

# Have You Got The Gall?



When is extrahepatic biliary tract disease a surgical problem?

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# Learning Objectives

- Understand the pertinent anatomy of the biliary system and understand the relevant species differences between dogs and cats
- Describe the diagnostic approach to extrahepatic biliary tract disease in dogs
- Understand the indications for surgery in dogs with gallbladder mucocoeles
- Understand the indications for surgery in cats with extrahepatic biliary tract disease
- List the expected outcomes following extrahepatic biliary tract surgery in dogs and cats

# Outline



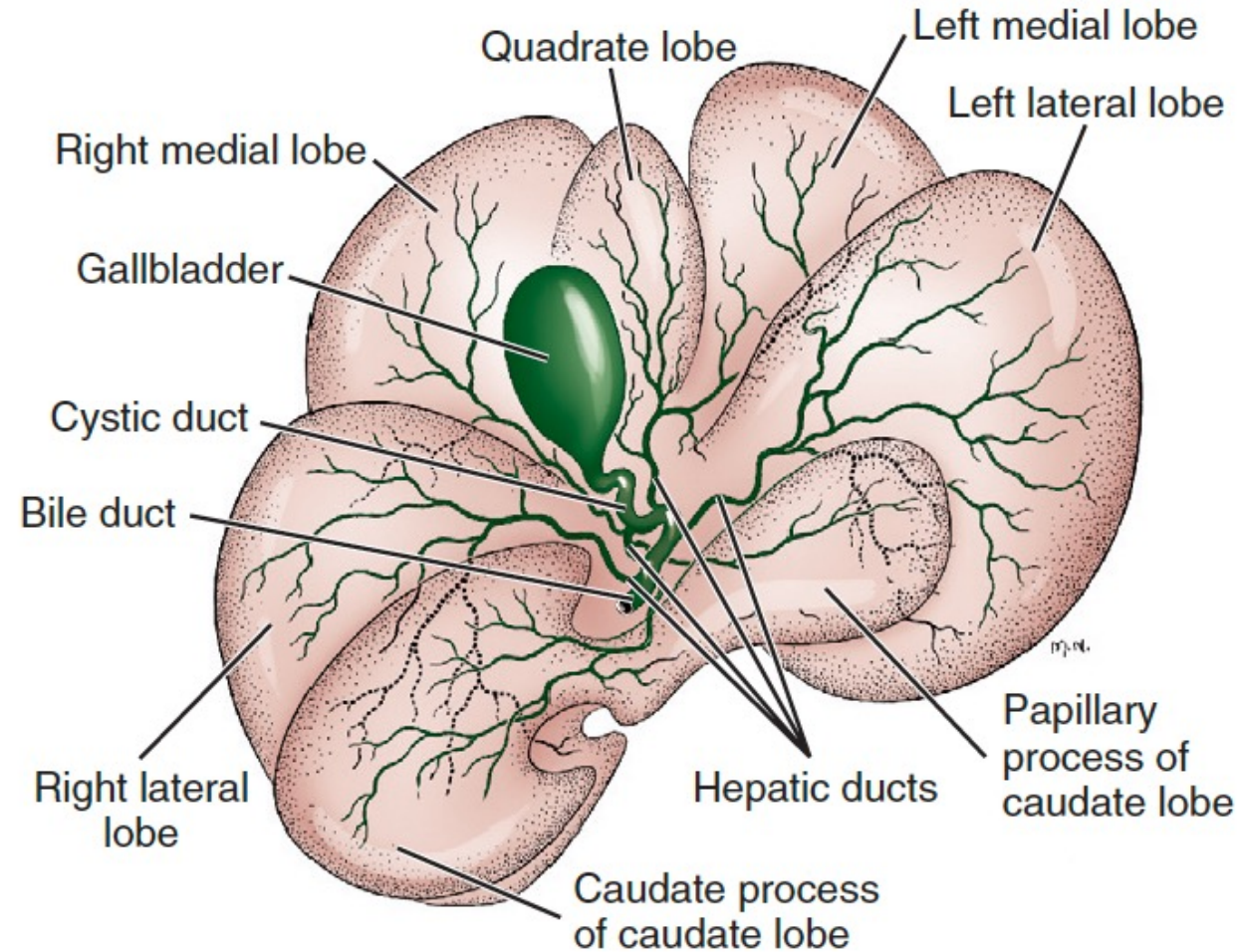
1. Anatomy
2. Diagnostic investigation for extrahepatic biliary tract disease in dogs
3. Gallbladder mucocoeles in dogs
4. Cats with extrahepatic biliary tract obstruction

