FELINE TRIADITIS: THE ENIGMATIC CONDITION

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Triaditis refers to a combination of cholangitis, pancreatitis and inflammatory bowel disease. The presenting signs are more usually due to cholangitis. The link is thought to arise through the presence of inflammatory bowel disease increasing the possibility of an ascending infection, which passes up both the pancreatic and bile ducts, due to their common exit path on the duodenal papilla.

FELINE INFLAMMATORY LIVER DISEASE

Feline cholangitis is subclassified into three histopathological conditions (WSAVA Liver Standardisation Group), of which two will be considered in the disease profile triaditis:

1. **Neutrophilic cholangitis**
2. **Lymphocytic cholangitis**

**Neutrophilic cholangitis**

Neutrophilic cholangitis is thought to arise following ascending infection from the gastrointestinal tract. Hence, it may be more frequently associated with pancreatitis. It is more common in older cats. The disease is also commonly associated with biliary stasis (and therefore icterus) due to inflammation rather than obstruction.

**Clinical signs** include lethargy, pyrexia, anorexia and icterus (variable). Occasionally, they may demonstrate abdominal pain.

**Diagnostic indicators** include elevated alkaline phosphatase, alanine transferase and gamma glutamyl transferase; hyperbilirubinaemia and elevated serum bile acids. There may be a neutrophilia
with a left shift in some cases. Ultrasound examination can reveal a thickened gall bladder lining, bile sludge, but sometimes little change. Occasionally, the liver can be hyperechoic. If there is biliary stasis, the common bile duct may be more prominent. Cholelithiasis may occur concurrently as a cause or consequence.

**Diagnosis** should be based on bile aspiration and culture. A liver biopsy helps confirm the diagnosis.

**Treatment:** appropriate antibacterial therapy - a broad spectrum bactericidal drug, effective against anaerobes and preferably excreted in bile with minimal metabolism by the liver e.g. amoxicillin-clavulanate. Alternatively, cephalosporins or fluoroquinolones combined with metronidazole may be used. Treatment should be continued for at least 4 to 6 weeks. In cases with biliary stasis due to marked inflammation, low dose prednisolone may be indicated at 1mg/kg PO SID. In cases of biliary obstruction, cholecystoduodenostomy may be required as a final resort.

**Prognosis** good, particularly if treatment is initiated early. More severe cases may develop fibrosis. Median survival time was 29 months in one study. Concurrent pancreatitis or inflammatory bowel disease can make the prognosis less favourable. Cases involving surgical intervention have a more guarded prognosis.

**Lymphocytic cholangitis**

A chronic disease progressing over months to years. It is more common in younger cats and Persians. The underlying pathophysiology is not known, although an autoimmune-mediated process is suspected. Alternatively, there may be an association with *Helicobacter*-like species infection. As the biliary tract is inflamed and abnormal, it is more prone to acquiring secondary infections of gastrointestinal origin; this can give a mixed inflammatory cell profile.

**Clinical signs** may include lethargy, inappetence, vomiting, weight loss, distended abdomen due to abdominal effusion, palpable liver margins and icterus (variable). However, the cat may be quite bright relative to its diagnostic profile and may be polyphagia.
**Differential diagnoses:** poorly defined small cell lymphoma, extrahepatic bile duct obstruction and feline infectious peritonitis.

**Diagnostic indicators:** hypergammaglobulinaemia, elevated liver enzymes, hyperbilirubinaemia, elevated serum bile acids, lymphopenia and occasionally mild neutrophilia and anaemia. Ultrasonography shows hepatomegaly with diffuse increase in echodensity and distended intra and extrahepatic bile ducts (dependent on the individual case and chronicity). A liver biopsy enables diagnosis.

**Treatment:** Corticosteroid 1-2 mg/kg prednisolone BID slowly tapered over a period of 6-12 weeks depending on case severity. **Antibacterial** administration for the first four weeks using potentiated amoxicillin for any secondary infection. **Ursodeoxycholic acid** 10-15mg/kg PO SID or divided BID helps suppress the inflammatory response and relieve biliary obstruction.

