**Signalment:** “Django” 5 month old male castrated Labrador Retriever

**History:** Django presented to the VMSG Surgery service for history of chronic, intermittent vomiting and diarrhea that was first detected at 16 weeks of age.

**Clinical Exam:** On presentation, the patient was bright, alert, and responsive, and vitals were within normal limits. There were no physical exam abnormalities.

**Laboratory Findings:** PCV/TS and In-house chemistry on initial presentation noted mild elevation in phosphorous of 10.4 (2.9-6.6) consistent with the young age. SNAP Parvovirus test was negative. Pre-operative CBC and Chemistry were within normal limits.

**Diagnostic Findings:**
- **Radiography:** Abdominal radiographs performed were within normal limits (Figure 1).
- **Ultrasoundography:** There was a 1-2 cm blind ended structure associated with small bowel with central mixed echogenicity contents, some of which were hyperechoic and hard shadowing suggesting mineral. The lesion had a small attachment to adjacent bowel. There was variable increase in echogenicity of the surrounding mesentery (Figure 2 & 3).

**Diagnosis:** Jejunal diverticulum

**Treatment/Management:**
On initial presentation, the patient was treated supportively with subcutaneous crystalloid fluids, metronidazole, famotidine, and cerenia. Intermittent diarrhea and soft stool managed on bland diet and canned pumpkin. Vomiting recurred after 4 days of treatment, and resolved with extended administration of cerenia. Abdominal ultrasound findings noted intraluminal, mineralized debris within suspected intestinal diverticulum. 1 month later, clinical signs of vomiting, diarrhea, and lethargy recurred, and then resolved spontaneously. Recheck abdominal ultrasound noted similar findings. Patient continued to have intermittent large bowel diarrhea and surgical consultation was recommended to discuss abdominal exploratory laparotomy.

After discussing the risks and benefits of surgery with the owner, an abdominal exploratory laparotomy and intestinal biopsies were elected. At surgery, a multi-lobulated, firm mass was adjacent to mid-jejunum and adhered to omentum.
(Figure 4 & 5), and mesenteric lymph nodes were markedly enlarged. A marginal jejunostomy en bloc mass removal using elliptical pattern was performed, and the omental attachment was ligated and transected. Wedge resection biopsy of mesenteric lymph nodes and punch biopsy of duodenum and ileum were also obtained for histopathology.

On biopsy, the jejunal mass was confirmed to be an intestinal diverticulum. The mass extended from the wall of the jejunum with a small focus of luminal connection, and composed of a ventral cavitary region of necrotic debris, fibrin, and macrophages, surrounded peripherally by a fibrovascular wall. Histopathology of mesenteric lymph node noted diffuse lymphoid hyperplasia, ileum had minimal, multifocal, lymphoplasmacytic enteritis, and duodenum noted no significant findings.

**Follow-up Care:**
Patient was recovered uneventfully following surgery and was hospitalized overnight for supportive care. Patient had normal bowel movements, no vomiting, and good appetite, and was discharged 1 day following surgery. The patient was discharged on Tramadol 5mg PO q8-12 hr for 7-10 days.

Patient returned for a recheck 2 weeks following surgery. He was doing well with great appetite, and no further episodes of vomiting or diarrhea. At last communication on 6/19/14, patient continues to remain asymptomatic.

**Discussion:**
Canine intestinal diverticula are rare (Albin et al, 1991). 3 case reports in recent literature noted intestinal diverticula occurring in the duodenum of young boxers (Van Klaveren et al, 2007 & Polf & Poteet, 2010) and adult basset hound. The etiology of intestinal diverticula is unknown. Human literature suspects that during embryological development of the primitive gut, the endodermal proliferation and recanalisation is disrupted. This may result in congenital abnormalities, including diverticula (Van der Gaag & Tibboel 1980). Other possible etiologies include a true diverticulum caused by adhesion or extraluminal scarring relating to ulcerations (Knoefel & Rattner, 2001).

Meckel's diverticulum has also been used to describe intestinal diverticula with inconsistent definitions. According to Mackey & Dineen in 1983, Meckel's diverticulum is an intestinal diverticulum resulting from embryologic failure of the most proximal portion of the vitellean ducts to involute, thus resulting in a blind-ended pouch in the terminal ileum. Other definitions describe a Meckel’s diverticula as intestinal diverticula containing ectopic gastric mucosa, causing mucosal ulceration (Margolies, 2001). Meckel's diverticula occur in 2% of the human population, and have also been reported in the horse, pig, cattle, and rats (Polf & Poteet, 2010). Meckel’s diverticulum is a normal finding of domestic chickens and geese (Branton et al, 1988 & Besoluk & Eken, 2001).

The etiology in this patient is unknown. Considering the age of the patient, a congenital abnormality is suspected. However, it is also possible a previous foreign body may have ulcerated the jejunal wall due to focal hypermotility, bacterial overgrowth, and fermentation. This may have resulted in a weakening of the jejunal musculature and secondary diverticulum. This is considered more likely due to the composition of a fibrovascular wall of the diverticulum. No ectopic gastric mucosa was noted on histopathology.

The patient’s clinical signs of chronic vomiting, soft stool, and diarrhea are similar to previous case reports (Van Klaveren et al, 2007 & Polf & Poteet, 2010). However, patients can also present with more severe signs including anorexia, severe anemia, collapse, and melena (Van Klaveren et al, 2007). In those cases, clinical signs were attributed to stasis of ingesta, fermentation, bacterial overgrowth, and subsequent mucosal irritation, diverticulitis, and rupture of superficial blood vessels (Van Klaveren et al, 2007).
Diagnosis in our patient was confirmed on abdominal ultrasound. Additional diagnostic tools may be useful in identifying intestinal diverticula. In humans, Meckel’s diverticulum is diagnosed using abdominal scintigraphy with pertechnetate (Tc-99m) to detect ectopic gastric mucosa. Barium upper gastrointestinal study can also better identify the abnormalities, nature of the lesion, and character location (Polf & Poteet, 2010).

The patient was treated with focal diverticulectomy with primary closure of the jejunal wall. Surgical resection is recommended due to concern for future diverticulitis, rupture, and peritonitis. Prognosis after surgical resection is excellent with appropriate treatment (Albin et al, 1991).

References:

4. Van Der Gaag I & Tibboel D. Intestinal atresia and stenosis in animals: a report of 34 cases. Veterinary Pathology 1980; 25:311-314

Figures:

Figure 1: Normal left lateral of abdomen.
Figure 2: Abdominal ultrasound image of 1-2 cm blind ended structure associated with small bowel with central mixed echogenicity contents, some of which were hyperechoic and hard shadowing suggesting mineral. The lesion had a small attachment to adjacent bowel.
Figure 3: Abdominal ultrasound image of 1-2 cm blind ended structure with variable increase in echogenicity of the surrounding mesentery.
Figure 4: Intraoperative photograph of jejunal diverticula adjacent to jejunum and adhered to omentum.
Figure 5: Intraoperative photograph of jejunal diverticula with omentum transected.