with allis tissue forceps and then it is incised taking care not to cause any injury to underlying rumen.

4. The length of incision from skin to the peritoneum should be in descending order to facilitate closure.
5. The skin incision should be long enough to allow the surgeon's arm inside the abdomen.
6. If the rumen is not full, the walls of rumen and abdomen separate out spontaneously to facilitate exploration.
7. The abdominal cavity should be thoroughly explored to examine the wall of diaphragm, outer wall of reticulum, spleen and liver for any pathological lesion.
8. A thorough search is made by inserting hand in the abdominal cavity through the incision and rolling over the rumen on all sides to rule out any herniation, abscessation or foreign bodies.
9. No attempt should be made to break down the firm adhesions if present.

Rumenotomy

10-If the rumen is grossly distended, aspiration is done by piercing a 16" needle on dorsal aspect.

11-A fold of rumen is exteriorized. For better exteriorization, retention and to avoid contamination of abdominal cavity with ruminal contents, several ruminal fixation techniques are used such as:

A. Stay suture technique:

After laparotomy, the rumen has to be pulled out gently out of the laparotomy incision and rumen walls were anchored to the incision dorsally, ventrally, cranially and caudally by placing four or more sutures between ruminal walls and skin by using no.2 silk or nylon as suture material.

B. Rumen skin fixation sutures technique:

After rumenotomy the rumen wall can be fixed to the skin incision by a continuous inverting suture pattern to pull the rumen over the edges of the skin incision.

C. Weingarth ring technique:

Following laparotomy, a Weingarth ring is fixed to the dorsal commissure of the incision by its thumb screw. The rumen is fixed to the ring. As the rumen wall is incised hooks are placed into cut edges of ruminal wall, pulled out and hooked around the frame until the rumen had been reflected outward all the way around the incision.

D. Rumen skin clamp fixation technique:

The rumen is incised and fixed with skin on either side with the help of towel clamps.

E. McLintock's sheet and ring fixator.

Here ruminal incision can be fixed with rubber shroud. The ruminal wall is held outside the incision by using a rubber ring.

13- After fixation, the rumen is incised longitudinally in the vertical direction on the dorsal compartment.

14- In case, if the rumen is full of large amount of liquid digested material, a very large diameter stomach tube can be used to siphon off the content of rumen to allow the exploration of other chambers.

15- In case of coarse material manual removal is done.

16- Maximum 80% of the ruminal contents may be evacuated. If complete rumen is emptied fresh cud or microflora should be kept in rumen before its closure.

17- The hand is then inserted in the rumen and entire rumen, reticulum, reticulo-ruminal fold and esophageal groove are searched out and if any foreign body is present, it is removed.

18- A magnet may be introduced and swept over rumen and reticulum to retrieve any metallic substance.

19- After surgical intervention the surgeon rescrubs his hands and the edges of rumen incision are thoroughly cleaned and redraped.

20- The rumen incision is closed by double row of continuous inverting sutures using chromic catgut no. 2 or 3.

21- The suture site and exposed area is irrigated with polyionic fluids with or without antiseptic solution.

22- Rumen fixation instruments or sutures are removed and all the soiled substances are discarded.

23- The surgeon scrubs again before starting the suturing of peritoneum, muscle and skin incision.

Closure of laparotomy incision:

24- A flank laparotomy incision can be sutured in different layers depending on the preference of surgeon. Most preferred method is closure in 4 layers.

25- The 1st layer of a simple continuous suture is applied using no 2 or 3 catgut on peritoneum and transverse abdominis muscle.

26- The two oblique muscle are sutured together in 2nd layer with catgut or silk No. 2.

27- Subcuticular sutures are applied to bring the opposite edges of skin near to each other and to obliterate dead space.

28- Suturing of skin by placing series of simple interrupted or interrupted mattress sutures leaving 3-4 stay sutures to apply the gauze piece or bandage piece to cover the wound.

Post operative care:-

1-Course of antibiotic coverage for 5-7 days.

2-Anti inflammatory/analgesics drugs for 2-3 days

3-Dressing on alternate days for 7-10 days

4-Fluid therapy, if required.

5-Mild osmotic laxative, may assist in prompting gut motility

6-Light diet to animal for few days after the surgery

7-Removal of Skin sutures on 8th to 10th day post operation day.

Complications:-

1-Peritonitis

2-Haemorrhage

3-Rumen Fistula

4-Emphysema.

The reticulum

Traumatic reticuloperitonitis (TRP)

It means penetration of the wall of the reticulum by hard object resulting in localized reticulitis and peritonitis.

Causes:

1-Cattle prehension food by Tongue ,This lead to take wire pieces, Nails, animal take this material accidentally with food, Mastication is not complete and F.B. is quickly swallowed,

2-Animal may suffered from variety of nutrition deficiency such as phosphorus.

Symptoms:-

Onset of symptoms is usually sudden

1-Milk yield significantly decreased

2-Stiffness of thoracic limb and abduction elbows

3-Laying down, standing and turning especially to left

4-Rumination is weak or absent

5-Feces are firm and decrease quantity

6-Grunting teeth, especially during eating

7-Chronic recurrent tympany

8-Temperature remain normal except when there is spreading peritonitis.

Diagnosis:-

1-Case history

2-Clinical signs

3- Pain test: Pole stick test, Withers test , percussion at the xiphoid region, going up and down a hill,

4-Haematological examination: Shift to left

5- Radiographic examination

6-Metal detector.

