SURGERY OF THE BOVINE DIGESTIVE SYSTEM

Surgical Diseases of the Oral Cavity

LACERATIONS

Oral lacerations in cattle are associated with the same indiscriminate eating habit which results in traumaticreticulopericarditis. Lacerations are more common in calves because of their oral prehension and suckling habits on objects in their environment such as barbed wire, needles, and thorns. The lacerations may involve the lips, buccal membranes, and the tongue. Animals usually present with excess salivation, which may be mixed with blood, decreased appetite, and various degrees of dysphagia, depending on the severity of the laceration. The animal's tongue often protudes past its lips. The diagnosis is based on physical examination. First, the head is grasped with one hand on the maxilla at the level of the interdental space. The rostral aspect of the mouth can then be inspected and palpated using the other hand. Most lacerations heal without surgical intervention by using daily mouth lavage and systemic antibiotics and by feeding a soft diet.

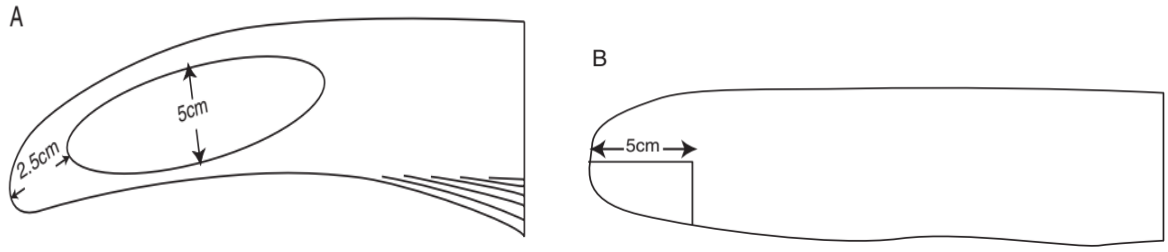
Severe tongue lacerations sometimes require a partial glossectomy. Because of the tongue's crucial role in prehension of food, as much of the tongue as possible should be preserved. In preparation for surgery The animal is anesthetized and placed in lateral recumbency. A tourniquet (made of rolled gauze) is applied proximal to the intended transection site. The tongue is transected so that the dorsal and ventral aspects protrude beyond the center. The ventral and dorsal aspects are sutured together with an interrupted horizontal mattress pattern with a no.-1 or no.-2 absorbable sutures. The animal should receive systemic antibiotics postoperatively and should be fed a soft diet (not pasture) for best results.

Buccal fistulae result from lacerations or other traumatic incidents and result in loss of saliva and feed material as well as cosmetic defects. While the animal is ruminating, the cud may be dropped during mastication. The diagnosis is obvious; one needs to inspect the lesion to determine the optimal time of repair. Surgery should be done on fresh lacerations or after any inflammation and infection in the local musculature has been resolved. The fistula edges are debrided while the animal is under sedation following infiltration of a local anesthetic or under general anesthesia. The defect is closed in three layers. The muscles (usually buccinator) are reapposed with absorbable suture material (no. 1 or 2) in a simple interrupted pattern. The oral mucosa is closed with a simple continuous pattern using no. 00 absorbable sutures. Finally, the skin is reapposed with a simple interrupted suture (no. 1). Postoperatively, systemic antibiotics are indicated along with a soft gruel or liquid diet, preferably for 10 to 14 days.

SELF-SUCKLING

Self-suckling is most commonly treated by using a nasal ring with a burr or nasal flap and individual housing. If these more conservative treatments are not successful, a partial glossectomy can be considered.

Partial Glossectomy Two surgical techniques have been created to perform a partial glossectomy to prevent self-suckling in animals. The techniques are performed with sedation and local infiltration of lidocaine or general anesthesia. Both techniques alter the tongue's contour to prevent the animal from forming a U-shaped tongue for suckling. For the ventral glossectomy technique, an elliptical incision is made that is approximately 5cm at its widest part and starts rostral to the frenulum attachment on the tongue and extends rostrally 2.5cm caudal to the tip of the tongue (Figure A). Each side of the ellipse is incised at an angle toward the midline to facilitate closing the defect, as shown in Figure 10.1-3B. The lateral glossectomy technique removes half of the tip of the tongue (Figure B). Again, the incision is extended at an angle to facilitate closing the tongue similar to what is shown in Figure 10.1-3B, except in a different plane.



A,Ventral glossectomy; note elliptical excision of a section of the tongue. B, Lateral glossectomy: note unilateral excision of the first two inches of the tongue.

