Abomasal and Third Compartment Ulcers in Ruminants and South American Camelids

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KEYWORDS

• Abomasal ulcers • South American camelids • Small ruminants • Cattle • Etiology • Pathogenesis • Diagnosis • Treatment

KEY POINTS

- Abomasal ulcers are most frequent in veal calves and are caused by a wide array of possible factors.
- Ante mortem diagnosis of abomasal ulcers is only possible indirectly based on clinical signs, tests for fecal occult blood, and ultrasound examination, among others.
- Abomasal ulcers can be treated pharmacologically, surgically, and by alleviating concurrent disease.

INTRODUCTION: NATURE OF THE PROBLEM

Types of Ulcers and Location in Cattle

Abomasal lesions can histologically be classified as ulcers if the necrosis of the abomasal wall reaches deeper than the lamina muscularis mucosae into the submucosal layer. More superficial lesions are defined as erosions. Smith and associates[1] introduced a classification of abomasal ulcers in cattle with 4 types (modified from Fox[2] and Whitlock[3]) and Braun and colleagues[4] added 4 subtypes of type 1 abomasal ulcers (**Table 1**).

The consequences of a perforation of the abomasum differ depending on its location: If the perforation site is adjacent to a structure, like the omentum or the abdominal wall, the formation of local adhesions limiting abdominal contamination is likely (type 3 ulcers). In other cases, the ingesta contaminate the peritoneal cavity before forming adhesions and cause generalized peritonitis (type 4 ulcers). The abomasum can

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Table 1
Types of abomasal ulcers with type 1 subtypes

Type	Description
1	Nonperforating ulcer with incomplete penetration of the abomasal wall
1a	Erosion with minimal mucosal defects and loss of mucosal rugae, sometimes mucosal discoloration only (often reddish-violet or green-brown)
1b	Deeper erosions with mucosal hemorrhage, sharply demarcated with a depressed center
1c	Craters with coating of detritus or fibrin, depressed center, and bulging margins
1d	Radial wrinkles with a central point, affecting gastric folds only
2	Bleeding ulcer with penetration of a major abomasal vessel and severe intraluminal hemorrhage
3	Perforating ulcer with localized peritonitis owing to adhesion to adjacent viscera
4	Perforating ulcer with diffuse peritonitis owing to spread of ingesta through the peritoneal cavity

also perforate so that ingesta leak either into the supraomental recess and cause peritonitis and adhesions of the small intestine or into the bursa omentalis with subsequent omental bursitis.[5] For this latter type of ulcer, the classification as type 5 has been used.[6]

The anatomic location of the ulcer within the abomasum may be related to differences in the pathogenesis, as discussed elsewhere in this article. There is a predisposition for calves to develop abomasal ulcers in the pyloric region (**Fig. 1**). In veal calves, 95% of nonperforating ulcers at slaughter were located mainly in the pyloric region of the abomasum.[7] In a study of feedlot cattle, both perforating and nonperforating ulcers found on necropsy were also located mainly in the pyloric region of the abomasum.[8] However, perforating ulcers in unweaned beef calves were found in the midpart of the corpus abomasi with a propensity for the greater curvature of the abomasum.[9,10] In a later study in feedlot cattle, ulcers were located mostly on mucosal folds of the corpus at the slaughterhouse.[11]

In dairy cows, erosions were found equally distributed in both parts, but bleeding ulcers occurred predominantly in the corpus of the abomasum.[12] At slaughter,

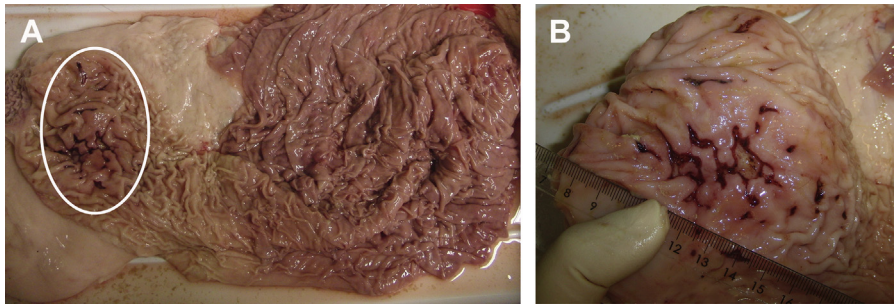

Fig. 1. Type 1 ulcer in the pyloric region of the abomasum in a slaughter veal calf. (*A*) Overview with circled ulcer in the pyloric region. (*B*) Close-up of the ulcer.