

Cecal Dilatation and Volvulus

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Definition

Dilatation or volvulus of the cecum is the principal differential diagnostic ruleout for cows with an area of tympanitic resonance centered over the right paralumbar fossa. Because passage of digesta between the cecum and the ascending colon is not impeded by the presence of a cecocolic valve or constriction, distention of the cecum invariably results in concurrent dilatation of the proximal loop of the ascending colon (proximal colon) or portions of the spiral or distal loops of the ascending colon.

Dilatation of the cecum is a condition of mild severity and may be asymptomatic, with the diagnosis being made during routine examination of the cow for other purposes. The cecum becomes distended with gas and expands into the pelvic inlet with the apex directed caudally. In contrast, volvulus of the cecum is an acute, life-threatening condition characterized by abdominal distention, absence of feces, colic, and death if untreated. In this condition, the cecum and (usually) the first two segments of the proximal colon twist about the mesentery causing incarceration and eventually strangulation obstruction of the affected portions of the bowel. True cecal torsion; that is, twisting of the cecum on its longitudinal axis, is rare. Usually, reports of cecal torsion should be described more accurately as volvulus.

History and Clinical Signs

Cecal dilatation with or without volvulus occurs sporadically in adult dairy cattle, usually within the first two months after calving although the tendency for cecal disorders to occur in cows during late pregnancy has also been observed. Rarely has the condition been reported in bulls. The majority of cows seem to be affected during the winter months in the period of confinement.

Cows with cecal dilatation may be identified as being ill because of decreased appetite and milk production, perhaps with accompanying ketosis. Often, cecal distention is diagnosed by rectal palpation during routine postparturient reproductive examination or during examination of a cow with such concurrent conditions as abomasal displacement of metritis.

Cows with volvulus or rotation of the cecum and proximal

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colon have an acute onset of anorexia, decreased milk production and right paralumbar fossa distention. Signs of visceral pain (colic) of moderate severity are common and persist throughout the course of the condition.

Physical Findings

Cecal Dilatation (without volvulus): The predominant finding in a cow with simple cecal dilatation is the presence of a gas-distended, freely movable blind-end organ palpated per rectum within the caudal part of the abdominal cavity and filling the pelvic inlet. There is a corresponding area of tympanitic resonance centered over the right paralumbar fossa. The cranial limit to this area of ping is determined by the extent to which the proximal colon is simultaneously involved. Succussion of the abdomen may yield splashing sounds; however the predominance of distention is due to the accumulation of gas rather than fluid. Unless the condition is protracted, vital signs and rumen function remain normal. Milk production may not be severely compromised, although affected cows are usually hypophagic and have concurrent ketosis. Fecal production is decreased in volume and feces may be loose or dry, depending on the type and degree of alterations in intestinal transit. Hydration is usually normal and there are no expected hematologic, electrolyte or acid-base alterations, even in chronic cases.

Cecal (and Proximal Colon) Volvulus: Cows with volvulus of the cecum and proximal colon have a variable degree of distention over the right paralumbar fossa, sometimes with a horizontal or oblique indentation at the skin surface corresponding to the distended segments of bowel. The area of tympanitic resonance is centered over the right paralumbar fossa, but it may extend cranially to the level of ribs 10-12. The quality of pitch and the loudness of ping may vary from one part of the abdomen to another depending on the portion of bowel deep to the percussion site. Succussible fluid is readily detected in the region where the ping is elicited. Rectal temperature is usually normal; however, the pulse rate may be high due to the presence of abdominal pain or dehydration. Mild to moderate signs of colic are often observed, characterized by treading with the rear limbs and occasionally kicking at the abdomen. After the first few hours following obstruction, feces becomes scant and mucus may be present in the rectum. On rectal examination, the cecum and/or proximal colon can be distinctly palpated extending cranially

from the level of the pelvic inlet. The cranial rotation of the cecum produces the sensation of the presence of two distended viscera. In fact, the palpated organs are most likely to be cecum and proximal colon, or two segments of the cecum folded on itself. The spiral colon may also be distended if it is involved in the twist. Similarly, dilated small intestine can sometimes be identified, either because a portion of the distal flange of the jejunioileum is twisted with the cecum, or because of backup of digesta proximal to the site of obstruction.

