Suffering in silence: spotting signs of chronic feline triaditis

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IDEXX

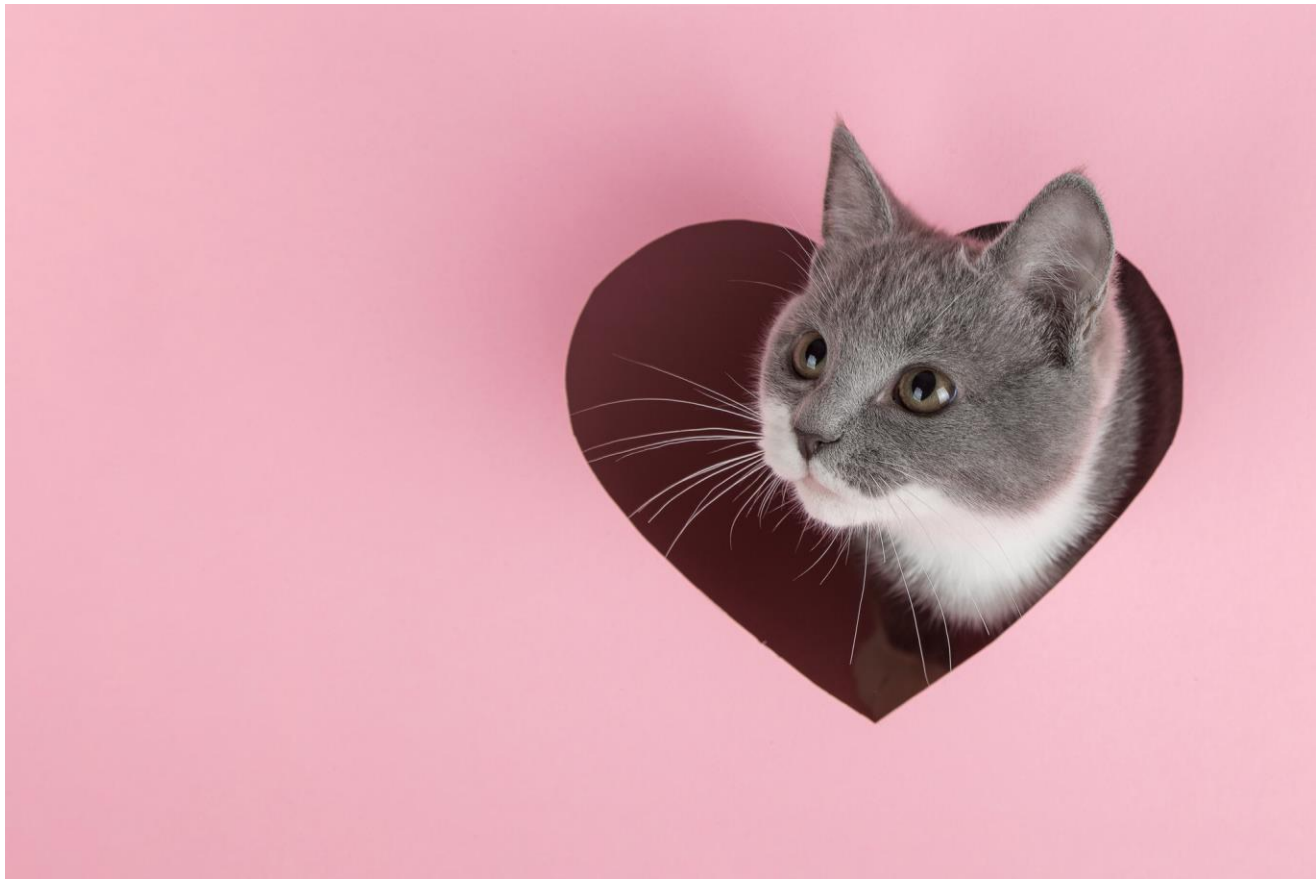
Conflicts of Interest & Disclaimer

- Stephanie Sorrell is an employee of IDEXX Laboratories UK

- *The information contained herein is intended to provide general guidance only. As with any diagnosis or treatment, you should use clinical discretion with each patient based on a complete evaluation of the patient, including history, physical presentation, and complete laboratory data. With respect to any drug therapy or monitoring program, you should refer to product inserts for a complete description of dosages, indications, interactions, and cautions. Diagnosis and treatment decisions are the ultimate responsibility of the primary care veterinarian.*

Agenda

+ Aetiology of triaditis
+ Review of the literature
+ Diagnostic approach to case with suspected triaditis
+ Treatment plan
+ Case Studies