# Outline

## 1. Anatomy



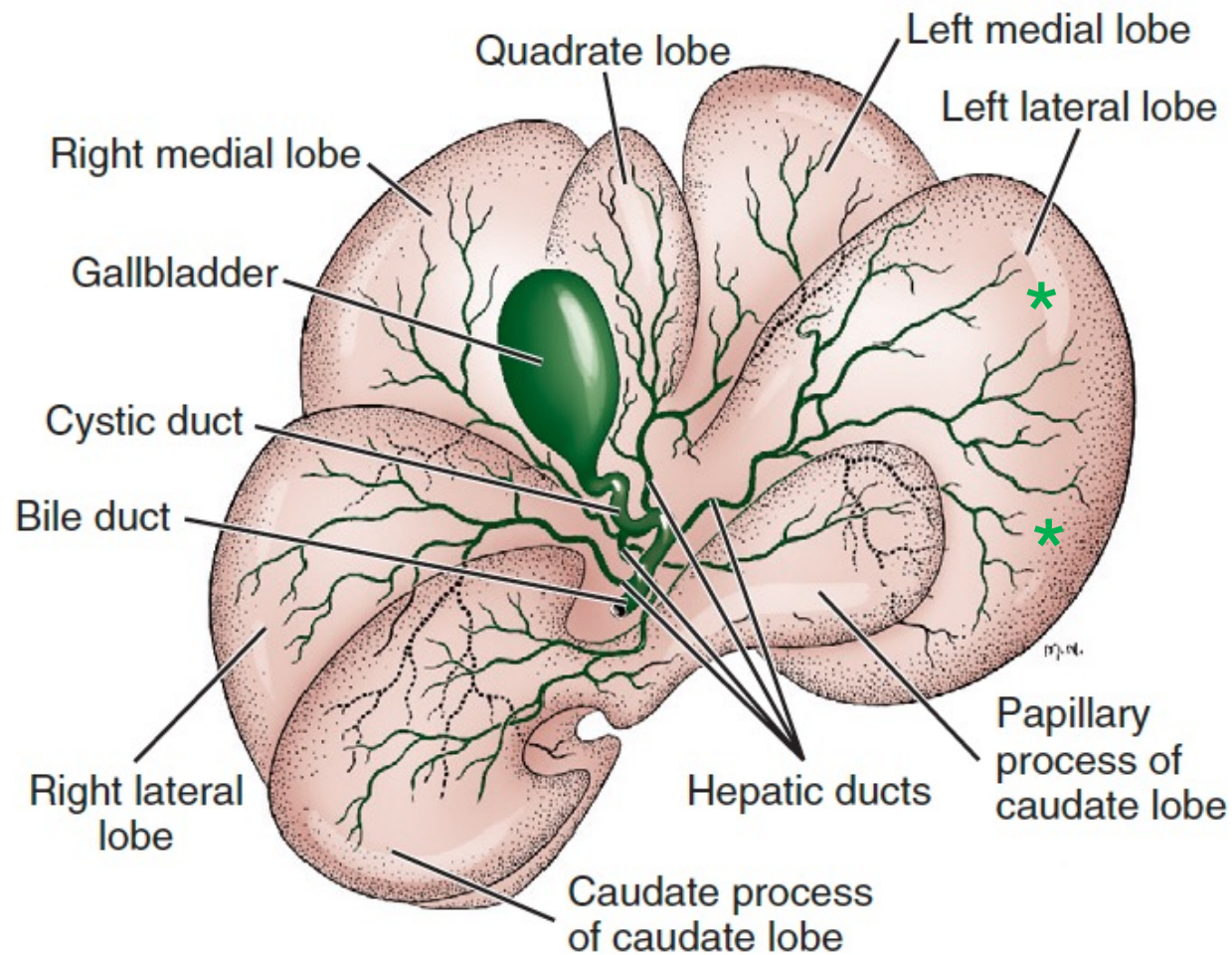
# Anatomy – Biliary System



# Anatomy – Biliary System: Intrahepatic

→ Bile canaliculi

→ Biliary ductules

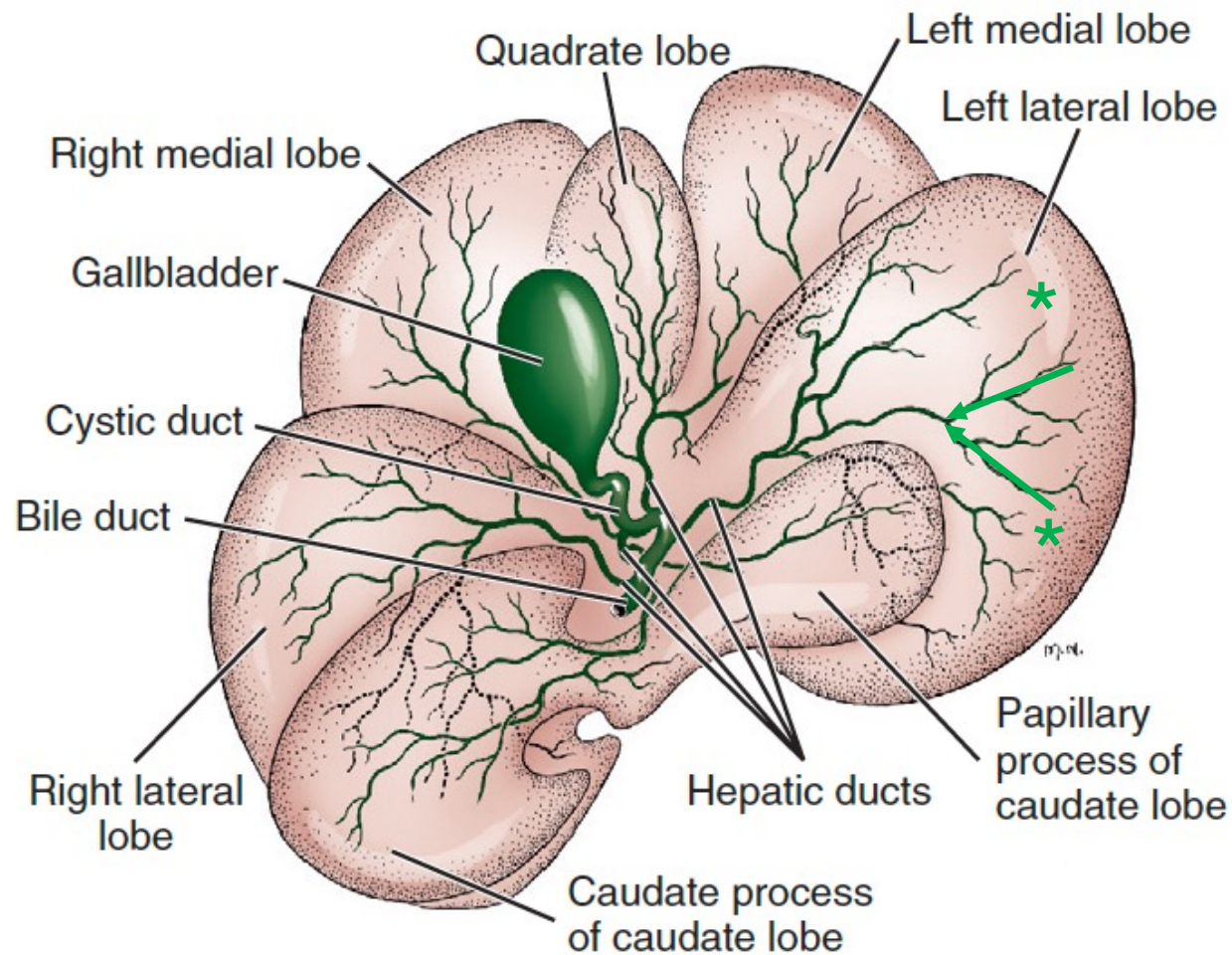


