Evaluation of the gastrointestinal tract in cats using dual-phase CT

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Introduction: In cats, ultrasonography remains preferred to evaluate the gastrointestinal (GI) tract being superior in spatial resolution and more useful to evaluate wall layering compared to computed tomography. CT of the abdomen is though commonly performed in cats as part of whole-body screenings and a normal description of the GI tract is lacking. The normal appearance of the GI tract using dual-phase CT is well described in dogs and an early (30 sec) mucosal surface enhancement (MSE) of the small intestines and a delayed MSE in the stomach is reported. Dual-phase CT improved wall conspicuity in these studies and GI walls were identified in up to 84,5%. The purpose of this retrospective cross-sectional study was to describe the conspicuity and contrast enhancement pattern of the normal gastrointestinal tract in cats using dual-phase CT and to compare measured gastrointestinal wall thicknesses and diameters to previously published ultrasonographic and radiographic normal values.

Methods: Abdominal CT exams (performed between August 2013 to December 2014) of 39 cats without history or clinical signs for GI tract disease were examined retrospectively. The GI tract was divided into 16 segments: cardia, fundus, gastric body, pylorus, pyloric canal, descending duodenum, caudal duodenal flexure, ascending duodenum, jejunum, ileum, ileocolic junction, cecum, ascending colon, transverse colon, descending colon and rectum. For all segments and walls pre and post contrast conspicuity was recorded using commercially available viewing software (Osirix, v 6.5.2). Wall enhancement pattern in early (30 s) and late (98 +/- 27,4 s) post contrast phases were described. Measurements of wall thicknesses and segment diameters were taken and compared to published radiographic and ultrasonographic normal values.

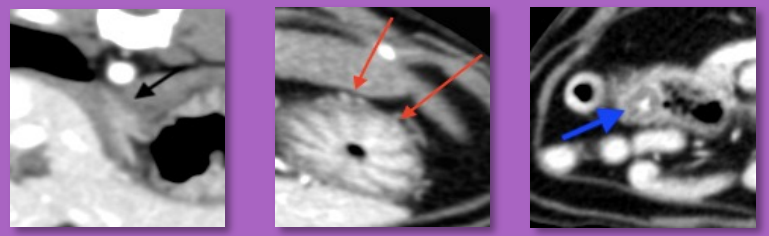

Figure 1: Transverse CT images in the early (30 sec) post contrast phase. Mucosal surface enhancement can be seen at the cardia (black arrow), fundus (red arrows) and ileocecocolic junction (blue arrow).

Figure 2: Transverse CT image in the late post contrast phase of the jejunum.: a luminal washout is seen .

Results: Of the total 624 gastrointestinal segments (serosa to serosa) 530 (84,9%) were identified on pre contrast studies and 545 (87,3%) segments in post contrast studies. The gastrointestinal walls (serosa to mucosa) were identified in 257 (41,2%) segments in the pre contrast studies and 314 (50,3%) in the post contrast studies. Measured segment diameters in the CT exam correlated well with previously published radiographic normal values, whereas wall thickness measurements usually were smaller compared to sonographic normal values. No five layer-appearance could be distinguished.

A mucosal surface enhancement was often seen at the cardia and fundus of the stomach and at the ileocolic junction most frequently in the early post contrast phase and a transmural enhancement of the remaining GI segments with a luminal washout in the jejunum especially in the late post contrast scans.

Conclusions: As shown in dogs, dual-phase CT is an excellent method to visualize the GI tract walls and segments in cats. Measured wall thicknesses did not correlate well with earlier published ultrasonographic reference values probably due to partial volume artifact. Conspicuity of walls was enhanced by contrast due to highlighting of the walls to luminal content, adjacent organs or GI tract segments. A 30 second scan aids to identify the mucosal surface in the cardia, fundus and ileocolic junction. We hypothezise that the absence of early MSE in the small intestines and late MSE in the stomach as observed in dogs might be related to the smaller body size, higher heart rate and thus different contrast timing in cats. Further studies using bolus tracking or test bolus techniques are needed to prove this. Ultrasound remains the modality of choice for the evaluation of gastrointestinal wall layering.

References:

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