**Prognosis:** Mean survival time for cats with lymphocytic cholangitis has been reported as 37 months. The prognosis is usually worse for those cats with ascites.

**General hepatic support**

- **Intravenous fluid therapy and electrolyte supplementation.**
- **Vitamin K** - 0.5mg/kg twice daily for 3 days.
- **s-adenosyl methionine** - 50mg (<5kg) to-100mg (> 5kg) once daily.
- **Silymarin** - can be obtained in compound preparations with sAMe.
- **Choleretics** - Indicated if there is biliary stasis with no evidence of extrahepatic bile duct obstruction. **Ursodeoxycholic acid** 10-15mg/kg PO SID or divided BID.
- **Diet** - A balanced diet, moderate in good quality protein unless the cat is encephalopathic. A proprietary hepatic diet is NOT indicated unless the cat is in end stage liver disease.
- **Feeding tube placement** - if anorexia is prolonged.
- **Anti-emetics** - Maropitant (Cerenia, Pfizer) 0.5-1mg/kg SID SQ. **Metoclopramide** infusion 1-2 mg/kg/24h. **Mirtazipine** (Zispin), 1.875-3.75mg per cat PO q24-72h.

- **Appetite stimulants** - Only use once the cat has been stabilised. **Cyproheptadine** (Periactin) 0.1-0.5 mg/kg po q8-12h. **Mirtazapine** (Zispin) (see above).

- **Diuretics** - If the degree of ascites in advanced lymphocytic cholangitis is causing complications (rarely required).

**FELINE PANCREATITIS**

Pancreatitis occurs due to autodigestion of the exocrine pancreatic tissue, which follows premature activation of digestive enzymes (proteases and phospholipases). It can be classified as two forms

1. **Acute pancreatitis**: Completely reversible after the cause is removed. Usually severe.
2. **Chronic pancreatitis**: Chronic disease with irreversible changes of fibrosis and atrophy.
   Usually milder. More common in cats than in dogs. May be subclinical.

**Clinical signs**

Most common clinical signs are lethargy, anorexia and dehydration.

**Diagnosis**

Clinical pathology tests may show: non-regenerative anaemia, hypoalbuminaemia, hypocalcaemia, hypokalaemia, elevated liver enzymes, hyperglycaemia, hypoglycaemia, hyperbilirubinaemia, increased feline trypsin-like immunoreactivity, pancreatic lipase immunoreactivity, prolonged coagulation times. Pancreatic biopsies give inconsistent histopathological results.

**Treatment**

1. **Intravenous fluid therapy**.
2. **Plasma**. Provides protease inhibitors.
3. **Electrolyte imbalances**.
   a. **Potassium**.
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<tr>
<th>Serum potassium</th>
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<tr>
<td>&lt;2 mmol/l</td>
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b. **Calcium.** Only consider supplementation if ionised calcium is moderately to severely reduced. 10% calcium gluconate at 5-15ml/kg/24h.

4. **Glucose.** In cats with hypoglycaemia causing clinical signs: 5% glucose saline IVFT. If ketones are present, treat with soluble insulin at low dose (0.2iu/kg i/m, then administer incremental doses of 0.1iu/kg as required to keep blood glucose below 15 mmol/l).

5. **Anti-emetics.** Maropitant (Cerenia) 0.5mg/kg once daily SQ; metoclopramide 1-2 mg/kg CRI (protect from light); mirtazapine 1.875-3.75mg per cat every 2-3 days; chlorpromazine 0.1-0.5mg/kg SQ or IM q8-12h.

6. **Analgesia.** Buprenorphine 0.01-0.02 mg/kg IV, SQ or sublingual TID. Pethidine (2-5mg/kg IM, SQ q 4-6h), morphine (0.1-0.3mg/kg IM, SQ q6-8h), fentanyl patch (25 µg/kg/h) or constant rate infusions for severe pain of morphine (2-6 µg/kg/minute) and ketamine (2-10 µg/kg/minute). Avoid NSAIDs due to the increased risk of renal toxicity in the dehydrated/hypovolaemic patient.

