A 2-year-old 13.4-kg (29.5-lb) Cocker Spaniel with no veterinary medical history or clinical signs that was adopted from a breeder underwent ovariohysterectomy. During the surgery, an approximately 1 × 5-cm intestinal mass was discovered attached to the jejunum. Resection and anastomosis of the affected jejunum was performed. The tissue was fixed in neutral-buffered 10% formalin and the mass submitted to the University of Illinois Veterinary Diagnostic Laboratory for evaluation.

### Gross Findings
Examination of the fixed specimen revealed an oblong, lobular mass approximately 5.5 cm in length with a maximum diameter of 2.75 cm, which was firmly attached to the serosa of the jejunum (Figure 1). On cut surface, the mass had a distinct, variably thick capsule and contained a mixture of gelatinous, sticky, and occasionally firm material and small foci of hemorrhage. No communication between the mass and the intestinal lumen was observed.

Formulate differential diagnoses from the history, clinical findings, and Figure 1—then turn the page →
Histopathologic Findings

Focally arising from the outer layer of the tunica muscularis of the jejunum was a large cyst-like structure filled with necrotic debris, amorphous material, a small number of leukocytes, and few cholesterol clefts. The cyst wall adjacent to the jejunum was composed of smooth muscle and fibrous connective tissue, which narrowed into a thin fibrous capsule at the apex of the cyst (Figure 2). The internal surface of the cyst wall was lined by a single layer of cuboidal to columnar epithelial cells and goblet cells supported by a thin submucosa which, toward the apex, gradually attenuated (Figure 3). Multifocally, the lamina propria between the crypts contained small numbers of lymphocytes and plasma cells as well as 3 to 10 eosinophils/40X field. The leukocytes also extended down and undermined the crypts approximately 2 to 5 cells deep. Alcian blue staining of additional sections of the cyst resulted in bright blue staining of the cytoplasm of the goblet cells lining the cyst wall, the material in the cyst, and the cytoplasm of goblet cells in the jejunum. Immunohistochemical staining for smooth muscle actin resulted in strong staining of the cyst wall, which blended in with the smooth muscle of the wall of the jejunum (Figure 4).

Morphologic Diagnosis and Case Summary

Morphologic diagnosis and case summary: jejunal duplication cyst, with minimal segmental lymphoplasmacytic and eosinophilic jejunitis in a dog.

Comments

Cystic enteric duplication is a rare congenital malformation that has been described in humans (most often children), dogs, cats, goats, and horses. Typically, duplication cysts consist of a blind pouch or cyst attached to the alimentary tract. They are most commonly associated with the ileum but may be located anywhere along the entire alimentary tract, including the esophagus, stomach, small intestine, and colon. Although duplication cysts may be subclinical in animals (as in this case) and humans, affected individuals frequently have nonspecific clinical signs associated with the location of the cyst. Clinical signs include choking or respiratory distress (usually observed with esophageal duplication cysts), signs of epigastric pain, emesis, diarrhea, constipation, signs of depression, abdominal distension, peritonitis, tenesmus, rectal prolapse, or signs of back pain. Because duplication cysts may develop anywhere along the alimentary tract and clinical signs are nonspecific, diagnosis can be difficult and usually
requires surgical exploration and histologic examination of appropriate specimens.

Prior to surgical exploration, specialized imaging techniques may provide a preliminary diagnosis. Plain radiographic views are of limited use because they often reveal only a vague radiopaque intraabdominal mass, often with poor detail. \(^1\) Computed tomography and MRI have been useful in identifying duplication cysts, \(^2\) and barium enemas in conjunction with radiography may also provide diagnostic information when a patient communication between the intestine and cyst is present. \(^6\) Abdominal ultrasonography is the preferred technique and can be diagnostic by delineating the layers of the cyst wall similar to those of the intestinal wall, \(^3\) although this type of imaging may only reveal a variably delineated fluid-filled structure, and other cystic masses such as enteric diverticula, hematomas, or abscesses should be considered. \(^7\)

Histologic assessment of the abnormal tissue provides a definitive diagnosis. The wall of the duplication cyst contains smooth muscle, which typically blends into the adjacent tunica muscularis and may also include a muscularis mucosa and epithelium. The epithelium may be similar to that of the adjacent intestine, with mucosal epithelium and goblet cells, or may be attenuated, flattened, or absent. In cases of esophageal duplication cysts, the epithelium is composed of stratified and pseudostratified epithelial tissues. The presence of a wall containing smooth muscle that is lined by intestinal epithelium and attachment of the cyst to the alimentary tract (as seen in the case described in the present report) are the criteria for diagnosis of a gastrointestinal duplication cyst. \(^4\) The smooth muscle wall distinguishes duplication cysts from false diverticula, which are outpouchings of the intestine that lack smooth muscle. \(^5\) A Meckel diverticulum is a true diverticulum that contains all 4 layers of the intestine and, in humans, is found on the antimesenteric border of the ileum approximately 60 cm from the ileocecal junction. \(^6\) It results from failure of the vitelline duct to completely close during gestation. These diverticula are most common in humans, pigs, and horses and rare in other species. \(^7\)

A duplication cyst at a similar location usually requires complete surgical excision, and the prognosis is typically favorable. \(^1\)

The cause of intestinal duplication cysts remains elusive to researchers and practitioners; the histologic similarity between embryological diverticula and congenital duplication cysts has led to some researchers using the terms interchangeably. \(^8\) The digestive tract initially develops from yolk sac endoderm, which eventually becomes the intestinal epithelium, followed by rearrangement and coalescing of epithelial vacuoles to form the lumen. \(^7\) However, much remains unknown about embryological development of the alimentary tract and multiple theories exist regarding the origin of enteric duplication cysts with no theory adequately explaining the cause of all intestinal duplication cysts.

Surgical resection and repair is the preferred treatment for humans and other animals with enteric duplication cysts, even in individuals without associated clinical signs, to avoid potential future complications including obstruction, perforation, or potential malignant transformation of the cyst. \(^9\) Successful surgical removal of duplication cysts involving the esophagus, \(^10\) jejunum, \(^11\) and colon \(^12\) has been performed in dogs, cats, and a horse; however, euthanasia is often selected in complicated cases that have other congenital malformations. \(^13\) Surgery is usually successful and the animals fully recover without any further clinical signs. The dog of the present report remained healthy at follow-up 12 months following surgery.

References