Treatment:-

Rumenotomy:- Surgical opening of the rumen by making the incision on the wall of rumen. Rumenotomy is a routine procedure for treating many diseases in ruminants

Evacuation of rumen following ingestion of toxins or poisons.

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Omasal Impaction

Omasal impact occurs mostly secondary to rumen impaction and is a result of poor quality feed. The omasum get distended with stagnated ingesta and absorption of fluid. Omasal impaction usually discovered during rumenotomy operation. A very hard mass was found right to the reticulum.

Clinical sign:-

- 1-Anorexia restless and signs of dehydration
- 2- Omasal sounds on auscultation are absent at the level of right elbow at the 9th intercostal space.

Treatment

- 1-Administration of 4-5 L of liquid paraffin or mineral oil to soften the contents through a stomach tube or lapararumenotomy incision.
- 2-Yeast, 2-3 kgs sugar, and 2-3 L of ruminal fluid from healthy animal may also be added to stimulate the rumen flora
- 3-Ruemenotmy may be performed and a long tube with needle attached to a syringe may be used to inject solution directly into omasum through the incision

Abomasal Impaction

Impaction of the abomasum develops in pregnant beef cows during cold winter months when cattle have decreased water intake and are fed poor-quality roughage.

Etiology

The cause of dietary abomasal impaction is Impaction with sand can occur if cattle are fed hay or silage on sandy soils.

The pathogenesis is unknown but is related to diet.

Varying degrees of dehydration develop, because fluids are not moving beyond the abomasum into the duodenum for absorption.. Impaction of the abomasum may be severe enough to cause irreversible abomasal atony.

Clinical Findings.

Complete anorexia, **scant feces**, moderate distention of the abdomen, weight loss, and weakness.

Body temperature is usually normal but may be subnormal during cold weather.

A mucoid nasal discharge tends to collect at the external nares and on the muzzle; the muzzle is usually dry and cracked, caused by both the failure of the animal to lick its nostrils and the effects of dehydration.

The heart rate may be increased, and mild dehydration is common.

Most often, the rumen is static and distended with dry contents, but it may contain excess fluid if the cow has been fed finely ground feed.

Diagnosis:

Clinical diagnosis of abomasal impaction is based on the nutritional history, clinical evidence of impaction, and laboratory results. The disease must be differentiated from secondary abomasal impaction as a form of vagal indigestion.

Impaction of the abomasum as a **complication of traumatic reticuloperitonitis** usually is seen in late pregnancy, and commonly only in one animal.

a right flank laparotomy may be necessary to explore the abdomen for peritoneal lesions.

Treatment:

The dehydration should be corrected.

Lubricants can be used in an attempt to move the impacted material; it is necessary to empty the abomasum surgically only in cattle with severe impaction.

Mineral oil should be administered at 4 L/day for 3 days.

Surgery may be considered, but results are often unsuccessful, probably because of abomasal atony, which appears to worsen after surgery. An alternative may be a rumenotomy to empty the rumen and infuse mineral oil directly into the abomasum through the reticulo-omasal orifice in an attempt to soften and promote evacuation of the abomasal contents.

Abomasum Displaced and Abomasal Volvulus

Because the abomasum is suspended loosely by the greater omentum and lesser omentum, it can be moved from its normal position on the right ventral part of the abdomen to the left or right side (LDA, RDA), or it can rotate on its mesenteric axis while displaced to the right and lateral to the liver (AV).

The abomasum can shift from its normal position to left displacement or to right displacement over a relatively short period. AV can develop rapidly or slowly from an uncorrected RDA.

Etiology:

- 1-abomasal hypomotility
- 2- dysfunction of the intrinsic nervous system
- 3- hypocalcemia and possibly hypokalemia,
- 4- periparturient changes in the position of intra-abdominal organs,
- 5- deep-bodied cows.
- 6- Genetic predisposition is correlated with milk yield,

Approximately 80% of displacements are seen within 1 mo of parturition; however, they can be seen at any time. LDA is much more common than RDA (30 LDA to 1 RDA); cases of AV are also more common than RDA (10 LDA to 1 AV). AV is preceded by RDA.

Clinical Findings:

The typical history of abomasal displacement includes

- 1- anorexia (most commonly a lack of appetite for grain with a decreased or normal appetite for roughage)
- 2- decreased milk production.
- 3- In abomasal displacement, temperature, heart rate, and respiratory rate are usually normal.
- 4- Feces are usually reduced in quantity and more fluid than normal.
- 5- **ping on simultaneous** auscultation and percussion of the abdomen, which should be performed in the area marked by a line from the tuber coxae to the point of the elbow, and from the elbow toward the stifle. The ping (detected during simultaneous percussion and auscultation) characteristic of an LDA is most commonly located in an area between ribs 9 and 13 in the middle to upper third of the left abdomen; however, the ping can be more ventral or more caudal, or both. Pings associated with a rumen gas cap are usually more dorsal, less resonant, and extend more caudally through the left paralumbar fossa.
- 6- Rectal examination

Treatment:

closed (percutaneous) techniques can be used to correct abomasal displacements. Rolling a cow through a 180° arc after casting her on her right side corrects most LDAs; however, recurrence is very likely.

Open (surgical) LDA can be corrected surgically using

- 1- right flank pyloric omentopexy,
- 2- right paramedian abomasopexy,
- 3- left paramedian abomasopexy,
- 4- Blind suture techniques (toggle-pin fixation or the “big needle” [blind-stitch] method),