# Anatomy – Biliary System: Intrahepatic

→ Bile canaliculi

→ Biliary ductules

→ Interlobar ducts



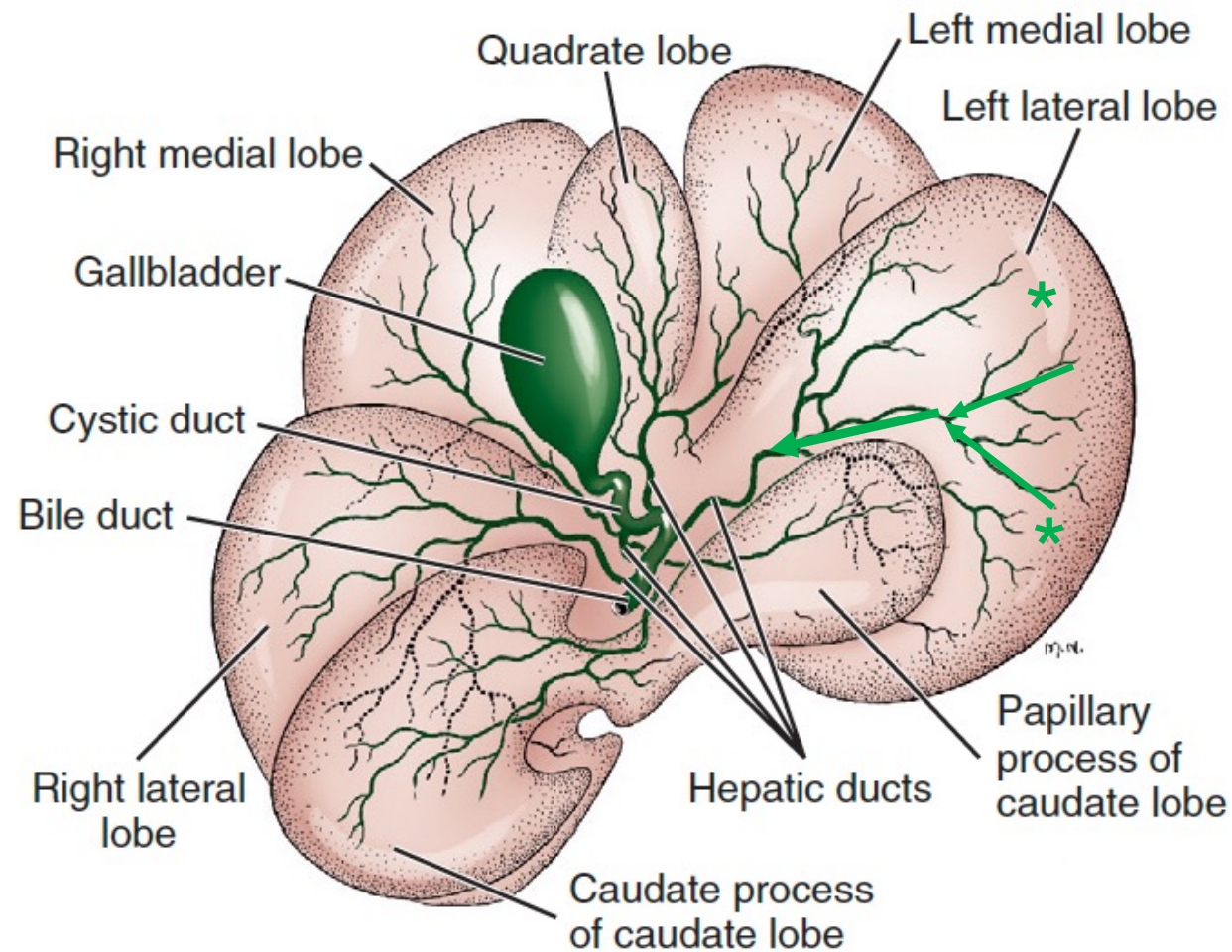
# Anatomy – Biliary System: Intrahepatic