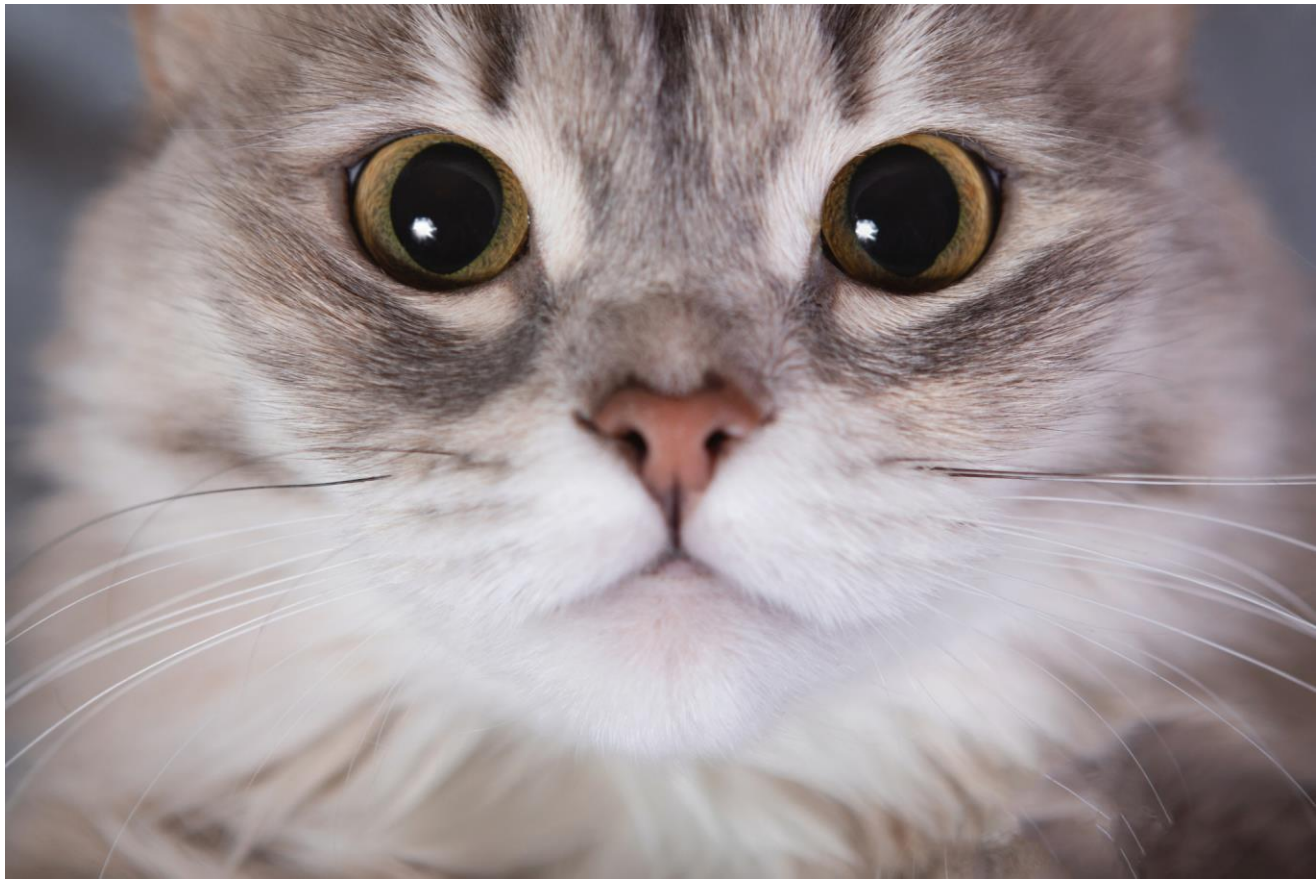


What is triaditis?

- Defined as concurrent pancreatitis, cholangitis and chronic enteropathy
- Reported in approximately 17–39% of ill cats in referral populations

Aetiology of triaditis

- Poorly understood
- ?infectious
- ?autoimmune
- ?duct obstruction
- ? different diseases in each organ or if the disease process in each organ has the same aetiology



*ESVE Alive definition

Aetiology of triaditis

- Poorly understood but increased risk of bacteria ascending duodenum
- Feline cf canine
  - Shorter GIT in cats
  - Higher concentration bacteria in duodenum
  - Entrance of pancreatic duct
- Close association between the pancreas and the duodenum

Aetiology of triaditis

- Ascending infection from duodenum into liver is postulated
- Systemic inflammatory response syndrome can result in translocation of enteric bacteria resulting in a neutrophilic cholangitis

Aetiology of triaditis

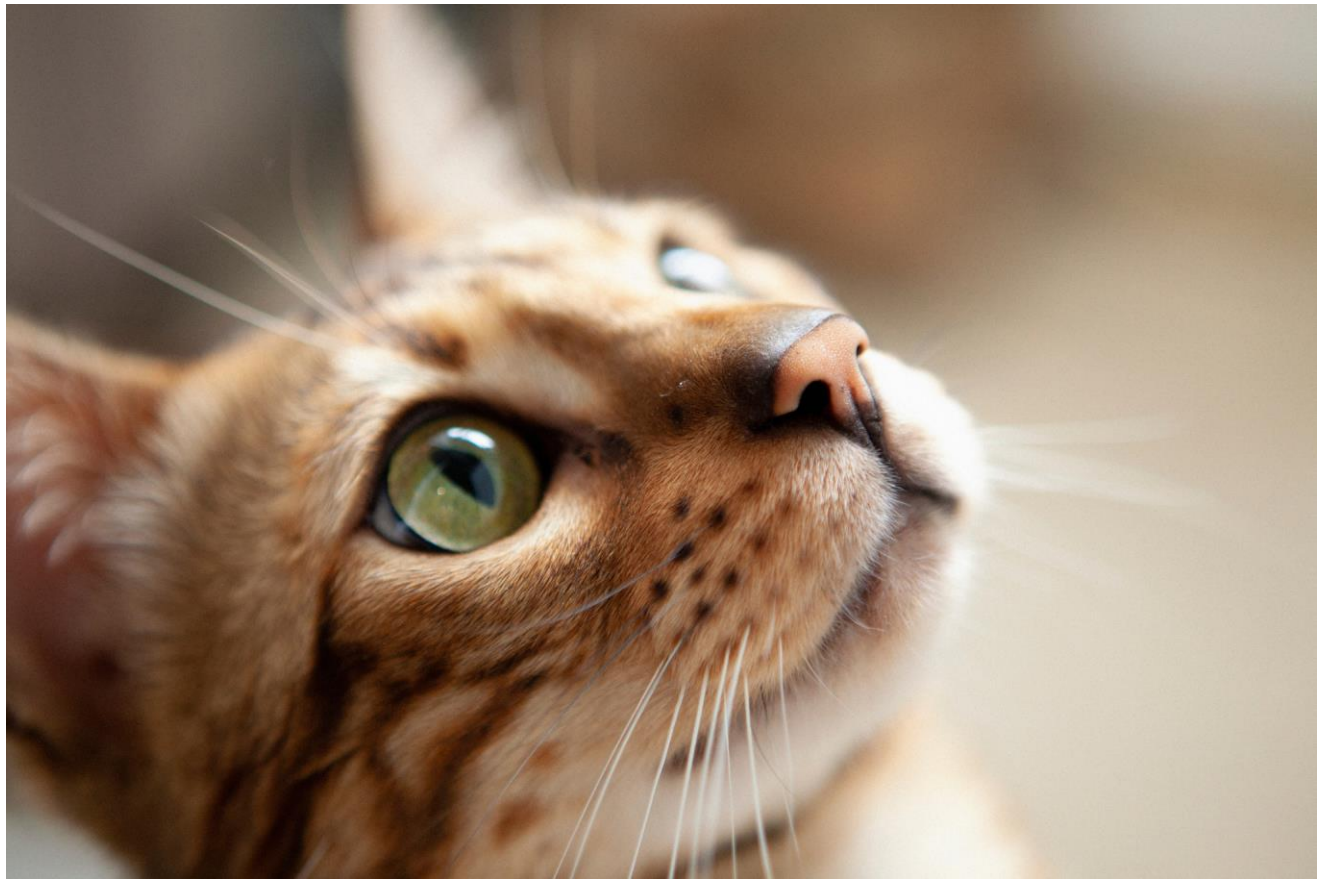
- In one study (Twedt et al 2013) bacteria were noted in 21/39 (54%) cats with inflammatory liver disease.

- The predominant bacteria identified were common enteric forms, such as *E coli* and *Enterococcus* species.

