

VITICUSGROUP[™] WVC ANNUAL CONFERENCE MARCH 2 - 5, 2025 | LAS VEGAS, NV

Suffering in Silence: Spotting Signs of Feline Triaditis

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Triaditis



- Triaditis describes a syndrome in cats that is characterized by concurrent inflammation of:
 - the biliary tree (i.e., cholangitis)
 - the pancreas (i.e., pancreatitis)
 - the intestines (i.e., chronic inflammatory enteropathy)
- This also occurs in humans and dogs however, not termed triaditis in other species



'Triaditis' in Humans

- Inflammatory condition of the hepatic triad region
- Reaches into the surrounding connective tissue





Feline Triaditis

- Described in several case reports
- Landmark paper by Weiss et al.
 - cats with cholangiohepatitis had concurrent:
 - inflammatory bowel disease (IBD) in 83%
 - pancreatitis in 50%
 - IBD and pancreatitis (i.e., triaditis) in 39%
- However, it has not yet been demonstrated that these conditions are causally related



Chronic Cholangitis



- Characterized by infiltration of the liver and the biliary tree with a mixture of
 - neutrophils,
 - lymphocytes,
 - and plasma cells





Chronic Pancreatitis



- Chronic inflammatory condition of the pancreas
 - associated with lymphocytic-plasmocytic infiltration





Chronic Inflammatory Enteropathy (CIE)

- Previously called idiopathic inflammatory bowel disease
- Group of chronic gastrointestinal disorders that are characterized by infiltration of the gastrointestinal mucosa with inflammatory cells
 - due to an identifiable cause or idiopathic
 - different predominant cell types
 - most commonly involves the small intestine
 - can also involve the stomach and/or the large intestine



Etiology of Triaditis

- Idiopathic
- Due to anatomy? Due to disease focused on major duodenal papilla?
- Due to an autoimmune component?
- → Although the 3 organs are frequently involved it is unknown if it is due to a single trigger or different trigger for each organ system resulting in multiorgan inflammation.





Etiology of Chronic Cholangitis

- Idiopathic?
- Infectious?
- An autoimmune component is likely



Etiology / Risk Factors for Chronic Pancreatitis

- Idiopathic
- Infectious
- Dietary (high fat?)
- Cholangitis
- Pharmacological substances
- An autoimmune component is likely



Etiology for CIE

- Idiopathic
- Current hypothesis
 - CIE is a heterogeneous group of diseases that have a common final manifestation
 - CIE is the common result of an abnormal interplay of antigenic stimulation and response of the immune system



Pathogenesis of CIE





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Clinical Presentation



Clinical Signs of Chronic Cholangitis

- lethargy
- anorexia
- weight loss
- vomiting
- fever
- abdominal pain
 ⇒non-specific

- diarrhea
- polydipsia
- > polyuria
- icterus
- > ascites
- > encephalopathy
- bleeding diathesis
- ⇒ in case of hepatic failure



Clinical Signs of Pancreatitis



• anorexia	87%	
 lethargy 	81%	
 dehydration 	54%	
 weight loss 	47%	
 hypothermia 	46%	
 vomiting 	46%	
• icterus	37%	
• fever	25%	
 abdominal pain 	19%	
• diarrhea	12%	

⇒non-specific even in severe cases



Clinical Signs of CIE

- vomiting
 - most commonly in cases with gastric involvement
- diarrhea
 - most commonly small bowel diarrhea
- weight loss
- anorexia
- weakness
- other
- ⇒non-specific





Clinical Signs in Cats with Triaditis

- May be subclinical
- Common clinical signs
 - vomiting
 - anorexia
 - diarrhea
 - weight loss
 - lethargy
- In severe cases
 - icterus and systemic clinical signs



Photo from C. Dropkin



Abdominal Discomfort

- Cholangitis and pancreatitis can be associated with abdominal discomfort
- Abdominal discomfort can be difficult to diagnose patients with triaditis should be treated for abdominal pain/discomfort



Clinical Pathology Findings in Chronic Cholangitis

- Increase in liver enzyme activities
- Hyperbilirubinemia
- Hyperglobulinemia in about 50% of cases
- Increased serum bile acid concentrations

