ABSTRACT

Inflammatory bowel disease (IBD) commonly causes chronic diarrhea in dogs. Diagnosis is often challenging and relies on results of subjective clinical indices, gastrointestinal endoscopy and histopathological assessment of intestinal mucosal biopsies. In humans, contrast-enhanced ultrasonography (CEUS) can quantify intramural intestinal perfusion and correlates with disease severity in Crohn’s disease. We sought to evaluate the feasibility of, and describe perfusion patterns of CEUS in the duodenum of dogs affected by IBD. We hypothesized that CEUS would demonstrate changes in the perfusion of inflamed duodenum and provide additional information in the diagnosis of canine IBD.

We prospectively enrolled 20 dogs with IBD (based on Canine Inflammatory Bowel Disease Activity Index-CIBDAI) and endoscopic ultrasound evaluation and histopathological assessment of duodenal mucosa samples. Each dog was placed in left lateral recumbency and the cranial portion of the duodenum was imaged in a transversal plane. Before the endoscopy, each dog received two boluses (0.03–0.06 ml/kg IV) of contrast agent (SonoVue®, Bracco, Italy): first, while conscious and then after being anesthetized (using the same anesthetic protocol). Duodenal enhancement patterns were first evaluated qualitatively, then quantified using dedicated software (Qontrast®, Bracco, Italy).

In all dogs, the duodenal vascularization pattern was characterized by an initial rapid enhancement of the submucosal layer, followed by a gradual enhancement of the musculature. In some cases, the vascular enhancement was not homogenous and prolonged. We identified two patterns at peak enhancement: (A) complete enhancement of the submucosal and mucosal layers without subjective demarcation between the wall layers; (B) incomplete enhancement of the mucosal layer that had a non-homogeneous, pointed, or streaked appearance. Dogs had similar perfusion patterns whether conscious or anesthetized. We quantified analysed enhancement only in anesthetized dogs because of improved image quality. Analysis revealed a reduced peak enhancement intensity, reduced regional blood flow and reduced regional blood volume in dogs with CIBDAI scores ≥6 (n=15). Dogs with higher CIBDAI scores (n=5) showed an increase of time to peak and mean transit time. However, we found no relationship between perfusion patterns/parameters and histopathological findings.

Our study demonstrates that CEUS of the duodenum in dogs is feasible, and highlights the presence of different vascular patterns and contrast-enhancement features in dogs with IBD. Our findings showed some association with dogs that had higher clinical and endoscopic grades of IBD, but did not correlate with histopathological findings. Our study offers a novel, non-invasive imaging modality for the diagnosis and monitoring of canine IBD.

BACKGROUND

Can CEUS provide additional information in canine IBD?

METHODS

20 Dogs with IBD

- Transverse plane of duodenum imaged in left lateral recumbency
- Two boluses (0.03–0.06 ml/kg IV) of contrast agent (SonoVue®, Bracco, Italy):
  - Conscious
  - Anesthetized
- Duodenal enhancement patterns evaluated qualitatively and quantitatively (Qontrast®, Bracco, Italy)

CONCLUSIONS

- Qualitative CEUS analysis showed 2 different patterns at peak enhancement in dogs with IBD
- Dogs with higher CIBDAI scores showed a reduced vascularization of the duodenal mucosa (lower PI, RBV and RBF) at the quantitative analysis
- Dogs with higher endoscopic scores showed an increase of perfusion velocity parameters (higher TTP and MTT) at the quantitative analysis

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