7. **H₂-antagonists.** Ranitidine 3.5mg/kg per os q12h or 2mg/kg slow IV q8-12h. Famotidine 0.5-1mg/kg q12-24h.

8. **Appetite stimulants.** Cyproheptadine (Periactin) 0.1-0.5mg/kg q8-12h; mirtazapine 3.75mg q 72h.

9. **Nutritional support.** If the cat is persistently anorexic, a feeding tube should be placed. Diet should be a highly digestible minimal residue food; it is not necessary to restrict fat.

10. **Antibiotics.** Broad-spectrum antibiotics are recommended due to the risk of bacterial translocation from the intestine.

11. **Corticosteroids.** Prevent ongoing inflammation and fibrosis in chronic recurrent pancreatitis.

12. **Pancreatic enzyme supplementation**

13. **Vitamins and supplements**
a. Vitamin B12. Cyanocobalamin 0.02mg/kg monthly as indicated. If this does not correct deficiency, injections can be given weekly for 4 weeks, then monthly.

b. Vitamin K. If coagulopathy identified or concurrent liver disease.

c. Anti-oxidants.
   i. Selenium. There is no set dose reported, though one guideline is 10-25 µg per 4.5Kg cat daily, and no more than 60-120 µg.
   ii. S-adenosyl methionine. 20 mg/kg PO SID, particularly if cat has cholangitis.


15. Surgery. Surgery is rarely required, though in cases of severe or persistent biliary obstruction, cholecystoduodenostomy may be indicated.

FELINE INFLAMMATORY BOWEL DISEASE

Disorder of the gastrointestinal tract, with persistent or recurrent clinical signs and histologic evidence of inflammation. Lymphocytic plasmacytic enteritis is the most common form seen. It is often over diagnosed and its true prevalence is unknown.

Most commonly affects middle-aged cats; Siamese cats over-represented.

Clinical signs: vomiting and diarrhoea. Signs may have environmental triggers or wax and wane spontaneously. Other clinical signs include thickened bowel loops, abdominal pain or discomfort, borborygmi and flatus, weight loss, altered appetite (polyphagia or anorexia) and occasionally effusion if severely hypoproteinaemia. Diarrhoea can be large or small intestinal (or both). Small intestinal disease is most often characterised by vomiting in cats.

Diagnosis:

1. Haematology – occasional neutrophilia; anaemia of chronic disease or blood loss anaemia

2. Serum biochemistry – Look for signs of malabsorption (hypocholesterolaemia), hypocalcaemia, hypomagnesaemia, signs of protein losing enteropathy (hypoproteinaemia).
3. **Faecal examination** – rule out infection

4. **Folate and cobalamin** – The degree of hypocobalaminæmia correlates with the degree of histopathological change and correlates with outcome.

5. **Diagnostic imaging** – determine extent and focus of disease. Ultrasound-guided fine needle aspirates can aid diagnosis.

6. **Intestinal biopsy** – by endoscopy or surgery. Surgical approach for biopsy may be more useful in cats to allow biopsy of liver and pancreas to assess for triaditis.

**Treatment**

1. Dietary modification

2. Antibiotics – metronidazole is a good choice, 10mg/kg BID.

3. Immunosuppresants (e.g. prednisolone at 2-4 mg/kg q24h p/o then gradually tapering).
   
   Azathioprine **should not be used in cats** and, instead, **chlorambucil** (2-6 mg/m² SID p/o) is a suitable alternative, given as pulsed doses.

4. Probiotics and prebiotics

**Prognosis**

Reasonable prognosis compared to dogs with good periods of remission. Clinical improvement does not correlate with histopathological improvement
FELINE CONSTIPATION AND MEGACOLON

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Constipation in the cat is most usually associated with anxiety or disorders of the large intestine. Additionally, constipated cats may have underlying neurological or orthopaedic disease, which secondarily result in constipation due to a difficulty in posturing to pass faeces. Constipation can be a particular problem in cats with chronic kidney disease due to dehydration. Care should always be taken in cats with such chronic diseases to maintain fluid balance and observe toileting behaviour to allow timely intervention.