Esophageal Surgery

FOREIGN BODY OBSTRUCTION

Foreign body obstruction, or "choke," a common esophageal disorder in cattle, results from incomplete mastication and rapid ingestion. Cattle produce large quantities of saliva, which makes a smooth-skinned potato or apple difficult to masticate, so it can slip into the pharynx and esophagus. Other common sources of obstruction include cabbage, beets, turnips, and ears of corn. Infrequently, sharp foreign bodies such as glass or irregular metallic objects can be swallowed and lodged in the esophagus.

The clinical signs of "choke" include ruminal tympany, excessive salivation, coughing, tongue protrusion, and extension of the head and neck. The animal may be dehydrated and anxious. Obstructions in the cervical esophagus can usually be palpated externally. After rabies has been ruled out, a thorough oral examination should be performed to evaluate the pharynx and check for any foreign bodies. Passage of a nasogastric tube helps determine swallowing ability and localize the obstruction site. If the esophagus is filled with fluid proximal to the obstruction, visualization can be difficult. Plain radiographs can show esophageal distention with gas or deviation of the esophagus. Feed material impactions or radioopaque foreign bodies may show up on plain survey films. Contrast studies help delineate nonmetallic foreign bodies.

Treatment: Most esophageal disorders can be managed conservatively; thus few reports of surgical intervention in the ruminant esophagus exist. A lateral or ventrolateral approach is typically described

for performing a cervical esophagotomy; a left-sided rib resection is usually performed on the thoracic esophagus. General anesthesia and positive pressure ventilation are essential for a thoracotomy. A longitudinal incision is used to incise the esophagus. Once the muscular coat is incised, the esophagus separates into two layers: the elastic inner layer, which is composed of mucosa and submucosa, and the outer muscular layers and adventitia. The inner layer provides the greatest tensile strength during esophageal closure. Preservation of blood supply, aseptic technique, apposition of tissues without tension, and appropriate preoperative and postoperative management are essential for a successful outcome.

Primary esophageal closure involves a 2-layer technique. The mucosa and submucosa are closed together in either a simple continuous or simple interrupted pattern. A nonabsorbable (e.g., polypropylene or nylon) or longlasting absorbable (e.g., polyglactin 910, polydioxanone, or polyglyconate) suture material is used. It is recommended the knots be tied within the esophageal lumen to prevent contamination of the wound by ingesta migrating along suture tracts. The muscular layer can be closed by using either an absorbable or nonabsorbable noncapillary suture with a simple interrupted or mattress pattern. A suction drain* may be placed to allow evacuation of contaminated exudate. The lack of serosal covering may contribute to complications after surgery, including leakage and dehiscence.

Surgery of The Ruminant Forestomach Compartments

Lactic Acidosis

The consumption of a large amount of rapidly fermentable concentrate feed or a sudden diet change to such food can result in severe indigestion. This syndrome has been termed lactic acid indigestion, grain overload, rumen overload, and acute carbohydrate engorgement. This is a condition most commonly seen in feedlots but can occur in other instances such as inadequately mixed rations or cattle getting loose in the feed room. Within 6 hours of ingestion, the easily fermentable concentrate is broken down to lactic acid isomers of both the D and L forms. The L isomer is used rapidly, whereas the D isomer persists and results in D-lactic acidosis. Streptococcus bovis is the primary organism responsible for this conversion. The pH of the rumen contents decreases to 4.5 to 5.0, at which time microbes other than Streptococcus bovis have been destroyed. Rumen stasis occurs. Streptococcus bovis continues to exist at this low pH and produces more lactic acid. Rapid accumulation of lactic acid in the rumen osmotically draws water into the rumen, thus accentuating the cow's dehydration. In addition, the acidic fermentation produces excessive amounts of volatile fatty acids (VFA), which are absorbed and contribute to a metabolic acidosis. Eventually, the rumen mucosa is damaged, allowing transudation of protein into the rumen. Affected cattle are inappetent, dehydrated, and tachycardic, with a sudden decline in milk production. The rumen is distended and fluid-filled. Eventually, diarrhea develops, and untreated animals become weak and recumbent.