Aetiology of triaditis

- ?Intestinal inflammation as the inciting cause
- The most common type of intestinal inflammation is either lymphoplasmocytic inflammation or small cell lymphoma.
- Intestinal disease may lead to increased intestinal permeability contributing to bacterial translocation

Aetiology of triaditis



- Obstruction to the flow of bile or pancreatic juices may also play a role in triaditis
- Blockage or dysfunction of the sphincter can predispose cats to pancreatitis and cholangitis

Previous studies

- Many studies PM based
- 1996 study found that 39% of cats diagnosed with cholangitis also had IBD and pancreatitis (i.e., triaditis)
  Concurrent nephritis was found in 33% of cats with cholangitis
- 2011 study of 44 cats with moderate to severe cholangitis found that inflammatory bowel disease (50%), pancreatitis (60%), or both (32%) commonly accompanied cholangitis. Concurrent nephritis was found in 81% of cats with cholangitis

Weiss DJ, Gagne JM, Armstrong PJ. Relationship between inflammatory hepatic disease and inflammatory bowel disease, pancreatitis, and nephritis in cats. J Am Vet Med Assoc. 1996 Sep 15;209(6):1114-6. PMID: 8800259.
Callahan Clark JE, Haddad JL, Brown DC, Morgan MJ, Van Winkle TJ, Rondeau MP. Feline cholangitis: a necropsy study of 44 cats (1986-2008). J Feline Med Surg. 2011 Aug;13(8):570-6. doi: 10.1016/j.jfms.2011.05.002. Epub 2011 Jun 29. PMID: 21719332; PMCID: PMC10822413.

Prospective study

- Biopsies performed on 27 symptomatic cats with chronic clinical signs that could be attributed to triaditis
- Biopsies also performed in 20 asymptomatic cats presented for ovariohysterectomy.

Fragkou FC, Adamama-Moraitou KK, Poutahidis T, Prassinos NN, Kritsepi-KonsPrevalence and Clinicopathological Features of Triaditis in a Prospective Case Series of Symptomatic and Asymptomatic Cats. J Vet Intern Med. 2016 Jul;30(4):1031-45. doi: 10.1111/jvim.14356. Epub 2016 Jun 14. PMID: 27296565; PMCID: PMC5089651tantinou M, Xenoulis PG, Steiner JM, Lidbury JA, Suchodolski JS, Rallis TS..

Prospective study

- Symptomatic cats
  - Histopathological evidence of inflammation in 1, 2, or all 3 organs was present in 27/39 (69.2%)
- Asymptomatic cats
  - Histopathological lesions of either cholangitis or enteritis alone, or combinations of inflammatory infiltration in 2 of the 3 organs were identified in the absence of clinical signs in 20/39 (51.3%).
- Pancreatitis alone or triaditis was only present in cats that were symptomatic.

Fragkou FC, Adamama-Moraitou KK, Poutahidis T, Prassinos NN, Kritsepi-KonsPrevalence and Clinicopathological Features of Triaditis in a Prospective Case Series of Symptomatic and Asymptomatic Cats. J Vet Intern Med. 2016 Jul;30(4):1031-45. doi: 10.1111/jvim.14356. Epub 2016 Jun 14. PMID: 27296565; PMCID: PMC5089651tantinou M, Xenoulis PG, Steiner JM, Lidbury JA, Suchodolski JS, Rallis TS..

Clinical Presentation

- Vague clinical signs including weight loss, lethargy and anorexia.
- Anorexia 63-97% cases
- Lethargy 28-100% cases
- More specific signs such as icterus and vomiting may be noted.
- Pyrexia, abdominal pain, hepatomegaly possible
  - 25% pancreatitis cases pyrexic and 50% hypothermic

Consistent signs

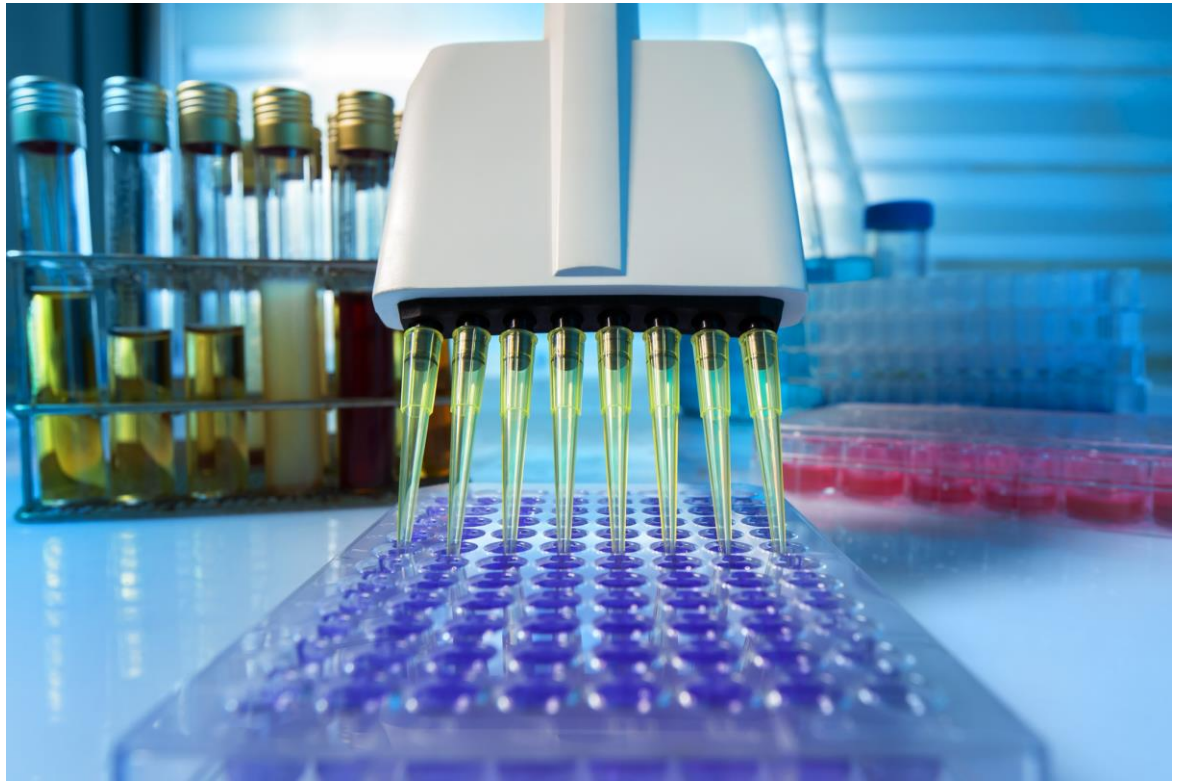
- Full haematology, serum biochemistry
- SNAP fPLi, Quantitative fPLi or DGGR lipase measurement
- Folate/B12 assessment
- Abdominal imaging
  - Radiographs have low sensitivity
  - Ultrasound is superior
- For a definitive diagnosis, biopsies are required