The colon or large intestine has two functions:

1. Water and electrolyte absorption (ascending and transverse colon)
2. Faecal storage (descending colon)

Definitions

**Constipation**: Reduced frequency of defecation or difficult evacuation of hard dry faeces

**Obstipation**: Intractable constipation where cat is no longer able to defecate and requires intervention. Implies permanent loss of function. Defined after several treatment failures.

**Tenesmus**: Straining to defecate, which may be painful

**Dyschezia**: Difficult or painful passage of faeces

Why do faeces become hard?

1. Low fibre diet
2. Indigestible elements in diet (hair, bones)
3. Poor hydration due to reduced intake or increased loss
4. Lack of exercise
5. Weakness
6. Colonic or rectal obstruction
7. Neurological abnormalities

**Evaluating the constipated cat**

**History**

- Duration of constipation
- Frequency of litter tray use
- Is tenesmus or dyschezia present?
- What diet is the cat eating?
- Breed (Manx cat)
- Mega colon more common in middle aged male cats

**Clinical examination**

- Assess for underlying diseases causing anorexia, PU/PD, weakness
- Neurological and orthopaedic examination
- Colon full of faeces palpable
- Abdominal palpation for masses/foreign bodies, obstructions, etc.
- Behavioural assessment

**Differential diagnoses (Based on Ettinger p.1581)**

**Neuromuscular dysfunction**

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<tr>
<th>Colonic smooth muscle</th>
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<tr>
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<tr>
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<td>Sacral spinal cord deformities (Manx cat)</td>
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<tr>
<th>Hypogastric or pelvic nerve disorders</th>
<th>Traumatic injury</th>
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<td>Dysautonomia</td>
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<td>Ageing</td>
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**Mechanical obstruction**

Intraluminal
- Foreign material
- Neoplasia
- Rectal diverticula
- Perineal hernia
- Anorectal strictures

Intramural
- Neoplasia
- Stricture

Extramural
- Pelvic fractures
- Neoplasia

External
- Hair matting

**Inflammation**

- Perianal fistula
- Proctitis
- Anal sac abscess
- Anorectal foreign body
- Perianal bite wounds

**Metabolic and endocrine**

Metabolic
- Dehydration
- Hypokalaemia
- Hypercalcaemia

Endocrine
- Hypothyroidism
- Obesity
- Nutritional secondary hyperthyroidism

**Environmental and behavioural**

- Soiled litter box
- Inactivity
- Hospitalisation
- Change in environment
Diagnostic tests

- Rule out systemic disease: haematology, biochemistry, urinalysis
- Rule out hypothyroidism: T4
- Abdominal radiography and ultrasonography
- Colonoscopy once faeces evacuated if concern over colonic disease
- Biopsy of any masses or thickenings.

Treatment

Treating the constipated cat (mild to moderate cases)

