Acute Abdomen in Cattle: Decision Making and Case Management

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Key Points

- Systematic clinical exam and supportive diagnostic testing may yield diagnosis and/or determine need for surgery.
- Monitor frequently to evaluate response to therapy.
- Appropriate communication of prognosis and cost to owner maximizes outcome satisfaction.

The workup and management of cases of acute abdomen in cattle begins, as with many other disease processes, with the anamnesis. The type of husbandry system from which they present, the intended use of the patient, and of course their signalment, already begin to narrow and prioritize the list of differential diagnoses when presented with another vaguely described "ain't doin' right" case. Reaching the correct diagnosis to provide an appropriate recommendation for treatment, though challenging, still only represents a portion of the challenge these cases represent. Providing the anticipated prognosis of the condition following attempted treatment and an accurate estimate of costs make up the other two portions of the decision-making triad. The latter will be specific to the practitioner and not further discussed herein.

The ability to treat abnormal is predicated on the ability to differentiate it from normal, thus prompting the following anatomic reminders of the peritoneal cavity. The rumen occupies a majority of the abdomen (in the non-gravid patient), taking up the left half of the abdomen dorsally and ventrally, and crossing midline to the right, especially the ventral sac of the rumen. This results in a relatively short list of differential diagnoses when a left-sided percussible or succussible abnormality is identified as compared with the right side of the abdomen. Depending on husbandry system, left-sided differentials should include left displaced abomasum, rumen tympany or void, physometra, and pneumoperitoneum, whereas right-sided differentials include right displaced abomasum or volvulus, cecal dilatation +/- volvulus, small instestine, proximal colon, physometra, pneumorectum, and pneumoperitoneum.

The greater omentum is a combination of the superficial leaf and deep leaves, respectively originating from the left and right longitudinal grooves of the rumen, to create a potential space between them, the omental bursa. The greater omentum passes ventrally, laterally to the right, then dorsally to attach to the greater curvature of the abomasum and the descending duodenum on the right side of the abdomen, thereby creating a sling that much of the gastro-intestinal tract distal to the abomasum is contained within, called the supraomental recess. The right side of this omentum, which in the normal animal is immediately visible upon entry into the abdomen via right paralumbar fossa laparotomy, is termed the omental curtain. The lesser omentum arises from the lesser curvature of the abomasum and extends dorsally. This anatomic knowledge is helpful to keep in mind for surgical planning, particularly in cattle, on whom standing surgery is routinely performed. With the rumen in contact with much of the left abdominal wall, the left paralumbar fossa approach is best suited for surgery of the rumen and access to the lumen of the reticulum (via rumenotomy), correction of left displaced abomasum (LDA), and the peritoneal portions of genitourinary tracts. The right paralumbar fossa approach provides access to much of the rest of the GI tract, such as surgery of the small and large intestines and correction of right displaced abomasum or volvulus (in addition to LDA), and the peritoneal portions of the genitourinary tract. The omental curtain previously described, and the short mesentery of the ruminant intestinal tract does limit exteriorization. The following structures cannot be fully exteriorized through a right paralumbar fossa approach: abomasum, sigmoid flexure of the duodenum and the ascending duodenum, a portion of the

ascending and descending loops of the colon, and the rectum. When not limited to standing surgery, dorsal recumbency allows for ventral, paramedian and paracostal approaches that improve access to the genitourinary tract, GI tract, and abomasum.

When presented with a bovine patient for signs of “colic” or acute abdomen, it is important to keep in mind that these classic signs of pain may be attributed to any organ system within the abdomen. While often not as severe or obvious as their equine counterparts, cattle may paw the ground with a forelimb, lift their back limbs such as to kick at their abdomen, flank watch, and display restlessness or agitated behaviors such as frequent standing up from lying and vice versa. However, cattle are often stoic in nature and signs may be subtle to only include standing with an arched back, appearing depressed or lethargic, or display a decrease in feed intake. Production system will provide another set of factors to scrutinize, such as a drop in milk production or cessation of weight gain. A thorough history and physical exam will guide the selection of diagnostic tests to differentiate gastrointestinal from extraintestinal causes. Husbandry and production system begins to narrow the differential lists, such as a recently fresh dairy cow being susceptible to a displaced abomasum or a feedlot steer being at risk for urolithiasis.

Visual examination may further characterize location or organ system of involvement. Abdominal contour, as viewed from behind the animal, in the shape of a reverse capital “D” may indicate bloat or other causes of Type I vagal indigestion, whereas a “papple” shape of rounded abdominal distention on the left and low abdominal distention on the right may indicate omasal outflow obstruction or other causes of Type II vagal indigestion. A cow standing with an arched back, abducted elbows helps to localize pain to the thorax or cranial abdomen. This can be confirmed by an abnormal response to a withers pinch, where the normal animal will ventroflex away from the examiner, or a painful response to a bar test, when pressure applied to the sternum in the region of the xiphoid results in a grunt or teeth grinding. Percussion and succussion findings help to prioritize differential diagnosis lists, as previously discussed. Lastly, rectal exam findings may also identify and localize organ system of interest. A gas distended, blind-ended viscus may be palpable with cecal dilatation +/- volvulus. Firm, distended loops of jejunum may be palpable in cases of hemorrhagic bowel syndrome. Peritonitis often results in a tight rectum on palpation with poor mobility. Urinary tract disease may reveal pulsation of the pelvic urethra or pain on palpation of an enlarged kidney or ureter in cases of obstructive urolithiasis and pyelonephritis, respectively.