A sample of rumen fluid in the acute stages will show a pH of 4.5 to 5.0 (normal is 6.5 to 7.0). This may be less evident with time as the rumen contents are buffered by the high bicarbonate content of swallowed saliva. A severe metabolic acidosis with neutropenia is typical. The prognosis and treatment

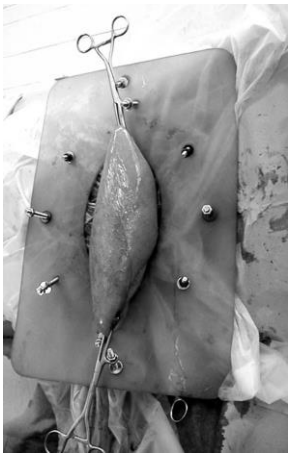
plan will depend on the duration of the insult. In the acute stage, a rumenotomy may be indicated to empty as much foodstuffs as possible. Recommendations for surgery include an animal with a rumen pH of 5.0 or less, a heart rate greater than 100 beats per minute, dehydration greater than 8%, and marked rumen distention, which indicates a severe grain overload. The rumen is emptied and lavaged with water several times to remove as much lactic acid as possible. Additional therapy includes laxatives, fresh hay in the rumen, repeated rumen transfaunates if available, parenteral calcium, nonsteroidal antiinflammatory drugs, and intravenous fluid therapy. Intravenous fluids should be balanced electrolyte solutions such as lactated Ringer's solution, and supplemental sodium bicarbonate is added if acidemia is suspected or confirmed by acidbase/electrolyte values. Prognosis for these cattle is guarded.

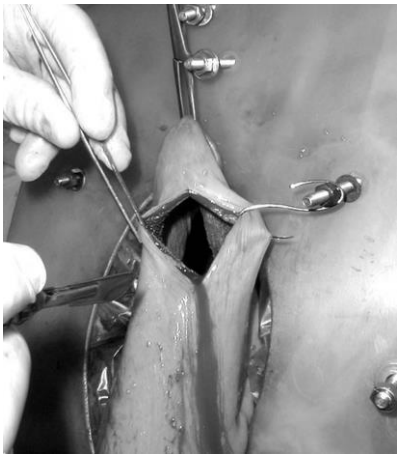
LEFT FLANK CELIOTOMY AND RUMENOTOMY

The left flank is prepared for aseptic surgery. Anesthesia is achieved by infiltration with a local anesthetic in a line block, inverted L block, or paravertebral block.

A 20- to 25-cm dorsoventral skin incision is made 4cm caudal and parallel to the last rib and 6 to 8cm ventral to the transverse process of the lumbar vertebrae.

RUMENOTOMY WITH THE RUMEN BOARD OR WEINGARTH APPARATUS Because use of the rumen board and Weingarth apparatus is similar, only use of the rumen board will be described. The wall of the dorsal sac of the rumen is grasped with two large noncrushing rumen forceps. These forceps are hooked on the dorsal and ventral aspect of the rumen board. This allows exteriorization of a portion of the rumen wall (Figure 10.3-8). The rumen wall is incised dorsally. The rumen hooks are implanted in the cut edges of the rumen and attached securely to screws and nuts placed at regular intervals along the rumen board. Incision is continued ventrally, and the hooks are placed at regular intervals to secure the rumen wall to the rumen board down to the level of the ventral forceps.





RUMENOTOMY AFTER SUTURING THE RUMEN WALL TO THE SKIN The goal of rumenotomy is to obtain a good seal between the skin and rumen, so that even if ruminal contents escape the incision, no abdominal contamination will occur. As one makes the seal, it is important to exteriorize a generous part of the rumen so the rumenotomy incision can be closed without disrupting the rumento-skin seal. Otherwise, the seal will have to be undone to close the rumen, which increases the possibility of

abdominal contamination. The dorsal sac of the rumen is grasped by an assistant and exteriorized with forceps or moist sponges. Starting at the dorsal aspect, the rumen is sutured (usually with a nonabsorbable #1 suture) to the skin with a simple continuous pattern and to the rumen with a Cushing-type pattern. A cutting needle should be used so that the skin is penetrated. Care should be taken not to penetrate the ruminal mucosa, although the authors have not recognized complications when penetration has occurred.

CLOSURE After gross contamination has been removed, the rumen wall is closed with No. 2 absorbable sutures with a twolayer closure; at least one layer of which should be an inverting pattern (see Figure 10.3-13). The surgery site is thoroughly lavaged, and all soiled instruments are discarded. If the rumen was sutured to the skin, the suture is cut, and one quadrant at a time is freed. A moist sponge is used to wipe off ingesta trapped between the rumen and skin. The surgeon dons fresh sterile gloves. The abdominal musculature is usually closed in two or three layers by using a simple continuous pattern ofabsorbable sutures in the muscle layers. The skin layer is closed with a continuous Ford interlocking pattern. It is wise to close the ventral aspect of the skin incision with two to three simple interrupted sutures. The possibility of incisional infection is obvious, and drainage can be easily obtained by removing these ventral two-to-three sutures if necessary.