→ Bile canaliculi

→ Biliary ductules

→ Interlobar ducts

→ Lobar ducts





# Anatomy – Biliary System: Extrahepatic

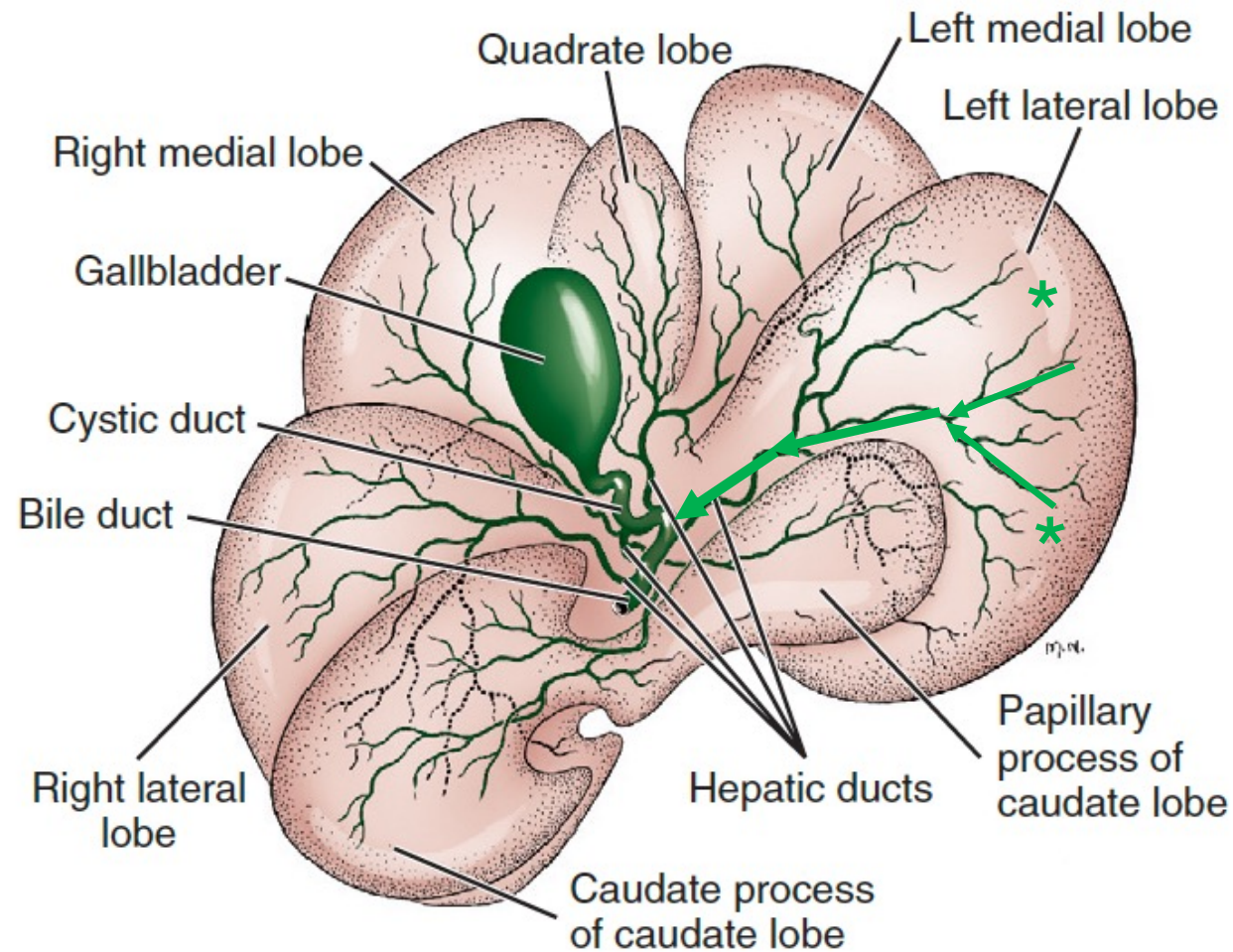
→ Bile canaliculi

→ Biliary ductules

→ Interlobar ducts

→ Lobar ducts

→ **Hepatic ducts**



# Anatomy – Biliary System: Extrahepatic

→ Bile canaliculi

→ Biliary ductules

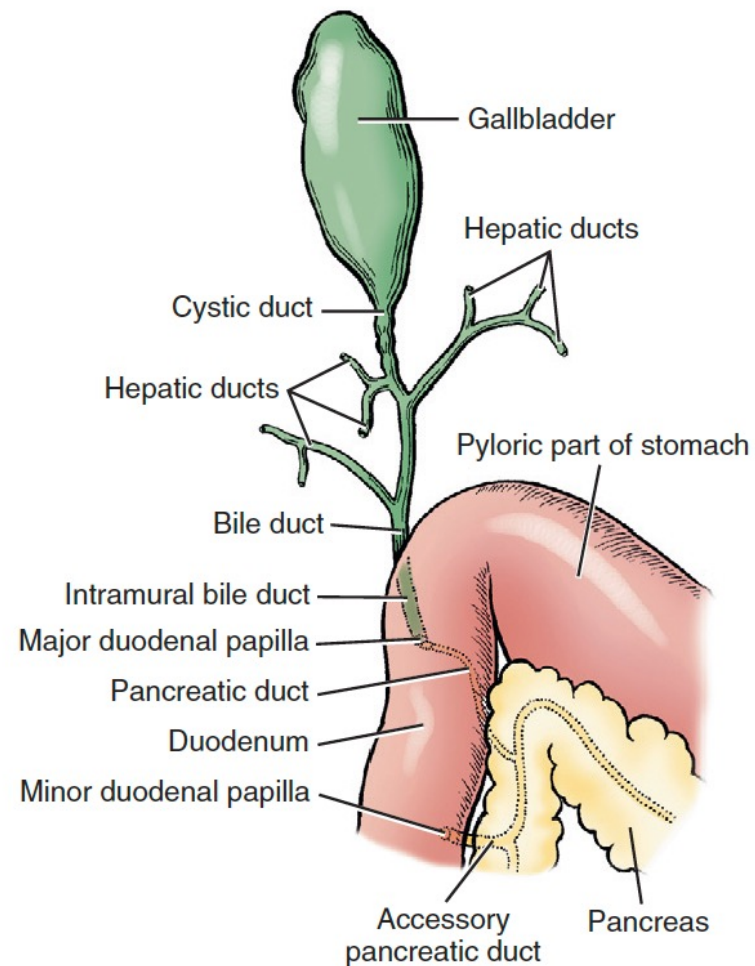
→ Interlobar ducts

→ Lobar ducts

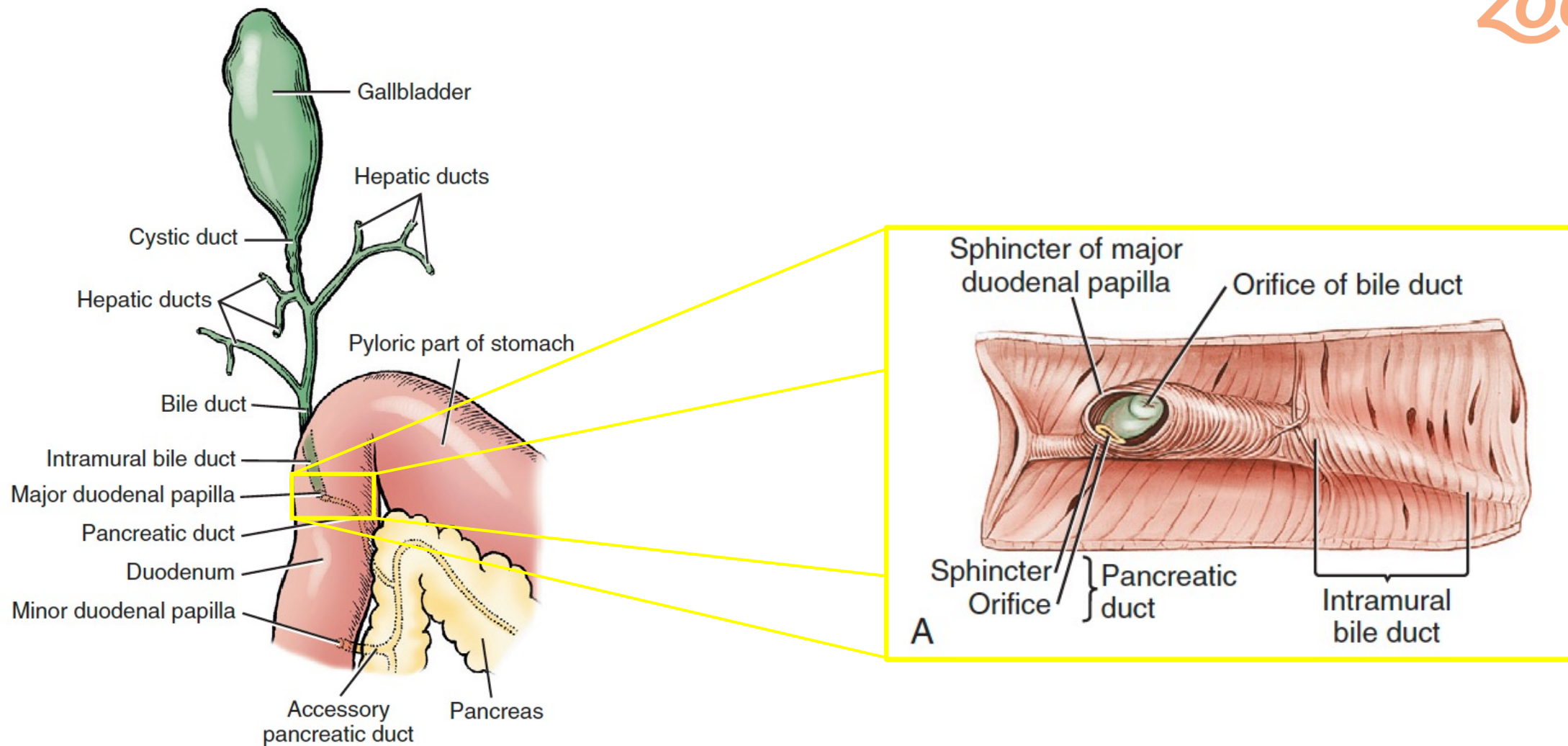
→ Hepatic ducts / gallbladder / cystic duct