If chemistry or blood gas are available, proximal instestinal outflow obstruction is indicated by hypochloremic, metabolic alkalosis. A transition to metabolic acidosis may be seen later in the disease process, or may indicate strangulation, can be seen with severe diarrhea in cases of enteritis, or urinary tract disease. Proximal intestinal outflow obstruction may be confirmed by evaluating rumen fluid for elevated chloride levels (normal <25-30 mEq/L). This sample may be obtained by ororumen intubation, however, if rumen pH is to be evaluated as well, rumenocentesis is recommended to avoid false elevation of pH by salivary bicarbonate. Normal rumen fluid is green to brown in color with a pH of 6.0-7.0, however pH may vary significantly with diet. Abdominocentesis in cattle is typically performed in two sites, following routine clipping of hair and aseptic preparation. The first location is in the right paramedian region a handsbreadth caudal to the xiphoid and a handsbreadth from midline. The second location is in the right caudal abdomen immediately cranial to the udder below the right fold of the flank. Samples are collected via 18ga needle or metal teat canula, the latter requiring local anesthetic administration and a stab incision through the skin and body wall to be performed. In either case, penetration of the peritoneum is indicated by a distinct “pop” that is felt as the needle passes through. Fluid is collected into EDTA for cytology and cell count, whereas a sterile sample is collected for culture. Normal abdominal fluid is clear-yellow in color with low protein (normal <3.0 g/dL) and few cells (TNCC 2,000-5,000 cells/uL). Bowel necrosis is indicated by cloudy yellow to serosanguinous appearance with elevated protein, cell count, and lactate (>3 mmol/L).

Indicators of peritonitis include abundant, cloudy fluid with severely elevated protein and cell counts. Rupture of GI viscus is indicated by the presence of green colored fluid and feed material, while rupture of the urinary tract may reveal yellow colored, urine-smelling fluid.

While often limited to referral facilities, radiographs of the cranial abdomen may reveal the presence of metallic foreign bodies in cases of traumatic reticulitis/peritonitis/pericarditis. Ultrasound is growing in availability to practitioners and may yield a definitive diagnosis in some cases. The cranioventral abdomen is evaluated for the presence of fluid or fibrin and changes to the bi-phasic contraction pattern of the reticulum, both of which may indicate the presence of adhesions. Ultrasound may also be used to confirm left displaced abomasum, typically in the last two rib spaces on the left side. The appearance of dilated, hypo- to amotile small intestines with organized mixed echogenic material is consistent with hemorrhagic bowel syndrome. One may even be lucky enough to see the classic “target” lesion, characteristic of an intussusception.

For some disease processes, a specific diagnosis is quickly and easily achieved and appropriate medical and/or surgical treatment can be initiated to whatever degree the budget and desire of the client should allow. However, even in cases with an unlimited budget for diagnostics, a definitive diagnosis may fail to be achieved. There are several factors that urgently indicate the next diagnostic step should be exploratory laparotomy, including the following: continued severe signs of colic, rapid deterioration of vital parameters, heart rate >100 beats/min, pings compatible with cecal or abomasal conditions, suspicion of intestinal or cecal torsion, or abdominocentesis yields fluid consistent with bowel devitalization. In the absence of these, medical management is indicated, including supportive care to correct abnormalities in hydration and electrolyte status. Complete re-evaluation should be completed in 4-6 hours to determine response to therapy. Exploratory laparotomy is indicated in the face of deterioration or no improvement, while improvement warrants continued supportive treatments.

Whether responsive to medical management or if surgery has been pursued, the prognosis can be more accurately predicted when a definitive diagnosis is achieved. The following summarizes the general prognosis of several common diseases that are encountered in acute abdomen cases. When peritonitis is localized in cases of traumatic reticuloperitonitis, the prognosis is considered fair to good, with one study reporting 83% and 90% survival to discharge with medical and surgical therapy, respectively. Prognosis is poor to guarded in the presence of pericarditis, pleuritis, or generalized peritonitis. Left displaced abomasum cases are generally considered to have a good to excellent prognosis for survival, but one study revealed two factors that were associated with early removal from the herd (culled within 60 days): cows that had dystocia were 13x more likely and those that were not ketotic (BHBA < 1.2 mmol/L) at the time of surgery were 3x more likely. The association between nonketotic cows and early removal is hypothesized to be due to the decreased ability of this population to return to normal milk production, reflecting poor adaptation to support a return to economically viable level of milk yield in the short term. Following right paralumbar fossa laparotomy for correction of LDA, pyloro-omentopexy appears to have a lower rate of recurrence compared to omentopexy (4/29 vs 0/58). For right abomasal displacement and volvulus, prognosis for survival to discharge following surgical correction is 97% and 84%, respectively, and one year survival rates are better as well (86% vs 66%, respectively). Systemic lactate has been associated with outcome in cases of RDA; those having a positive outcome had a mean lactate of 3.2 mmol/L and those with a negative outcome had a mean lactate of 5.8 mmol/L. Small intestinal intussusception generally carries a poor prognosis and poor prognostic indicators include severe dehydration (>12%), severe tachycardia on presentation (>120 beats/min), and severe hypochloremia (<80 mEq/L). The prognosis of hemorrhagic bowel syndrome cases ranges from grave to fair, with surgery

appearing to be protective. The largest study available on the condition reported that manual clot dissolution was preferable to enterotomy or resection and anastomosis.

In summary, there are many factors that continue to make cases of acute abdomen in cattle a diagnostic and therapeutic challenge, including the stoic nature of the patient, the financial limitation that are associated with many cases, and the lack of diagnostics that are available, particularly in an ambulatory practice setting. These limitations place an emphasis on clear communication between practitioner and client regarding what constitutes a successful outcome for the patient in question and the associated cost estimate. It is the author's opinion that one of our greatest responsibilities as veterinarians is to provide our clients with understandable and accurate information that allows them to make an informed decision regarding their livestock.

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