POSTOPERATIVE MANAGEMENT Antibiotics are administered systemically to treat the septic reticuloperitonitis. Oral or intravenous fluids may be needed to correct dehydration and metabolic alkalosis, if present. Rumen transfaunate can be given to reestablish normal flora and stimulate ruminal motility. Postoperative complications include swelling and discharge at the incision site. Because of the nature of the surgery, contamination of the incision site occurs easily. If recognized, these infections respond well to ventral drainage.

Abomasal Displacement Syndromes

The abomasum has the capacity for major changes in volume and location. The abomasum is mobile because it is suspended in the distal turn of a U supported by the lesser omentum (Figure 10.4-1). Three syndromes that involve movement of the abomasum are commonly recognized: left abomasal displacement (LDA), right abomasal dilation/displacement (RDA), and volvulus of the abomasum on the

right side (RVA). The conditions called RDA and RVA may be two stages in a progression rather than separate syndromes, with RDA developing first and developing in some but not all cases into a RVA.

Left Abomasal Displacement (LDA)—General Considerations

Definition and Incidence

Left displacement of the abomasum (LDA, refers to the abomasum relocating to the left side of midline between the rumen and left body wall. It was first reported in 1950 and is currently one of the most common surgical problems encountered in modern production dairies, with an incidence of 0.35% to 4.4% in large population studies—and as high as 15% in some herds. The number of reported LDAs appears to have increased in production dairy cattle over the last two decades, indicating an increase in incidence, in recognition, or both. Left displacements occur sporadically in beef cows and in beef and dairy bulls. In data from over 100,000 admissions to 17 veterinary teaching hospitals in North America, dairy cattle were found to have an adjusted odds ratio of 95.2 of developing an LDA in comparison to beef cattle, and female cattle in general have a 29.1 adjusted odds ratio in comparison to males.

Predisposing Factors

The majority of LDAs in adult dairy cows occur in the first month of lactation, with 57% reported in the first 2 weeks postpartum, 80% within the first month, and 85% to 91% within the first 6 weeks postpartum. The risk of development increases with age and is highest in dairy cows between 4 and 7 years of age. Predisposition in Guernsey, Holstein-Friesian, and Ayrshire breeds has been suggested, although some variation exists between studies. A genetically linked predisposition has been suggested in Holstein cattle but has been disputed. A phenotypic predisposition in cattle with large abdominal cavities has also been suggested. A seasonal predisposition for developing LDAs has been identified in North American cattle, with the highest incidence in spring (March through June) and the lowest in fall (September through October).

Diagnosis

Adult dairy cows with an LDA typically are noticed when their milk production and/or feed consumption is less than expected or they have a sudden drop in milk production and/or feed consumption later in their lactation. Classically, cows with LDAs selectively go off concentrates first, although this may vary with individual animals. Other commonly recognized signs include depression and loose or pasty, scant feces that may be darker in color than normal. The nature of feces is an important indicator of possible concurrent diseases. Although often called diarrhea, fecal volume generally decreases in cows with only an LDA. When fecal volume and fluidity increases, concurrent intestinal diseases such as Johnes or bovine viral diarrhea should be considered, with the prognosis and plan adjusted accordingly. Dark feces (melena) may occur as a result of abomasal hemorrhage from ulcers, with a similar need for an altered prognosis and plan.

The veterinarian most commonly diagnoses LDA by using simultaneous auscultation and percussion to detect a tympanic ping on the left side of the cow. The ping is usually centered over the last few ribs on

a line from the elbow to the tuber coxae. With extreme distention, the abomasal ping can be detected in the left flank as far caudally as the tuber coxae and as far cranially as the ninth rib. Occasionally, the ping will be located more ventral or cranial than expected. This may occur transiently because of repositioning of structures as gas enters or leaves the abomasum. However, if the abnormal ping location is consistent, the possibility of abomasal adhesions caused by concurrent abomasal ulcers should be considered. In some cases, the ping will disappear completely for a period of time only to recur at a later time. This is commonly called a floating DA, which suggests the abomasum moves back and forth from displaced to normal position. It is more likely the ping comes and goes as gas builds then passes temporarily out of the abomasum, which remains left of the rumen.

Treatment Effective management of a cow with an LDA requires a number of decisions, the first being whether to treat the individual cow at all. This decision should be based on the cost of treatment, anticipated economic losses from the LDA and concurrent conditions, prognosis for return to production, expected future income from production, immediate slaughter value, and—perhaps of greatest impact—the owner's interest in treating the specific animal in question. Use of decision analysis can help weigh the variable economic factors, although the owner may ultimately make his or her decision based on factors that do not fit directly into an objective formula.