In late stages of cecal volvulus, portions of the cecum and proximal colon become compromised, with evidence of intraluminal or intramural hemorrhage, edema or infarcts. If necrosis is present, it is usually centered at the junction of the first and second segments of the proximal colon rather than within the cecum. In fact, the cecum itself may be viable, whereas a segment of the proximal colon may have a significant degree of infarction. Presumably, this is due to the fact that the twist is focused at the proximal colon rather than the cecum.

Affected cows become dehydrated with an increasing degree of hemoconcentration and hyperproteinemia as the condition progresses. Complete blood count may be normal or may reflect leukocytosis due to endogenous corticoid release or the development of peritonitis. The acid-base picture is interesting in that many affected cows develop hypochloremic, hypokalemic metabolic alkalosis in relatively early stages of the condition. This is difficult to explain solely on the basis of backup of intestinal contents and reflux of abomasal acid into the forestomach compartments. However, recent observations in isolated cases have identified the presence of obstruction of the duodenum by external compression of the distended cecum and colon. This explanation seems to most appropriately explain the presence of these metabolic disturbances in cows which otherwise do not have evidence of pyloric outflow obstruction.

The etiology of cecal dilation and volvulus is unclear, but the pathogenesis has been reported to be similar to that of abomasal displacement in that increased grain feeding may result in greater quantities of volatile fatty acid production. This causes increased intraluminal gas production and decreases motility. The blind sac nature of the cecum perhaps contributes to the exacerbation of the condition.

The mechanism of twisting associated with cecal volvulus has not been completely described, although the direction of twist has been classified as clockwise or counterclockwise as viewed from the right side of the cow. In both situations, the apex of the cecum acts as the leading component of the organ and the axis of rotation is through the second segment of the proximal colon. The twist is centered in this portion of colon because it is a relatively fixed piece of bowel, being held in position by the attachment of the left surface of the greater omentum or the common mesentery dorsal to the descending duodenum. The distal segment (flange) of the small intestine may also be included in the volvulus, and has been observed to lie on the left side of the abdomen, caudal to the dorsal sac of the rumen.

Diagnosis

There is seldom difficulty distinguishing cecal dilatation/volvulus from right side dilatation/volvulus of the abomasum. In cattle with abomasal dilatation/volvulus, the area of tympanitic resonance is centered over the last few ribs; whereas, in those with cecal distention, the ping is centered over the paralumbar fossa. Careful rectal examination is essential for the accurate identification of cecal distention. A significant portion of the cecum, including both left and right surfaces, can be palpated. Palpation of the abomasum, on the other hand, is difficult and can be accomplished only at the extent of the arm's reach unless the abomasum is greatly distended.

Three other diagnostic ruleouts should be considered. Gaseous dilatation of the proximal or of the spiral colon has similar clinical signs to simple dilatation of the cecum. However, the area of ping in these cows is smaller, sometimes inconsistently identifiable, and is positioned farther cranially. The apex of the cecum cannot be felt, although distended colon may be palpated at the level of the paralumbar mass (including cecum) about the mesenteric root. Rectal findings in these cows may be very similar to those with advanced volvulus of the cecum and proximal colon; however, the differentiation may be made on the progression of illness as these cows have very severe colic and rapidly progress to a state of irreversible shock. Finally, vagal indigestion should be considered as a differential diagnosis. In cows with marked distention of the rumen, palpation of the greatly dilated ventral sac positioned far to the right of midline and dorsally within the abdomen can be confused with the cecum. The differentiation is made by palpating along the left surface of the organ in question to determine if it connects to the right longitudinal groove of the rumen or if it is an isolated viscus.

The greatest diagnostic challenge encountered relative to cecal diseases is the differentiation of simple dilatation from volvulus. Because cows with cecal volvulus require surgical intervention, differentiation of these conditions is important. The table summarizes the principal distinguishing features of these conditions.