Blood work

- Non specific changes on routine blood work.
- May see non regenerative anaemia
- Liver parameters can be normal or increased
- Ionised calcium should be assessed in cats with acute pancreatitis

Pancreatic tests

- In house
  - Lipase
  - Amylase
  - fPLi- SNAP
  - Catalyst Pancreatic lipase
- At lab
  - Quantitative Spec® fPL™
  - DGGR lipase
  - fTLI



- fPLi SNAP good to rule out
- fTLI, lipase, amylase not useful to confirm pancreatitis

Catalyst® Pancreatic Lipase Test

- Activity assay cf Spec® fPL™ which is an immunoassay
- Catalyst® Pancreatic Lipase Test aligns well with Spec® cPL™ and Spec® fPL™ tests
- One test validated for both dogs and cats
- Real-time diagnoses with results in less than 10 minutes

Diagnostic imaging

- Ultrasound is superior to radiographs
- In pancreatitis often see thick left limb of the pancreas, severely irregular pancreatic margins, and hyperechoic peripancreatic fat
- With cholangitis may see heterogenous liver parenchyma +/- biliary duct obstruction
  - Normal liver does not rule out cholangitis
- Inflammatory bowel disease may result in loss of intestinal layering, thickening of the muscularis layer, generalised intestinal thickening and mesenteric lymphadenopathy

Treatment

- Depends on severity of signs
- Histopathology and culture can guide treatment
- Supportive treatment often required
  - Fluid therapy
  - Analgesia
  - Anti emetics
  - Feeding tube placement

Treatment for pancreatitis

- Analgesia
- Anti-emetics
- Lack of evidence regarding low fat diets
- Consider placement of feeding tube
  - NO vs O tube
  - Start at 1/3 RER divided into several meals

Treatment for cholangitis/cholangiohepatitis

- Depends on the histopathology and culture
- Most common types are lymphocytic cholangitis or neutrophilic cholangitis.
- Supportive care similar to treatment of pancreatitis
- Additional therapy considered
- Vitamin K1
- Anti oxidants such as SAMe

Neutrophilic Cholangitis

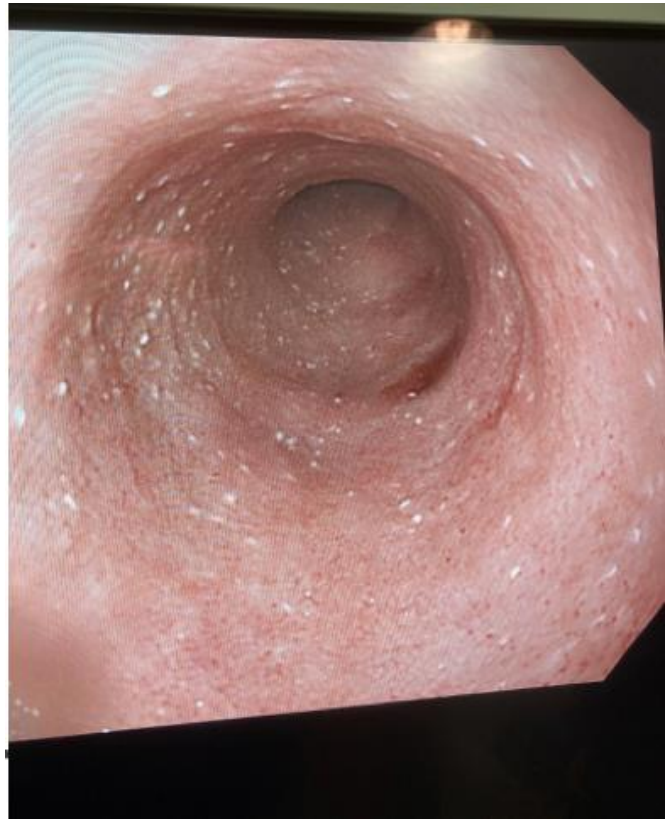
+ Occurs in younger cats
+ Antibiotic therapy ideally based on culture and sensitivity
+ Culture however can be falsely negative
+ ?FISH

Lymphocytic Cholangitis

- Chronic and slowly progressive disease
- FISH studies have failed to find underlying bacterial aetiology
- Thought to be underlying immune mediated aetiology
- Prednisolone mainstay of therapy
  - Start at 1-2mg/kg/day and taper after 4-6weeks

Inflammatory bowel disease

- Thought to be due to hypersensitivity reactions to dietary or bacterial antigens.
- Diet trial initially
  - May need multiple diets
- Immunomodulatory therapy is mainstay of treatment
- Supplementation of cobalamin if indicated



Max

+ 10 year old MN Siamese
+ Outdoor access
+ UTD vaccinations and flea/worming treatment
+ 1 month history of intermittent vomiting and lethargy
+ 1 week history of anorexia
+ No response to short courses of antibiotic (synulox) and Metacam.

Haematology/Serum biochemistry

- Neutrophilia
  - Infection, inflammation
- Anaemia
  - Chronic disease deemed most likely
- Raised ALT, ALP, bile acids
  - Primary hepatic disease or secondary hepatopathy due to GI disease
- Hypoalbuminaemia
  - Negative acute phase protein
  - Lost via GIT, renal or reduced production in liver

Investigations

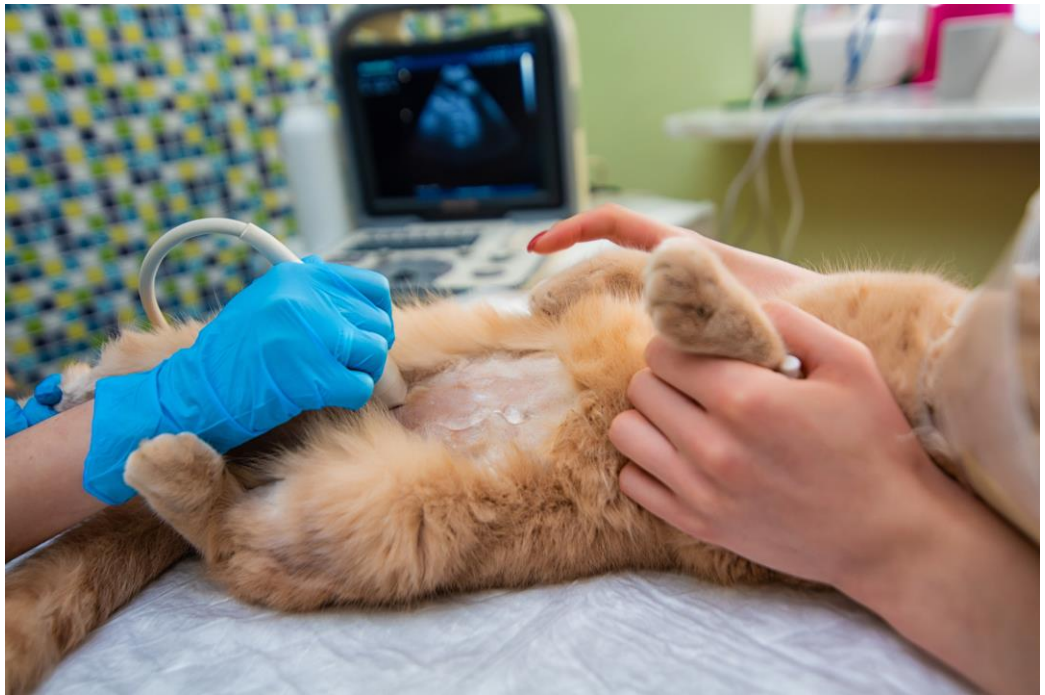
- Suspect hepatic and/or GI disease
- Cannot rule out secondary hepatopathy
- Cannot rule out concurrent pancreatitis
- Further investigations with Spec® fPL™, folate and cobalamin performed
- Urinalysis performed to rule out proteinuria as a cause of the hypoalbuminaemia