⇒non-specific findings for any type of hepatobiliary disease
 ⇒depending on disease severity



Clinical Pathology Findings in Chronic Pancreatitis



 elevation of ALT activity 	68%	
 hyperbilirubinemia 	64%	
 hypercholesterolemia 	64%	Н
 hyperglycemia 	64%	
• azotemia	57%	
 hypokalemia 	56%	
 elevation of SAP activity 	50%	
 hypocalcemia 	45%	
		_

n = 40

Hill et al., 1993

- ⇒non-specific findings related to systemic complications
- ⇒maybe completely normal



Clinical Pathology Findings in cats with CIE



- Complete blood count
 - often within normal limits
 - anemia of chronic disease in some cases
 - stress leukogram or inflammatory leukogram in some cases
- Serum chemistry profile
 - often within normal limits
 - slight elevations of hepatic enzyme activities
 - serum proteins may be decreased

⇒non-specific changes



Clinical Pathology in Triaditis



- Largely non-specific
 - cholangitis leads to changes suggestive of a hepatobiliary disease
- Mostly dependent on severity of disease
 - liver disease vs. liver failure
 - systemic complications
- CBC may or may not show an inflammatory leukogram



Abdominal Radiographs

- Enlarged liver
- Decreased contrast in the cranial abdomen
- Thickened bowel-loops
- ⇒ these findings are very subjective
- ⇒ abdominal radiographs are not useful to arrive at a primary diagnosis of triaditis
- ⇒ however, abdominal radiographs are useful to rule out other differential diagnoses





Abdominal Ultrasound Chronic Cholangitis

• Thickened gall bladder wall

• Dilated bile duct

Altered echogenicity of the liver
 ⇒ fairly suggestive of cholangitis

Ascites with hepatic dysfunction





Abdominal Ultrasound Chronic Pancreatitis

- Fluid accumulation around the pancreas
- Enlargement of the pancreas
- Increased echogenicity (pancreatic fibrosis)
- Pancreatic mass effect
- sensitivity and specificity are dependent on several factors



Image from Michigan State University



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Ultrasound for the Diagnosis of Pancreatitis



Abdominal Ultrasound CIE



 Abdominal ultrasound may show thickened, and fluid filled bowel loops

Abdominal ultrasound is more useful to exclude other causes of chronic gastrointestinal disease



Differential Diagnoses

isolated chronic cholangitis

- Isolated CIE
- Isolated chronic pancreatitis
- Other hepatopathies
- Hyperthyroidism
- Other primary gastrointestinal diseases
 - e.g. GI lymphoma







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Diagnosis

Definitive Diagnosis



- Definitive diagnosis of triaditis requires hepatic, pancreatic, and intestinal biopsies
- Histopathological evaluation
 - inflammatory infiltrates in the liver, the pancreas, and the small intestines
- However, very invasive and usually not indicated
 - at least initially



Hepatic Biopsy

- Multiple pieces should be collected
- One piece should be cultured
- Biopsies can be collected by
 - true-cut needle
 - laparoscopy
 - laparotomy





Presumptive Diagnosis of Chronic Cholangitis

• Ultrasonographic changes

• Abnormalities on a serum chemistry profile suggesting hepatobiliary disease

• Response to therapy





Presumptive Diagnosis of Chronic Cholangitis

⇒ A presumptive diagnosis of chronic cholangitis is often not sufficient for long-term management

⇒ however, initial therapy can be initiated based on a presumptive diagnosis
 ⇒ in patients that do not respond to therapy a definitive diagnosis needs to be sought





Presumptive Diagnosis of Chronic Pancreatitis

- Ultrasonographic changes
- Serum pancreatic lipase



Serum Pancreatic Lipase

- Measured by enzymatic assays
 - Most assays do not specifically measure pancreatic lipase
 - Many assays have not been analytically validated
 - New Catalyst PL assay has been validated and specifically measures pancreatic lipase
- Measured by immunoassays
 - Spec fPL and SNAP fPL have been analytically and clinically validated



Important Considerations

- Even if assays use the same substrate, they may produce completely different results
- Assay conditions are crucial
 - co-factors
 - temperature
 - pH
 - other factors





Hepatic and/or Lipoprotein Lipase

• The release of hepatic and/or lipoprotein lipase can be stimulated by administration of heparin



DGGR Feline Study

• Correlation of serum Spec fPL and DGGR lipase in 161 cats

- Agreement between the two assays showed a Cohen's kappa coefficient of 0.7
- This may seem high, but it basically means that if Spec fPL has a sensitivity of approximately 80% the DGGR has a sensitivity of approximately 56%



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Catalyst PL by Idexx Laboratories

- A new DGGR-based point-of-care assay for the catalyst analyzer
- 1st DGGR-based lipase assay on a dry-chemistry analyzer
 ⇒ proprietary technology to keep DGGR stable
- 1st DGGR-based lipase assay that appears to be specific for the measurement of pancreatic lipase
 ⇒ proprietary technology



Catalyst PL by Idexx Laboratories

- Internal analytical validation has been completed
- External analytical validation has been completed
- Provides a numerical result that has been aligned with the Spec fPL assay
- Ideal for patients with acute clinical signs that require immediate and accurate results

⇒more data is under way

Method Comparison







Lipase Immunoassays

- Use an antibody that recognizes a specific moiety of the lipase molecule
- Only detect pancreatic lipase, which is only synthesized by pancreatic acinar cells
- Highest sensitivity and specificity for the diagnosis of feline pancreatitis
 - However, chronic mild pancreatitis maybe missed





Presumptive Diagnosis of CIE

- Chronic signs of GI disease
- Rule out of other obvious causes
 - Secondary GI disease
 - Renal failure, hepatic failure, hyperthyroidism, or other
 - Primary GI disease
 - Endoparasites, tritrichomonas foetus, or other
- Response to therapy





Presumptive Diagnosis of CIE

A presumptive diagnosis of CIE is often not sufficient for long-term management

- However, initial therapy can be initiated based on a presumptive diagnosis
- ⇒ In cases that do not respond to therapy definitive diagnosis needs to be sought







Presumptive Diagnosis of Triaditis

- Chronic diarrhea with other nonspecific symptoms
- Exclusion of other diseases
 - increased activities of liver enzyme activities
 - increased serum bilirubin concentration
 - increased serum pancreatic lipase
 - decreased serum cobalamin and/or folate
 - supportive ultrasonographic changes





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Management



Therapy of Chronic Cholangitis

- Treatment of the cause
 - antibiotic therapy
 - ideally based on culture and sensitivity
- Anti-inflammatory therapy
- Supportive therapy
- Therapy of complications
 - hepatic dysfunction
 - hepatic lipidosis



Therapy of Chronic Pancreatitis

- Treatment of cause
- Treatment of concurrent conditions
- Dietary management
- Anti-nausea agents
- Analgesics
- Anti-inflammatory agents
- Antioxidants
- Monitoring



Immunosuppressive Therapy





Monitoring



- Serum fpli concentration or catalyst PL
- Initially every 2-3 weeks
- After amelioration of pancreatitis with decreasing frequency



Principles of Therapy of CIE

- Treat underlying cause
 - e.g., Anthelmintic agents for GI parasites
- Treat complications
 - e.g., Cobalamin supplementation
- Dietary trial
- Anti-inflammatory and immunosuppressive therapy



Therapy of Triaditis

- Moderately fat-restricted diet
 - Easily digestible diet or home-made diet
- Antibiotic agent for cholangitis (initially)
- Supportive therapy for cholangitis
- Cobalamin supplementation if indicated
- Immunosuppressive therapy
- Monitoring
 - Clinical signs
 - Chemistry profile and serum pancreatic lipase





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Prognosis

Prognosis



- Depends on severity and systemic complications
 - Short term: good
 - Long term: guarded
 - Relapses are common



Take Home Points



Triaditis should be viewed as a combination of inflammatory conditions of the liver, the pancreas, and the small intestines

Definitive diagnosis requires biopsies of all 3 organs, which, at least initially, is rarely in the best interest of the patient

A presumptive diagnosis of triaditis can be made based on the clinical presentation, abdominal ultrasound, and clinical pathology results

Our Successful management requires careful monitoring and adjustment of ongoing therapies



Questions?







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