Therapy

Cecal Dilatation (without volvulus): Cows with cecal dilatation usually respond to symptomatic medical therapy. Correction of electrolyte imbalances, in particular calcium or potassium deficiencies, and ketosis, is important to restore gastrointestinal motility. If possible, the diet should be modified to decrease the concentrate/roughage ratio. Exercise is sometimes useful in expelling the gas from the cecum. The use of cathartics containing magnesium oxide or magnesium hydroxide is discouraged because of their tendency to induce iatrogenic metabolic alkalosis. If cecal dilatation persists as a chronic condition unresponsive to medical therapy, and if the cow's appetite and milk production continue to be affected, surgical therapy is

TABLE 1. Clinical Differentiation of Cecal Dilatation and Cecal (and Proximal Colon) Volvulus.

Parameter	Cecal Dilatation	Cecal Volvulus
Onset of signs	gradual	acute
Progression of illness	slow	rapid
Degree of illness	mild	moderate to severe
Abdominal Distention	right paralumbar fossa (mild to moderate)	right paralumbar fossa (moderate to severe)
Colic (Visceral pain)	absent	often present; mild to moderately severe
Feces	dec volume; variable consistency	scant or none; mucus
Tympanitic Resonance	R paralumbar fossa, cranially to rib 13	R paralumbar fossa, cranially to rib 10-12
Succussible fluid	absent	present
Palpation per rectum	distended apex of cecum in pelvic inlet	body of cecum and/or proximal colon at level of PLF; may also feel spiral colon/ileum.

indicated. Through a right paralumbar fossa celiotomy (with the cow in a standing position), the cecum and ascending colon can be completely examined to ascertain if there is a mechanical cause for the prolonged dilatation. If none is found, as is usually the case, gas is evacuated by suction. When present, fluid digesta can be removed through a stab incision at the apex. If, after both gas and fluid are removed from the organ, the cecum fails to contract to its normal size, surgical removal of the cecum up to but not including the ileocecolic junction (as described below) is recommended. Typhlectomy is also advocated in those cows in which the cecum remains edematous and thick-walled following decompression.

Cecal (and Proximal Colon) Volvulus: Cows with cecal volvulus require surgical correction. If the cow is severely dehydrated, preoperative intravenous fluid therapy with lactated Ringer's or sodium chloride (plus KCl) is essential. Perioperative antibiotic therapy is also indicated.

A standing right paralumbar fossa celiotomy is performed. The distended cecum and proximal colon are readily identified and are often located outside of the supraomental recess between the greater omentum and the right body wall. Reduction of the volvulus should not be attempted before decompression. Gas is evacuated using needle and suction. The cecum is then exteriorized and a small stab incision is made at the apex through which fluid from the cecum and proximal colon is removed. Repeated milking of fluid from the intra-abdominal portion of the colon is necessary to attain optimal decompression. Following decompression, the cecum, proximal and spiral loops of the ascending colon and the distal flange of the jejunioileum are exteriorized, then repositioned in their normal configuration within the supraomental recess.

The need for typhlotomy is based on the failure of the cecum to contract adequately following surgical decompression or the presence of areas of infarction.

Removal of the apex of the cecum is also recommended for cows which have had a recurrence of cecal volvulus. If there is evidence of infarction of a portion of the proximal colon, as is sometimes the case in cows with prolonged volvulus, the cecum, ileocecolic junction and the affected segment of the proximal colon should be resected. This procedure is difficult to perform and requires general anesthesia for optimal results.

Complications

Some cows with simple cecal dilatation fail to respond to medical therapy and require surgical intervention. Others have recurrence of the condition in the same, or in subsequent, lactations.

There are a few recognized complications to surgical management of cecal volvulus in cattle unless the cecum or colon are severely necrotic or the cow is in advanced stages of circulatory collapse at the time of surgery. Most cows start to pass voluminous amounts of loose feces within hours of surgical correction. As above, there may be recurrence of cecal volvulus in a significant proportion of cows. The only reliable way to prevent this is to amputate the apex of the cecum, although this procedure is not generally recommended unless there is recurrence of the condition.

Prognosis

For both conditions, the prognosis is very good. Cows with cecal dilatation generally return to full milk production after successful medical management. Similarly, most cows recover completely following surgical repair of cecal volvulus, even if typhlotomy is required. The effect of the cecum including the ileocecolic junction have been studied and found to have minimal effect on digestability, weight gain and other metabolic parameters.