Results

- Spec® fPL™ raised
  - Primary pancreatitis or secondary to GI/liver disease
- Cobalamin reduced
- Folate within normal limits
- Urinalysis unremarkable; UPC 0.2

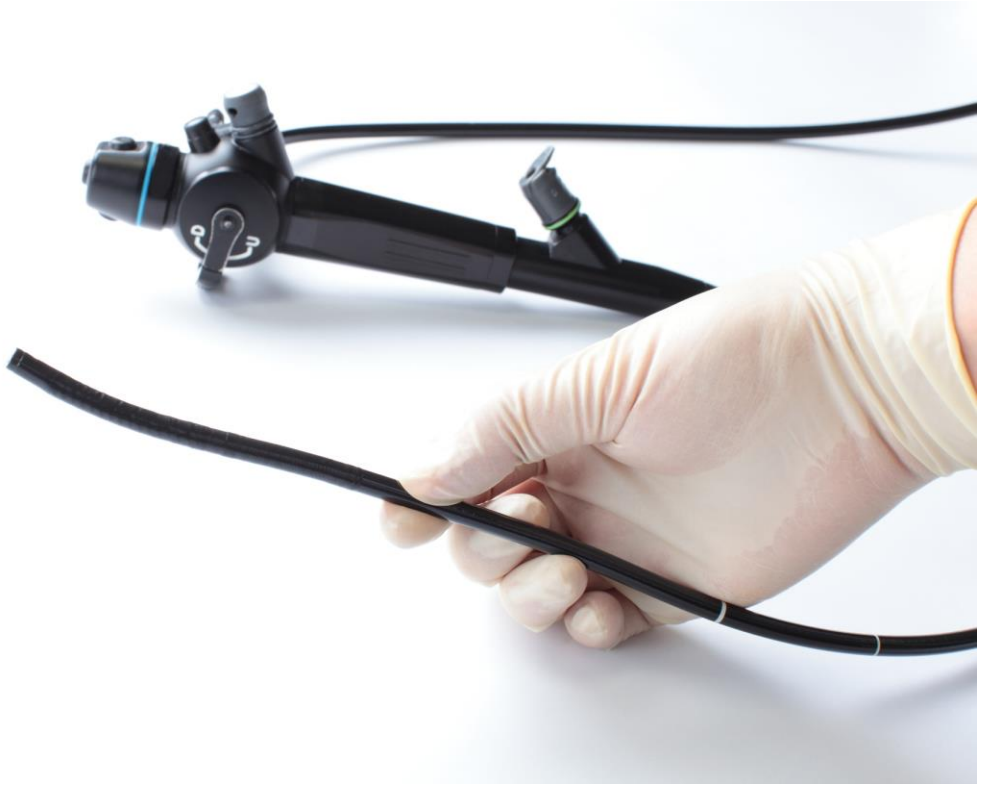
Advanced imaging

+ Abdominal ultrasound
+ Hypoechoic enlarged pancreas with hyperechoic mesenteric and peripancreatic fat
+ Normal appearance of liver and biliary tree
+ Thickening of muscularis layer in small intestine, predominately in the ileum and jejunum



Options

+ Trial treatment?
+ Endoscopy and ultrasound guided FNA of liver and bile aspirate?
+ Exploratory laparotomy?



Exploratory laparotomy

+ Coagulation profile performed first and was wnl
+ Multiple biopsies taken
+ Biopsies submitted for histopathology
+ Bile aspirate submitted for culture and sensitivity and cytology
+ Placement of oesophageal feeding tube

Post op treatment

+ IVFT
+ Analgesia - buprenorphine
+ Anti emetic- maropitant
+ Enteral feeding
+ Potentiated amoxicillin IV pending results
+ B12 supplementation
+ SAMe and UDCA started

Results

+ Lymphoplasmocytic gastritis and enteritis
+ Moderate chronic pancreatitis
+ Neutrophilic cholangiohepatitis
+ *E.Coli* cultured from bile
    + Sensitive to all antibiotics tested against

Treatment

+ Continue enteral feeding until appetite returns
+ Once appetite back to normal transition to hydrolysed diet e.g. Purina HA
+ Continue potentiated amoxicillin for 6-8 weeks
+ Continue SAMe and UDCA

Follow up

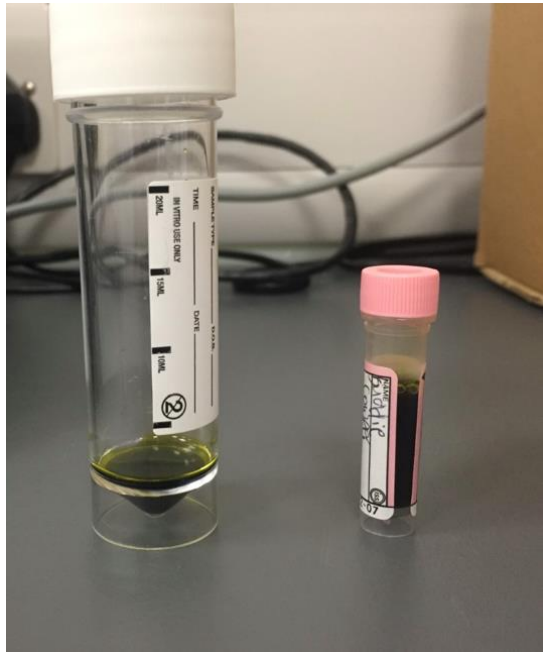
+ O tube removed after 3 weeks
+ Exclusively fed Purina HA
+ Resolution of vomiting and weight gain at revisit 8 weeks later
+ Continued solely on dietary therapy

Follow up

+ 6 months later represented for vomiting and small bowel diarrhea
+ Continued to be fed on Purina HA
+ Full blood work, faecal analysis and abdominal ultrasound performed.

Results

- Blood work unremarkable
- Folate wnl, cobalamin reduced again
- Spec® fPL™ increased
- Faecal analysis unremarkable
- Abdominal ultrasound revealed normal hepatic and biliary tree, thickening of intestinal muscularis and normal pancreatic parenchyma.
- FNA of liver and bile aspirate performed.
  - Cytology unremarkable and culture negative



Diagnosis

+ Chronic enteropathy
+ Possible pancreatitis
+ No evidence for return of bacterial cholangiohepatitis

Treatment/follow up

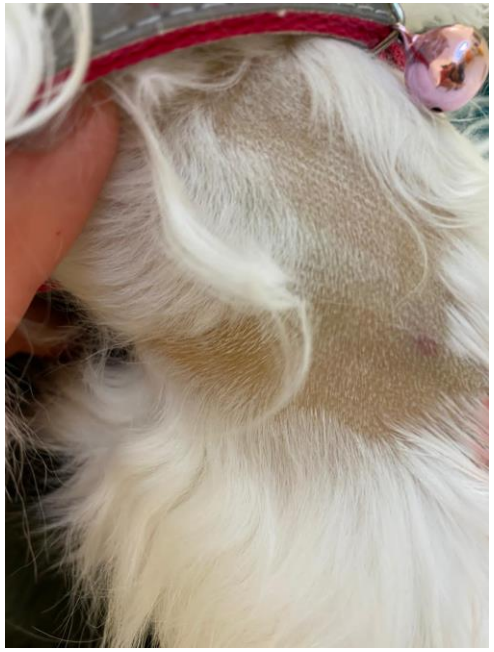
+ Purina HA
+ Prednisolone started at 2mg/kg/day
+ Vomiting and diarrhea improved over a month
+ Prednisolone tapered by 25% every 4 weeks and stopped
+ Long term dietary therapy

Alonzo – 9y MN DLH

+ 1 month history of weight loss (1Kg)
+ Otherwise no concerns
+ UTD vaccinations and flea treatment
+ No travel history
+ Indoor/outdoor access.
+ Not known to hunt

Physical examination

+ Bright, alert and responsive
+ Visibly icteric - skin, mucous membranes
+ TPR wnl
+ Thoracic and abdominal palpation unremarkable
+ LN wnl



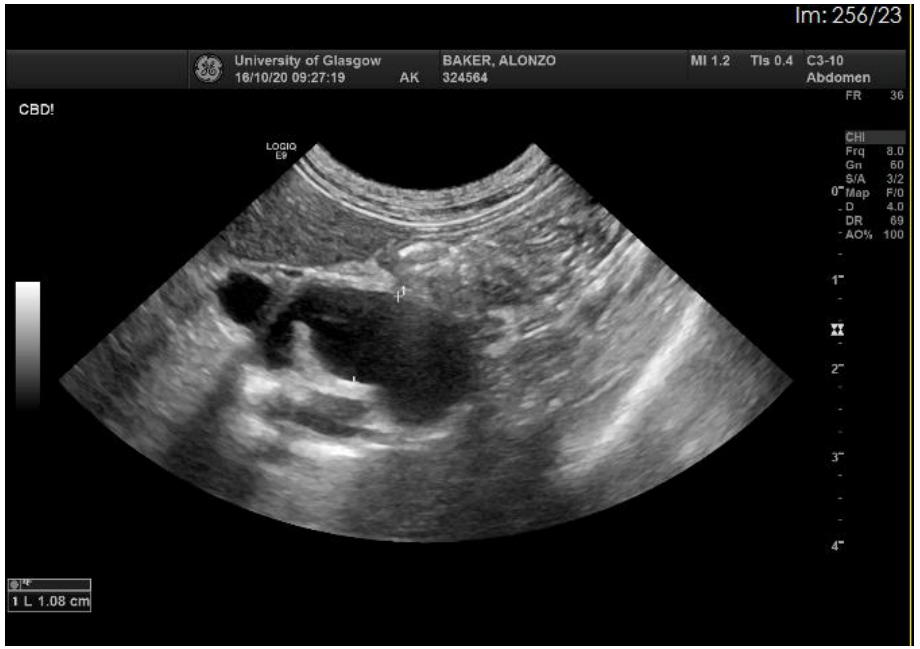
Haematology

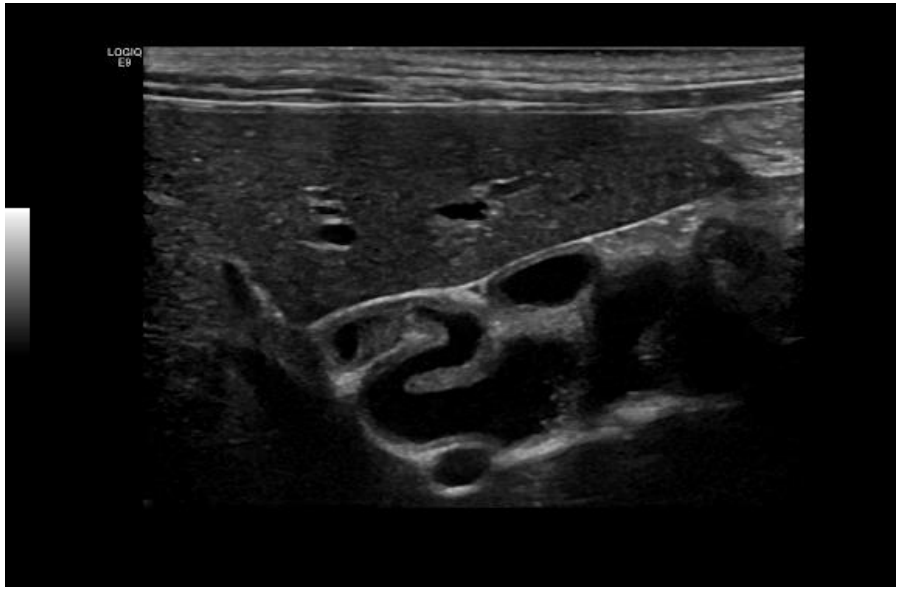
	*RBC	9.33	10^12/L	7.12 - 11.46	
	*Haematocrit	0.415	l/L	0.282 - 0.527	
	*Haemoglobin	12.5	g/dL	10.3 - 16.2	
	*MCV	44.5	fL	39.0 - 56.0	
	*MCH	13.4	pg	12.6 - 16.5	
	*MCHC	30.1	g/dL	28.5 - 37.8	
	*Reticulocytes	8.4	10^9/L	<=50.0	
Low	***Reticulocyte Haemoglobin**	**14.1**	**pg**	**15.3 - 22.9**	
	*WBC	11.8	10^9/L	3.9 - 19.0	
	*% Neutrophils	71.0	%		
	*% Bands	2.0	%		
	*% Lymphocytes	17.0	%		
	*% Monocytes	9.0	%		
	*% Eosinophils	1.0	%		
	*% Basophils	0.0	%		
	*Neutrophils	8.38	10^9/L	2.62 - 15.17	
	*Bands	0.24	10^9/L	0.00 - 0.30	
	*Lymphocytes	2.01	10^9/L	0.85 - 5.85	
High	***Monocytes**	**1.06**	**10^9/L**	**0.04 - 0.53**	
	*Eosinophils	0.12	10^9/L	0.09 - 2.18	
	*Basophils	0.00	10^9/L	0.00 - 0.10	
	*Platelets	302	10^9/L	155 - 641	