→ Common bile duct

→ Duodenum



# Anatomy – Biliary System: Extrahepatic



# Outline

1. Anatomy
2. Diagnostic investigation for extrahepatic biliary tract disease in dogs



# Extrahepatic Biliary Tract Disease

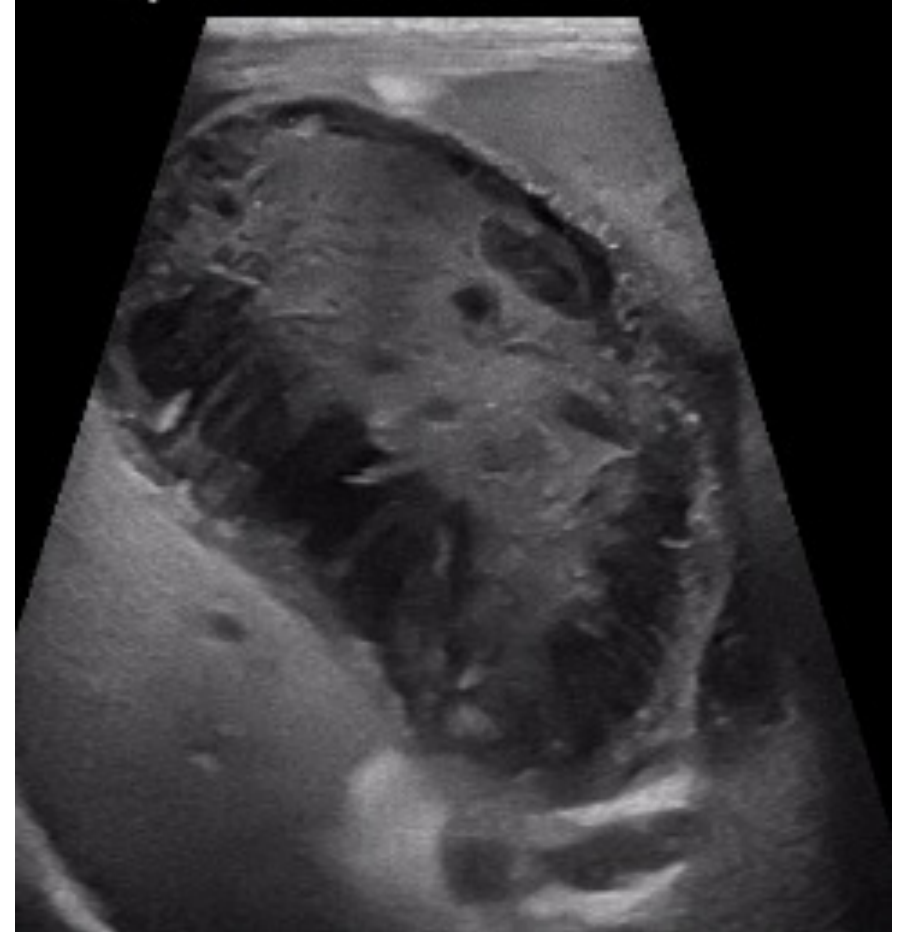
- Non-specific signs
- Waxing and waning signs over days to weeks
- Clinical signs
  - Vomiting, lethargy, anorexia, diarrhoea, abdominal pain, jaundice
  - Bile peritonitis, SIRS +/- septic peritonitis

# Diagnostic Investigation - Bloods

- CBC:
  - Leukocytosis
  
- Biochemistry
  - ↑ ALT, ALP, GGT, cholesterol, bilirubin
  - ↓ Albumin
  
- Coagulation profile
  - Variable

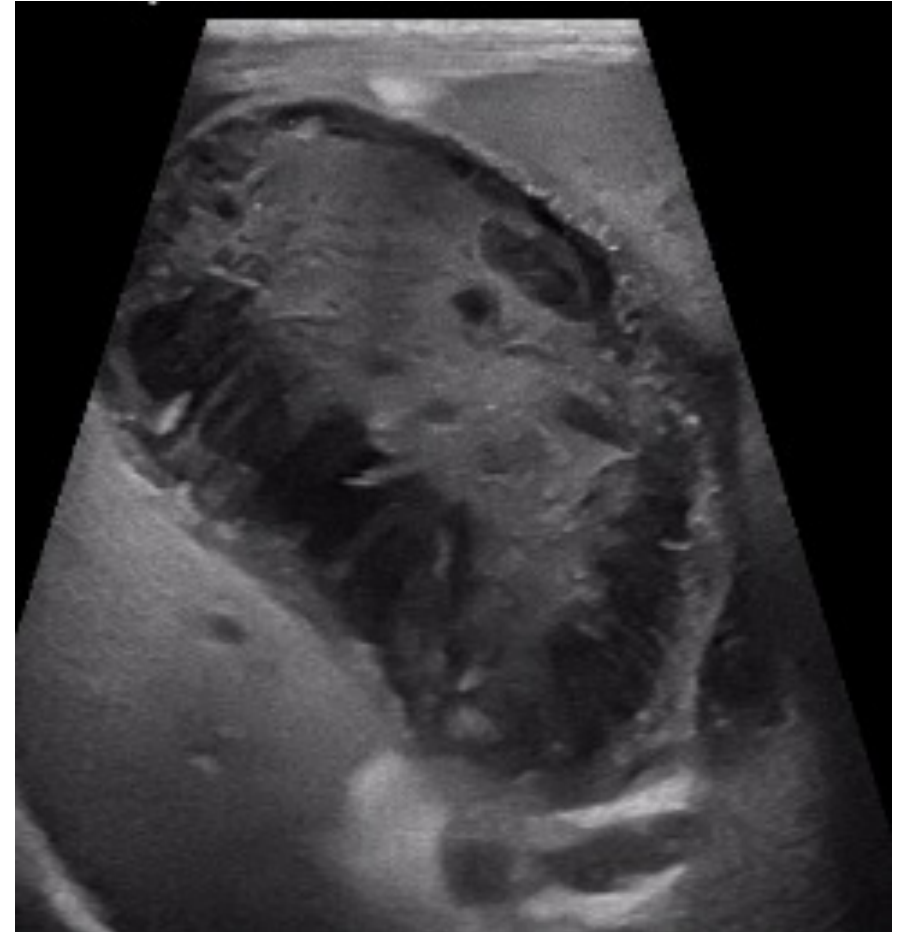
# Diagnostic Investigation – Imaging

- Abdominal ultrasound



# Diagnostic Investigation – Imaging

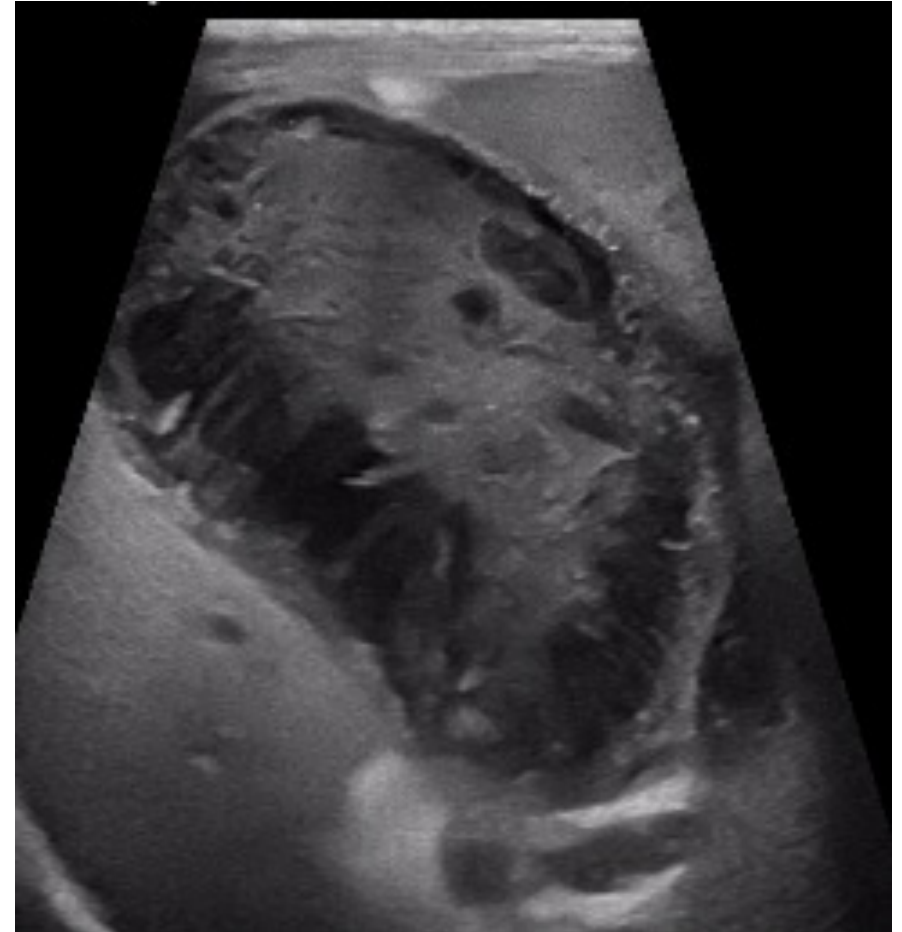
- Abdominal ultrasound
  - Diagnosis of mucocoeles





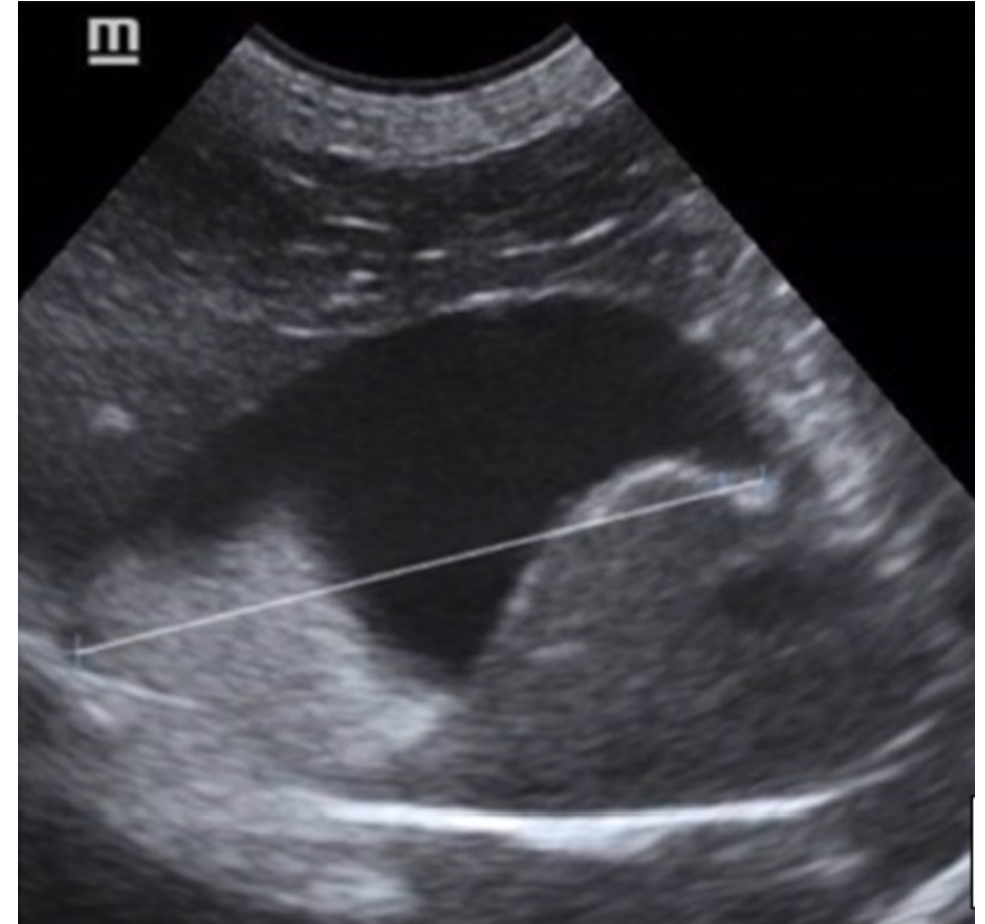
# Diagnostic Investigation – Imaging

- Abdominal ultrasound
  - Diagnosis of mucocoeles
  - Distended common bile duct
    - >3-4 mm
    - Dilated within 48 hours of obstruction
  - Distended hepatic ducts
    - Dilated within 1 week of obstruction
  - Monitoring change over time



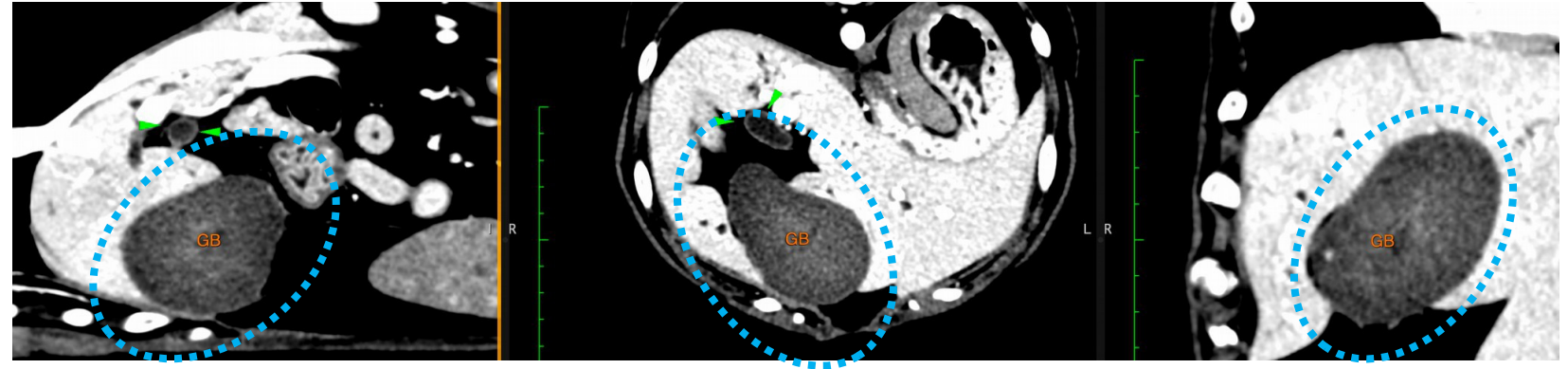
# Diagnostic Investigation – Imaging

- Abdominal ultrasound
  - Gallbladder ejection fraction
    - Non-gravity dependent sludge
    - ~40% reduction in volume normal
    - <25% reduction in volume 2 hours post-prandial = dysmotility
    - Hills a/d 30-60g/kg