Left Abomasal Displacement (LDA): Medical Management

The common goal of medical approaches is to restoreabomasum motility sufficiently to allow it to expel gas and spontaneously return to its normal position. Although some aspects of medical therapy are valuable adjuncts to surgical treatment, the likelihood of effectively resolving an LDA with medical therapy alone is very low (less than 5%). Pharmaceutical approaches include oral or systemic calcium, parasympathomimetic agents, various oral intestinal stimulants, fluid therapy to correct dehydration and electrolyte imbalances, and agents to treat ketosis (dextrose, insulin, propylene glycol corticosteroids). Although correcting fluid imbalances and treating ketosis and hypocalcemia in affected animals are valuable adjuncts to surgically managing an LDA, there is little evidence to suggest that pharmaceutical treatments alone have any permanent effect on correcting a displacement. Acid-base disturbances can be exacerbated if magnesium-based intestinal stimulant use is continued in an uncorrected displacement. Withholding feed for 48 hours, feeding high fiber diets, forced exercise, and truck rides have been suggested treatments generally acknowledged to have little long-term effect. A transient reduction or loss of the characteristic LDA ping after transportation is a phenomenon well recognized by food animal practitioners at referral centers. The rapid return of the ping (generally within 6 to 8 hours) suggests that transportation helps expel gas from the abomasum but does not restore normal abomasal position or function.

Left Abomasal Displacement (LDA) Surgical Procedures The conventional open surgical procedures group includes all procedures that involve a surgical approach to the abdomen. They share diagnos abomasum and other structures in the abdomen, and structure(s) used to stabilize the abomasal position. The commonly used open procedures that meet the goals of treatment for LDAs include right paralumbar fossa omentopexy, right paralumbar fossa pyloropexy, right paramedian abomasopexy, and left paralumbar fossa abomasopexy. Other techniques described in the literature—including

rumenopexy, pyloromyotomy, left paralumbar fossa omentopexy and right paralumbar fossa abomasopexy— have significant disadvantages over the four described procedures and have largely fallen out of use in favor of the other more reliable techniques. The open procedures share a similar risk of peritoneal and/or incisional infection. In otherwise healthy cattle where good technique is used, all open procedures would be considered clean, and prophylactic antibiotics would not be warranted. However, a high percentage of cows with an LDA either have a concurrent infectious process (mastitis, metritis) or a concurrent condition that may decrease the host response to surgical contaminants (ketosis, hypocalcemia, dehydration). Limitations in restraint and the surgeon's ability to control the surgery site in a field setting also increase the risk of surgical contamination. If any of these risk factors exist, a single broad-spectrum preoperative prophylactic dose of antibiotics given IM (1 hour) or IV (15 minutes) before surgery would be indicated. Preoperative calcium supplementation is particularly important if a recumbent approach is planned or if the cow is at risk of going down during a standing approach. Fluid therapy should be initiated before surgery in moderately and severely dehydrated cattle.

Rectal Prolapse

OCCURRENCE AND CLASSIFICATION

Any breed, sex, or age can be affected; however, rectal prolapse occurs most commonly in feedlot cattle from 6 months to 2 years of age. In a type I prolapse, only the rectal mucosa projects through the anus. A type II prolapse is a complete prolapse of all layers of the rectum. In a type III prolapse, a variable amount of descending colon intussuscepts into the rectum in addition to a type II lesion. In a type IV prolapse, variable lengths of the peritoneal rectum and/or descending colon form an intussusception through the anus. Types I and II are much more common than types III and IV.

MANAGEMENT

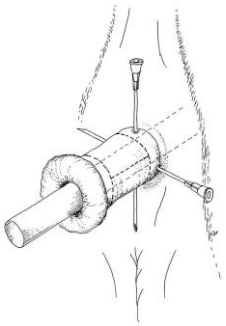
Generally, management of rectal prolapse includes elimination of predisposing factors, soothing of the irritated mucosa, elimination of straining, and resolving the prolapse. The condition of the prolapsed tissue plays the most important role in choosing the treatment method. The color of the membranes, degree of edema/hemorrhage, and presence and depth of erosions are the parameters used to decide whether the tissue is salvageable. In general, the rectum recovers from injury well, and attempts should be made to salvage the prolapsed tissue unless deep necrosis or trauma to the tissue exists. Caudal epidural anesthesia is performed first. This temporarily eliminates straining, allows evaluation of the tissue, facilitates repositioning, and allows surgical intervention, if necessary. The prolapsed tissue is cleaned with a mild antiseptic. The tissue is evaluated for necrosis, trauma, or tears. The treatment options include replacement and purse-string suture, submucosal resection, or amputation. For management of a type IV prolapse, celiotomy, resection of the affected tissue, and end-to-end anastomosis would be indicated.

REPLACEMENT AND PURSE-STRING SUTURE

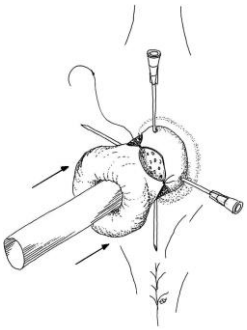
This technique is indicated for treatment of salvageable rectal prolapses. After caudal epidural anesthesia is performed and the mucosa is cleaned, the edema is reduced by temporary topical application of a hyperosmotic solution, such as a sugar solution. Lidocaine jelly is applied, and the tissue is manipulated back into its normal position. A purse-string suture is applied to the perirectal tissue with 0.2 to 0.5cm umbilical tape. The rectal opening is tightened to two-to-three fingers' width to prevent recurrence of the prolapse while allowing passage of fecal material. The umbilical tape is tied in a bow that is placed laterally and readily allows adjustment of the suture. Usually, the purse-string suture is removed within one week after placement to reduce fecal contamination and the severity of suture tract infection. If straining recurs, the caudal epidural may need to be repeated.

SUBMUCOSAL RESECTION

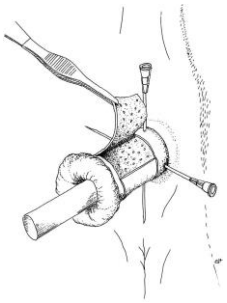
Submucosal resection is the preferred technique if the prolapsed mucosa is necrotic, ulcerated, or traumatized, but the underlying tissue is healthy. This technique includes removal of the affected mucosa and salvage of the healthy underlying tissue. After placing caudal epidural anesthesia and cleaning the mucosa, the edema is reduced by temporary topical application of a hyperosmotic solution, and a final preoperative evaluation is performed. A piece of flexible tubing of appropriate diameter is inserted into the lumen of the prolapse and cross-pin fixation performed to control movement of the prolapse during surgery. For this purpose, two 15-cm, 18-gauge needles are inserted at a 90° angle to each other, close to the anal opening across the prolapse and tubing, exiting at the opposite site. Two circumferential incisions are made through the mucosa on either side of the tissue to be removed. A longitudinal incision at the same depth is then made to connect the circumferential incisions. The collar of affected tissue is removed in the healthy submucosal plane by using blunt dissection. Hemorrhage may be controlled by ligature of individual vessels. The mucosa is aligned with four simple interrupted sutures that are placed equidistant around the circumference of the prolapse. The four quadrants are apposed separately with one simple continuous suture pattern for each quadrant. Size #2-0 to 3-0 monofilament absorbable material with a taper point swaged-on-needle is used. The specific type of suture pattern and tubing that acts as a place holder prevents the occurrence of a purse-string effect at the suture site that might decrease the lumen and provoke postoperative stricture formation. Several advantages of this technique in comparison to amputation have been described and include the following: not exposing the serosal lining minimizes the possibility of peritonitis or perirectal abscess formation; not transecting the main blood supply minimizes the danger of postoperative hemorrhage; less postoperative straining occurs; the lumen is only minimally constricted; healthy tissue is not sacrificed; and healing is faster.



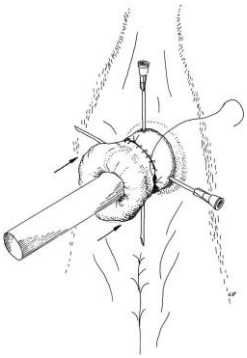
A piece of flexible tubing is inserted into the lumen of the prolapse, and cross-pin fixation is performed with two 18-gauge needles. The dashed lines represent the intended sites of mucosal incision.



The mucosa is aligned with four simple interrupted sutures placed equidistant around the circumference of the prolapse.



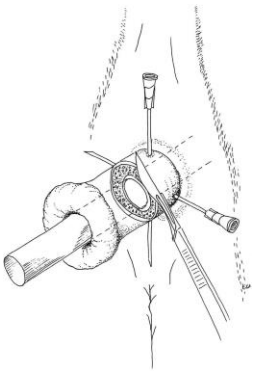
Blunt dissection of affected mucosal tissue in the healthy submucosal plane.



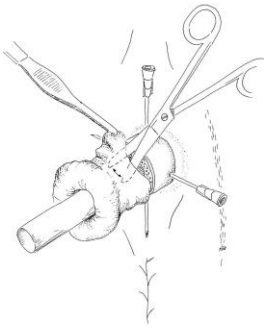
Final alignment of the mucosa with continuous sutures.

STAIRSTEP AMPUTATION

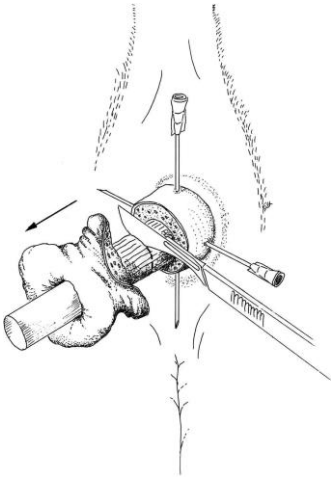
When the prolapsed tissue is severely damaged, amputation may be the only alternative. Although several techniques of amputation have been described and accepted, the authors prefer the stairstep technique because the tendency for stricture formation is kept minimal. Preparations—including epidural anesthesia, insertion of tubing, and needle fixation—are identical to those described for submucosal resection. A circumferential incision is made just cranial to the necrotic area. All tissues except the inner mucosa and parts of the inner submucosa are incised. With blunt dissection, a plane is created towards the caudal aspect of the prolapse within the inner submucosa between the inner and outer segment. The outer segment is pulled forward, and the inner segment amputated 2 to 3cm more distal than the outer segment. This allows salvage of extra mucosa and facilitates adaptation of the mucosal layers over the bulging fat tissue. Suture pattern and material for adaptation of the mucosal layers are identical as described for submucosal resection.



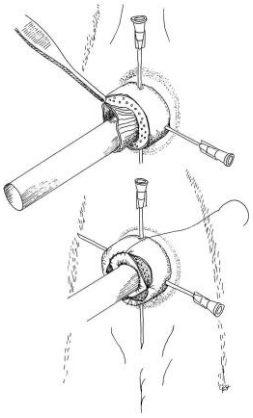
Schematic representation of the first step of stair-step amputation to correct rectal prolapse type II. A circumferential incision is made just cranial to the necrotic area. All tissues except the inner mucosa and parts of the inner submucosa are incised.



A plane is created towards the caudal aspect of the prolapse.



The inner segment is amputated



Adaptation of the mucosal layers as described for submucosal resection.

Atresia Coli

OCCURRENCE AND ETIOLOGY

Intestinal atresia is the complete absence of a portion of the intestinal lumen. The ascending colon is one of the most commonly affected segments in the calf. Atresia of the colon is most frequently located in the mid spiral loop of the ascending colon. The cause of atresia coli in calves is not well understood and represents a matter of scientific controversy. In a retrospective study, Holstein-Friesian calves were identified significantly more often with atresia coli than would have been expected from the hospital population. Supporting this finding, in a Holstein-Friesian herd, atresia coli was found to be inherited autosomally recessive with a single locus displaying two alleles being responsible for the disease. On the other hand, atresia coli was found in one of identical twin calves—but not the other. In addition, purposely mating five affected cows and two affected bulls produced 23 calves but failed to create a single offspring with atresia coli. The heritability of atresia coli was estimated to be 0.0875, which implies other, non genetic etiologies, such as early manual pregnancy testing. Rectal palpation of the amniotic vesicle at 42 days of age or earlier was associated with increased incidence of colonic and jejunal atresia. At this time, we consider this a non genetic disease because of the above observations and the low heritability factor.

Clinical Signs and Diagnosis

Affected calves are usually born without incident and have a normal appetite until 12 to 48 hours later when they develop inappetence, abdominal distension, signs of abdominal pain, and progressive depression and weakness. The hallmark of the disorder is that no manure is passed. At clinical examination, tachycardia, hyperpnea, and normal to reduced rectal temperature are evident. Calves have a normal appearing anus and rectum. On digital palpation per rectum, a clear to yellow mucus, sometimes blood-tinged is identified. A well-lubricated flexible catheter may be passed through the descending colon without resistance. However, this is not recommended because of the risk of trauma to the bowel. The abdomen becomes severely distended, and percussion (ping) and succussion auscultation in both flanks are positive. The contours of distended large intestinal loops may be detected by visual examination or palpation in the right paralumbar fossa. A presumptive diagnosis can be made with an accurate history and physicalexamination. Imaging studies can confirm the distended viscera. Lateral radiographic examination of the standing animal reveals gas distension of the small and large intestine. Distended small and large intestinal loops are routinely observed at ultrasonographic examination of the ventral and dorsal aspects of the right flank, respectively. Dehydration with normal to low plasma protein concentration and neutrophilia with left shift are typically observed at hematological analysis. The diagnosis is confirmed by a right paralumbar fossa exploratory celiotomy.

SURGICAL MANAGEMENT

Because immediate surgical intervention is rarely considered necessary, supportive medical treatment—including rehydration, correction of acid-base imbalances, and antimicrobial treatment—is initiated before subjecting the calf to additional stress. Plasma may be necessary because failure of passive transfer can be present in these calves either because of intake failure or poor absorption. Surgery is performed under local or general anesthesia through the right paralumbar fossa with the calf in left

lateral recumbency. Gas is evacuated from the distended cecum and spiral colon. Digesta are removed from the intestine proximal to the site of atresia through an enterotomy at the apex of the cecum or through the dissected proximal blind end of the colon. If the enterotomy site is in the cecum, it is closed with two layers by using at least one inverting pattern. The compromised segment of the dilated blind end is resected, and continuity is established to the descending colon by either an end-to-side or side-to-side anastomosis. It is usually recommended to perform an end-to-side anastomosis because two calves that had a side-to-side anastomosis developed a volvulus of the blind end, which grew in length; this is presumably because of the growth potential of the bowel in the neonate. However, retrospective studies have not found a significant difference in survival rate between endto-side and side-to-side anastomosis. The descending colon is best identified by passing a flexible catheter into the rectum and then isolated with two umbilical ape loops placed carefully through the mesocolon. The surgeon must be careful not to puncture the friable descending colon when passing the umbilical tape. Anastomosis is achieved by either a single layer of apposing simple interrupted sutures or a GIA 55* stapling instrument . Postoperative management includes maintenance of appropriate electrolyte and fluid therapy, antimicrobial treatment for 5 to 7 days, and gradual resumption of oral feeding within 12 hours after surgery.

Atresia Ani (Et Recti)

OCCURRENCE AND ETIOLOGY

Atresia ani is found less often in dairy than beef cattle breeds. Lack of tail, fistula formation between the rectum and the reproductive tract, and abnormalities of the urinary tract may accompany atresia ani. In females, the rectum may communicate with the vagina, in males with the urethra or the bladder. Inheritance is reported in swine and lambs, and is possible in calves—but not documented. Surgical treatment of animals with breeding potential, presence of a fistula, and/or other abnormalities is ethically and economically questionable.

CLINICAL SIGNS AND DIAGNOSIS

Affected calves show signs within the first day of life because they are unable to pass feces. An exception to this is the affected female with a rectovaginal fistula that passes some feces through the fistula. Other congenital defects—including cleft palate, polydactyly, and abnormalities of the urogenital tract—can be seen. They exhibit progressive abdominal distention, straining, signs of abdominal pain, depression, and weakness. If only the anus is involved, the rectum usually bulges subcutaneously in the normal region of the anus during straining and when the abdomen is manually compressed. If no bulge is observed, atresia of the caudal rectum is suspected (Figure 14.2.3-11). The degree of involvement of the rectum may be determined radiographically. In newborn infants, ultrasonography was found to be an adequate noninvasive method to determine the distance between rectal pouch and perineal skin.

SURGICAL MANAGEMENT AND PROGNOSIS

For surgical correction, 1ml of 1% lidocaine solution is injected epidurally, and the hind part of the calf is directed toward the edge of the surgery table in sternal recumbency with the hind feet pulled slightly

craniad. After routine aseptic preparation of the surgical field, a 1-cm diameter circular incision is made through the skin and subcutaneous tissue at the site where the anus would normally be located. Careful blunt dissection in a cranial direction is used to identify the rectal pouch, which is gently pulled caudad with a pair of tissue forceps (rectal pull-through procedure). If this does not allow the rectum to be identified, it may be grasped during left flank exploratory celiotomy and moved in a caudal direction by simultaneous traction through the pelvic canal and manipulation in the abdomen. The rectum is sutured to the subcutaneous tissue with four to six interrupted sutures, the rectal pouch is incised, and the rectal mucosa is sutured to the skin using a broken simple continuous or interrupted suture pattern. Intraoperatively, the presence of anal sphincter muscles is rarely evident. Fecal incontinence is therefore a frequent complication of surgical correction of atresia ani (et recti). A single stab incision through the perineum into the rectum is not successful, as stricture and obstruction are likely to occur. If there is a sizable portion of rectum (and descending colon) missing, surgery is exceedingly difficult because the short mesocolon does not readily stretch. In these cases, surgery should be discouraged