- **Identify and treat any underlying condition**
- **Fluid therapy** if dehydrated
- **Correct electrolytes**, particularly potassium
- **Suppository enemas** – dioctyl sodium sulfosuccinate (emollient laxative – anionic detergent that enhances lipid absorption and impairs water absorption), glycerine (lubricant laxative – restricts water absorption and aids faecal passage), bisacodyl (stimulant laxative)
- **GA and warm water enema** if suppositories not effective. Warm tap water or isotonic saline 5-10 ml/kg. Alternatively, dioctyl sodium sulfosuccinate (5-10 ml/cat), mineral oil (5-10 ml/cat) or lactulose (5-10 ml/cat). Administer slowly. Well lubricated 10-12gauge French rubber catheter or feeding tube. Leave in place at least 5 minutes. Manual faecal evacuation can be used alongside through abdominal palpation.
- **Oral laxatives**. Laxatives stimulate fluid and electrolyte transport in the bowel. Do not give mineral oil orally due to risk of aspiration pneumonia. Lactulose is a hyperosmotic laxative (poorly absorbed polysaccharide). Organic acids produced during fermentation stimulate colonic fluid secretion and propulsion. 0.5ml/kg every 8-12 hours. Stimulant laxatives encourage propulsive motility. Bisacodyl 5mg PO every 24 hours is the most effective stimulant laxative in cats.
- **Colonic prokinetics** – Cisapride has supportive evidence for use from in vitro studies, and anecdotal evidence for use in mild to moderate cases of idiopathic constipation. Although cisapride was withdrawn from many markets in July 2000 after cardiac side effects were
reported in people, it can still be acquired through the Internet or through certain pharmacies. Ensure owner signs to say they understand that usage is off-licence. New drugs in development: tegaserod (5-HT₄ receptor agonist and weak 5-HT₁₀ receptor agonist; prokinetic effects in dogs but not yet studied in cats) and prucalopride (5-HT₄ receptor agonist, stimulates defecation in dogs and cats).

- **Diet** – Royal Canin Fibre Response, topical fibre supplements. Fibre products are bulk-forming laxatives. They are mostly poorly digestible polysaccharides and cellulosics from cereal grains, wheat bran and psyllium. For fibre supplements, add psyllium (1-4 teaspoons per meal), wheat bran (1-2 tablespoons per meal), pumpkin (1-4 tablespoons per meal). Royal Canin Fibre Response contains psyllium and has been clinically proven to manage constipation.

- **Behavioural and environmental management** – assessment of the cat’s home environment for stress triggers, correct placement of litter trays, food and water resources, litter box hygiene, sufficient number of resource stations, use of different litter substrates, provision of refuges and hides. Use of pheromone synthetic analogue, fraction F3, to reduce anxiety (Feliway, Ceva Animal Health). Consider whether behavioural consultation/referral required.

**Treating the constipated cat (severe cases)**

- Intravenous fluid therapy
- Hospitalisation and repeat GA, warm water enemas and manual faecal evacuation
- Other treatments as described for mild-moderate cases.

**Prognosis**

Cats with mild to moderate constipation respond well to medical management, as long as intervention is timely and dietary change, laxatives and colonic stimulants are used.

**MEGACOLON**

**Causes of megacolon**

- Dilation (end stage, idiopathic – permanent loss of structure and function)
• Hypertrophy (consequence of obstruction – reversible in early stages)

Differential diagnoses for obstipation

• idiopathic megacolon (62%)
• Pelvic canal stenosis (23%)
• Nerve injury (6%)
• Manx sacral SC deformity (5%)
• Complications of colopexy (1%)
• Colonic neoplasia (1%)
• Other (not proven): colonic hypoganglionosis/aganglionosis, obesity, hypothyroidism (2%)

Pathophysiology of megacolon

Smooth muscle develops reduced isometric stress compared to healthy controls. Histology is normal. May start in descending colon and progress to ascending colon.

Clinical examination

• Middle aged (5.8 years) male (70%) cats
• Domestic shorthair (46%), domestic longhair (15%), Siamese (12%)
• Burmese are over-represented with idiopathic disease
• Reduced /absent/painful defecation prior
• May make multiple posturing attempts to defecate or just sit in litter tray
• Colonic impaction
• Variable signs of dehydration, weight loss, debilitation, abdominal pain, mesenteric lymphadenopathy
• If due to dysautonomia, signs of ANS failure (urinary and faecal incontinence, regurgitation, mydriasis, lacrimation, nictitans prolapse, bradycardia)
Treatment

Subtotal colectomy. Cats refractory to medical therapy are selected for surgery. Favourable prognosis. They may experience mild to moderate diarrhoea for weeks to months during the post-operative period. Post-operative recovery is better if ileocaecocolic junction is preserved (i.e. subtotal colectomy rather than total colectomy).

References:
