

Surgery of the Forestomach



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KEYWORDS

• Forestomach • Rumen • Rumenostomy • Rumenotomy • Vagal indigestion

KEY POINTS

- Forestomach surgery is usually performed in the left paralumbar fossa.
- Most forestomach surgery is either surgery on the rumen or using the rumen to gain access to other forestomach compartments (reticulum/omasum).
- The prognosis depends largely on the underlying problem, but timely surgical management can greatly influence outcome in certain disease situations.

SURGICAL ANATOMY AND PHYSIOLOGY

The forestomach, or proventriculus, in the ruminant consists of a rumen, reticulum, and omasum. All 3 are nonglandular and lined with stratified squamous epithelium, whereas glandular abomasum is the “true stomach.” All are innervated almost entirely by the Vagus nerve which has both motor-parasympathetic and sensory fibers. It is divided into the ventral and dorsal vagi as it enters the abdomen. The ventral vagi innervates the cranial and medial parts of the reticulum, omasum, and abomasum. The dorsal branch innervates the rumen and parts of other segments of the stomach.¹ Blood supply comes from the celiac artery from the aorta and branches into the ruminal and splenic arteries. The left ruminal artery gives off a branch to the reticulum and the celiac continues to become the omasoabomasal artery.²

The reticulum is the smallest of the compartments and it lies just cranial to the rumen between the sixth and ninth intercostal spaces with equal parts on either side of midline. Ventrally it contacts the sternum and diaphragm. The left aspect contacts the spleen and costal diaphragm while the right is in contact with the left hepatic lobe, omasum, and abomasum.² The interior has a “honeycomb” appearance.³

The authors have nothing to disclose.

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Reticular contractions are biphasic with one partial contraction followed by a relaxation and another, full contraction just before ruminal contractions.²

The rumen lies on the left side of the abdomen extending from the pelvis to the seventh to eighth rib space. It is the largest of the compartments and grows in adult cattle from one-half of the size of the abomasum at birth⁴ to holding roughly 100 to 150 L² and is the site of fermentation of cellulose. It has a dorsal and ventral sac divided by right and left longitudinal grooves. The left and right longitudinal grooves are also the attachment sites for the superficial and deep leaves of the greater omentum, respectively. The rumen has additional dorsal and ventral grooves demarcating the caudodorsal and caudoventral blind sacs. The ruminal recess refers to the blind end to the cranial most portion of the ventral sac of the rumen, whereas the atrium or cranial sac refers to the cranial most portion of the dorsal sac which opens into the reticulum. This lies between the cranial pillar and the ruminoreticular fold. The ruminoreticular fold is a septum that separates the rumen from the reticulum. The cardiac opening, the opening of the esophagus, is just dorsal to the reticulum at the eighth intercostal space. Internally, the ridges formed by the exterior grooves are referred to as pillars. The inside of the rumen is covered by ruminal papillae, which are roughly 1 cm long. Adequate forage and fiber mat in the rumen is required for appropriate ruminal papillae development.³ Contractions of the rumen start just after a reticular contraction when the omasal orifice relaxes with a primary contraction. Primary contractions begin cranially and spread over the dorsal sac into the ventral sac. This contraction mixes and distributes ingesta and substrates. Following 2 primary contractions is 1 secondary contraction in which the ventral sac then contracts from caudal to cranial.² Secondary contractions push gas to the cardia and allow eructation to occur. There should be approximately 3 rumen contractions in 2 minutes.

The omasum is a spherical viscus that lies between ribs 7 to 11 just right of midline. It is sometimes called the “Butcher’s Bible” as the muscular laminae covered with short papillae resemble pages of a book.⁴ It has a capacity of 7 to 18 L. In the normal cow, 2 omasal contractions per minute can be auscultated at the ninth intercostal space at the level of the elbow.²

The gastric groove in suckling calves allows milk to bypass the forestomach and go straight to the abomasum. In the adult it is divided into the reticular groove, which leads to the reticulo-omasal opening and the omasal groove (as well as the abomasal groove).³

PATHOLOGY OF THE FORESTOMACH

Pathology of the forestomach often falls into a category of what is commonly referred to as “vagal indigestion.” The syndrome was named after the clinical signs were produced experimentally by transecting different branches of the Vagus nerve by Hoflund.¹ This at times leads to confusion, as Vagus nerve damage or inflammation is rarely the cause of vagal indigestion. The classification scheme of vagal indigestion most used by the authors is the Ferrante and Whitlock classification and is as follows: 1, failure of eructation or free gas bloat; 2, omasal transport failure; 3, abomasal impaction; 4, partial obstruction of the stomach. Only types 1 and 2 are conditions of the forestomach, but all 4 types can result in similar presentation so physical examination findings and diagnostics must be used to appropriately diagnose the animal and the type of vagal indigestion.¹

Type 1 Vagal Indigestion

Excessive free gas in the dorsal sac of the rumen is not a cause of a disease but a clinical sign. Fermentation in the rumen produces gas (methane and carbon dioxide) which

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