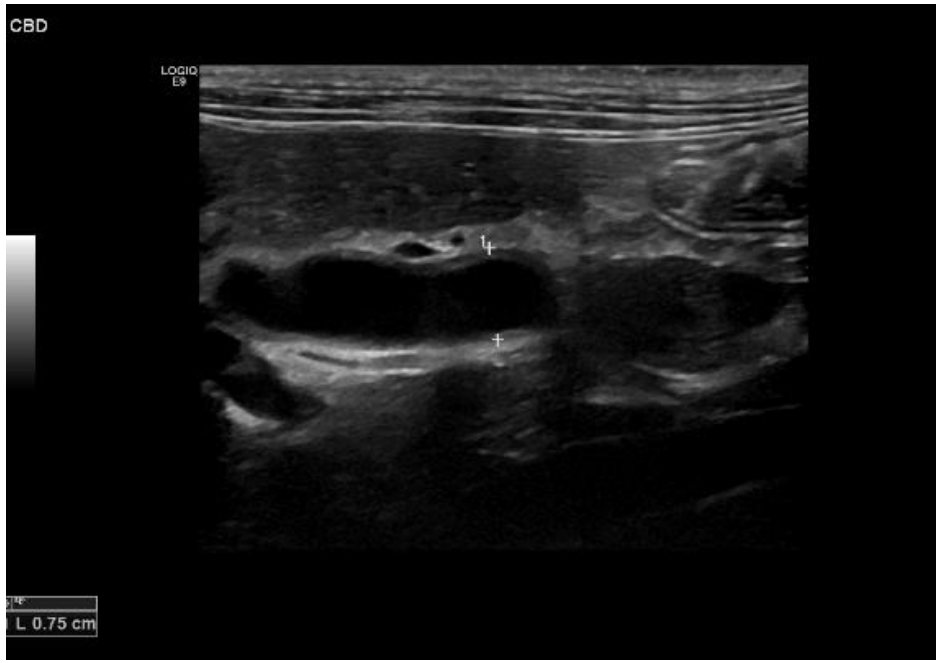
Biochemistry

	Glucose	5.1	mmol/L	3.9 - 8.0	
	IDEXX SDMA	8	ug/dL	1 - 14	
	Creatinine	130.0	umol/L	80.0 - 203.0	
High	**Urea**	**11.4**	**mmol/L**	**2.5 - 9.9**	
	Phosphorus	1.51	mmol/L	0.90 - 2.20	
	Calcium	2.70	mmol/L	2.05 - 2.95	
	Magnesium	0.90	mmol/L	0.80 - 1.00	
	Sodium	155.0	mmol/L	145.0 - 157.0	
	Potassium	4.55	mmol/L	3.50 - 5.50	
	Na: K Ratio	34.07		28.00 - 40.00	
	Chloride	119.7	mmol/L	100.0 - 124.0	
High	**Total Protein**	**83.4**	**g/L**	**60.0 - 80.0**	
	Albumin	34.4	g/L	25.0 - 45.0	
High	**Globulin**	**49.0**	**g/L**	**25.0 - 45.0**	
	Albumin: Globulin Ratio	0.70		0.60 - 1.50	
High	**ALT**	**441.8**	**U/L**	**5.0 - 60.0**	
High	**AST**	**207.0**	**U/L**	**10.0 - 50.0**	
High	**ALP**	**145.0**	**U/L**	**<=60.0**	
High	**GGT**	**5.3**	**U/L**	**2.0 - 5.0**	
High	**Bilirubin - Total**	**81.0**	**umol/L**	**<=5.1**	
High	**Cholesterol**	**7.10**	**mmol/L**	**2.20 - 4.00**	

Abdominal ultrasound



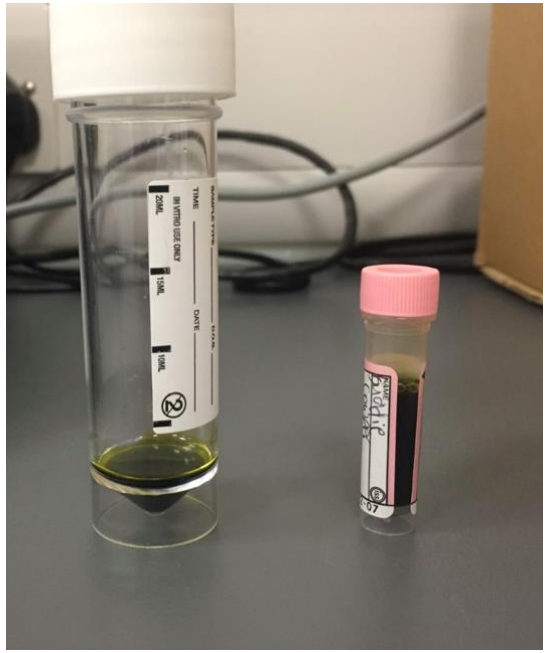




Further investigations

- Coagulation profile
  - PT 14.2 seconds (9-14)
  - APTT 44 seconds (28-44)
- Liver FNA
- Bile aspirate
- Bile cytology and culture

- No significant abnormalities
  - ?false negative result



Screening for concurrent diseases

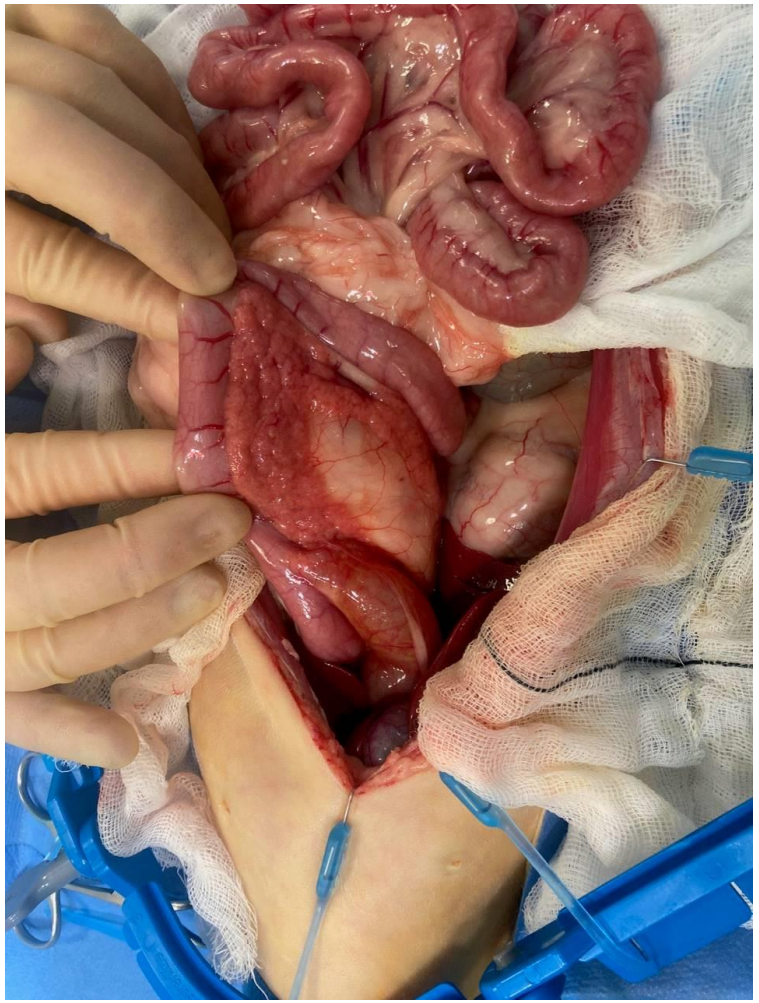
+ Folate wnl
+ Cobalamin 255ng/L (ref >400)
+ Spec® fPL™ 9 (ref <4)

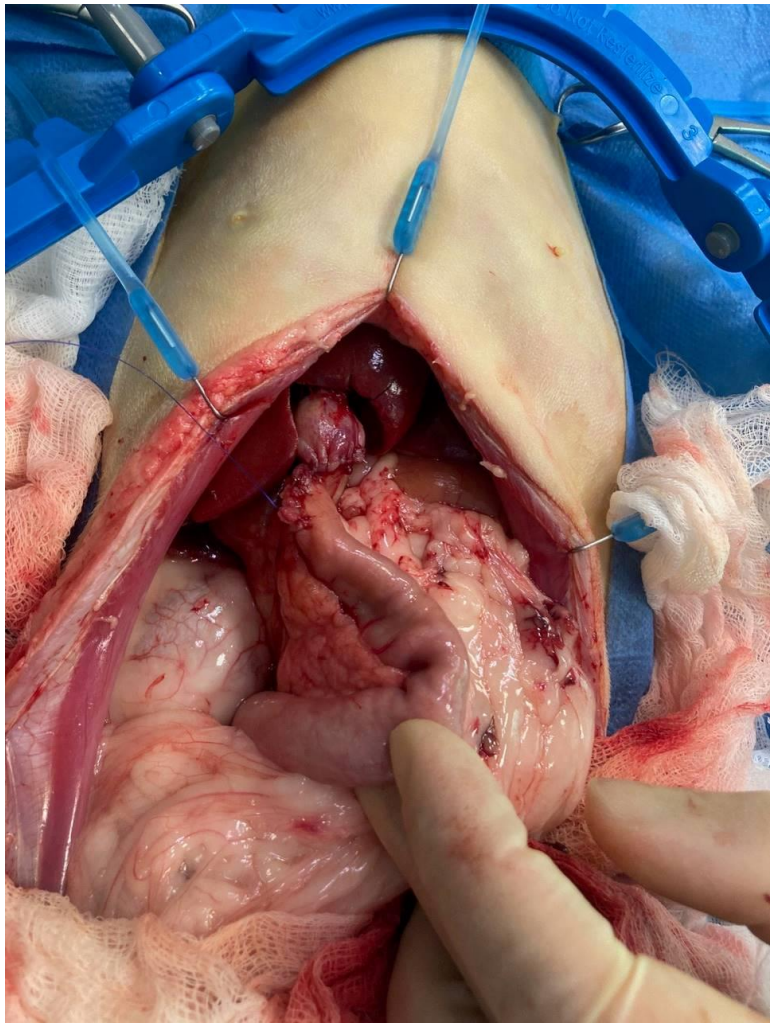
+ Suggestive of possible triaditis

Next step

- Trial treatment
  - Treatment for suspected enteropathy
  - Treatment for liver disease ?inflammatory ?infectious ?other
- Pursue definitive diagnosis
  - Exploratory laparotomy with biopsies

Exploratory laparotomy





Images courtesy of Professor Donald Yool

Histopathology results

+ Lymphocytic cholangitis
+ Stomach – nad
+ Duodenum, ileum and jejunum – lymphoplasmacytic enteritis
+ Bile and liver culture – negative
+ Pancreas inflamed at time of surgery. Biopsy not taken

    + Results suggestive of triaditis

Treatment

+ B12 supplementation
+
+ SAMe

+ Hydrolysed diet

+ Prednisolone therapy

Outcome

+ Prolonged recovery post surgery

+ Once steroids started responded well to treatment

+ Transitioned to chlorambucil due to concern regarding DM

+ Long term dietary management and close monitoring

Summary

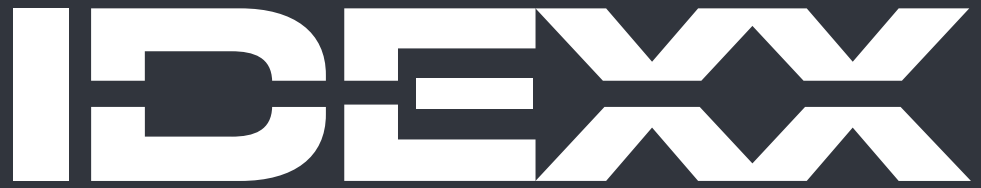
+ Controversy still exists over the underlying aetiology and initial initiating cause

+ Clinical signs can be vague

+ Screen for concurrent diseases, particularly chronic enteropathy

+ Treatment should ideally be guided by histopathology and culture results

+ Cats often require intensive hospitalization and supportive care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