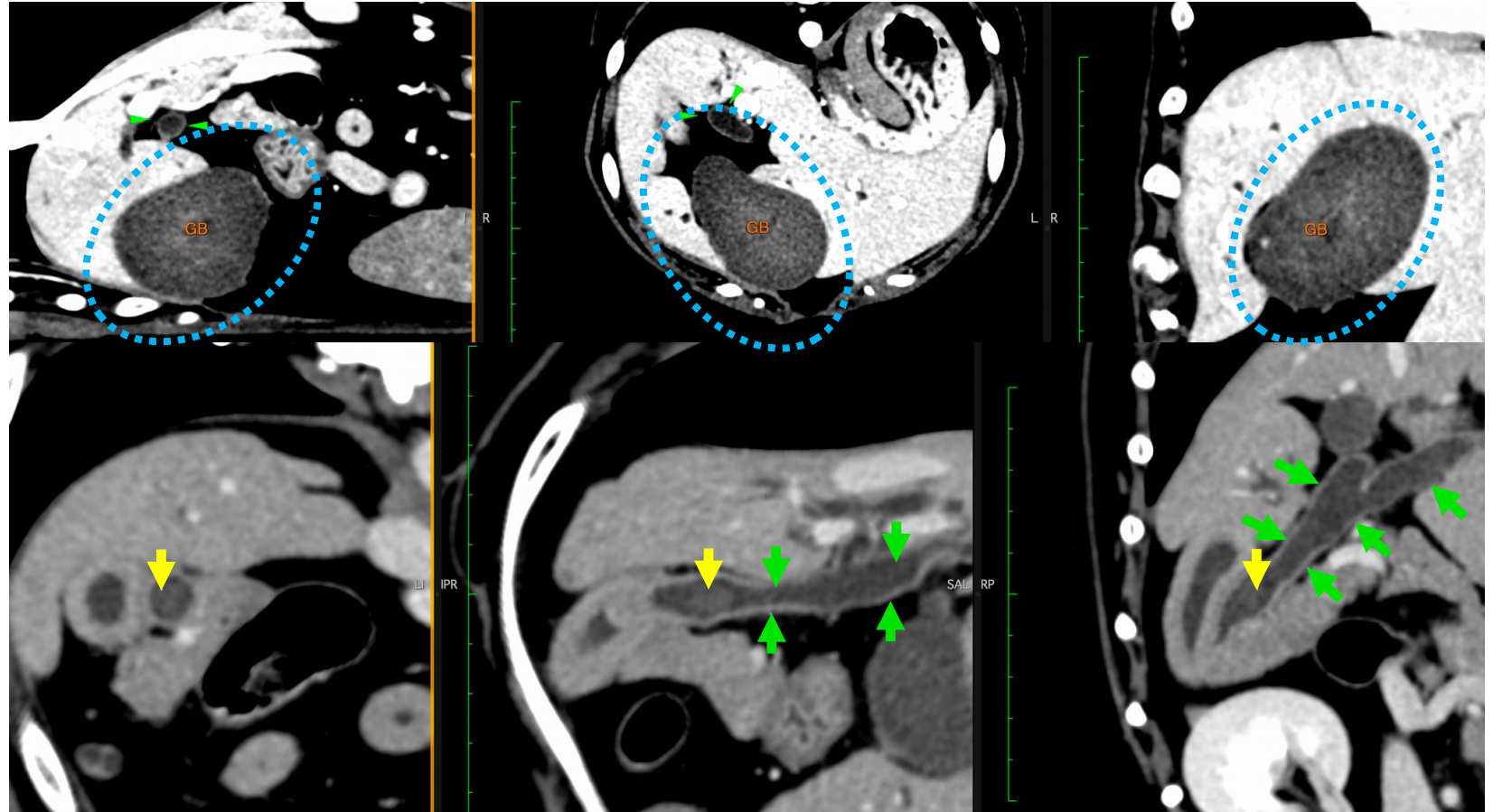
# Diagnostic Investigation – Imaging

- CT
  - Hyperattenuating bile
  - Mineral distribution



# Diagnostic Investigation – Imaging

- CT
  - Hyperattenuating bile
  - Mineral distribution
  - Hepatic, cystic and common bile duct dilation
  - Choleliths, choledocholiths



# Outline

1. Anatomy
2. Diagnostic investigation for extrahepatic biliary tract disease
3. Gallbladder mucocoeles in dogs



# Banjo

- History
  - 3-week duration
  - Reduced appetite
  - Diarrhoea
  - Lethargy/exercise intolerance
  - PU/PD
  - Vomiting
  - Dark urine and orange faeces
- Examination
  - Mild cranial abdominal pain
  - Soft yellow faeces on rectal



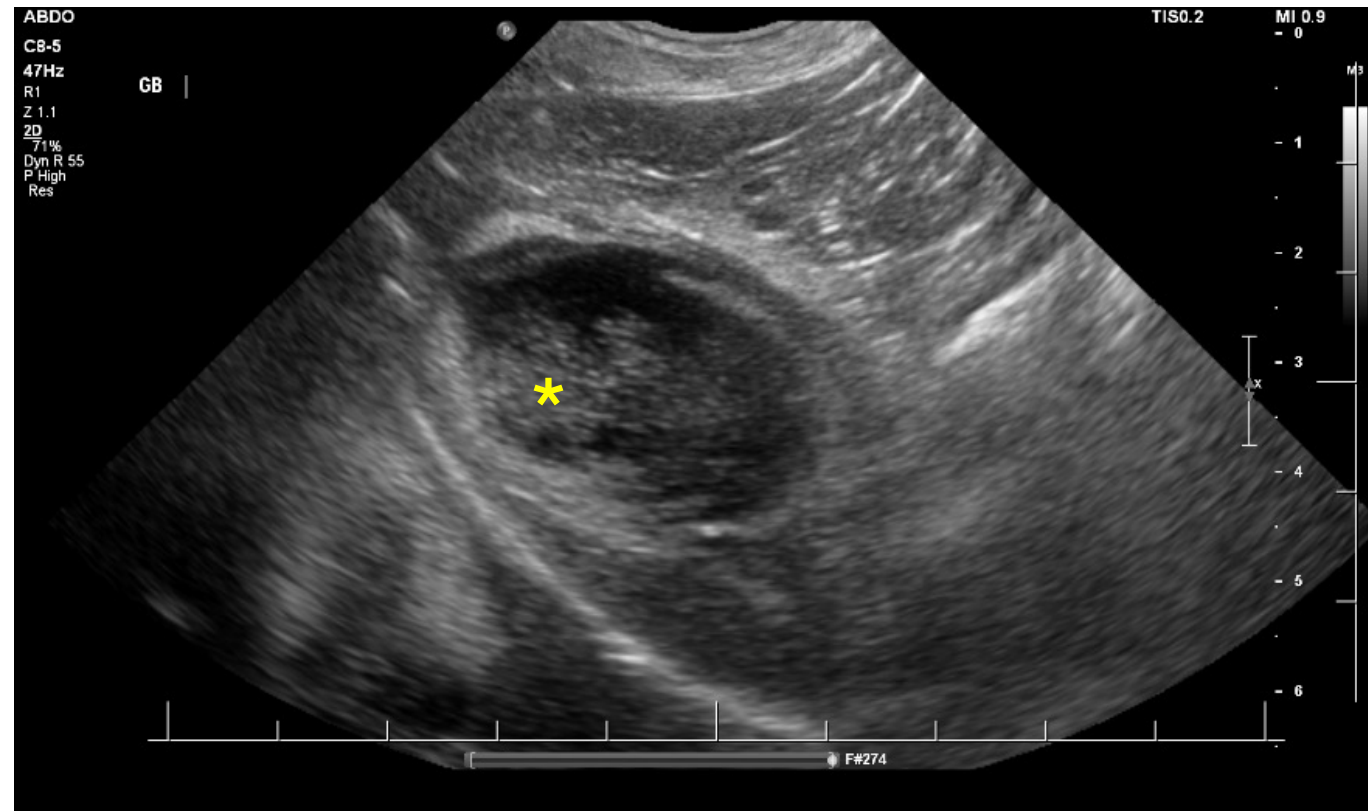
# Banjo

- Laboratory
  - Stress leukogram
  - ALT 6379 U/L
  - ALKP 1837 U/L
  - GGT 33 U/L
  - Tbil 90  $\mu\text{mol/L}$
- POCUS
  - Suspected gallbladder mucocoele
  - Peri-gallbladder inflammation



# Banjo

- Abdominal ultrasound
  - Gallbladder distension
  - Non-gravity dependent sludge
  - Diffuse gallbladder wall thickening
  - Peri-gallbladder steatitis
  - CBD ~3.4 mm





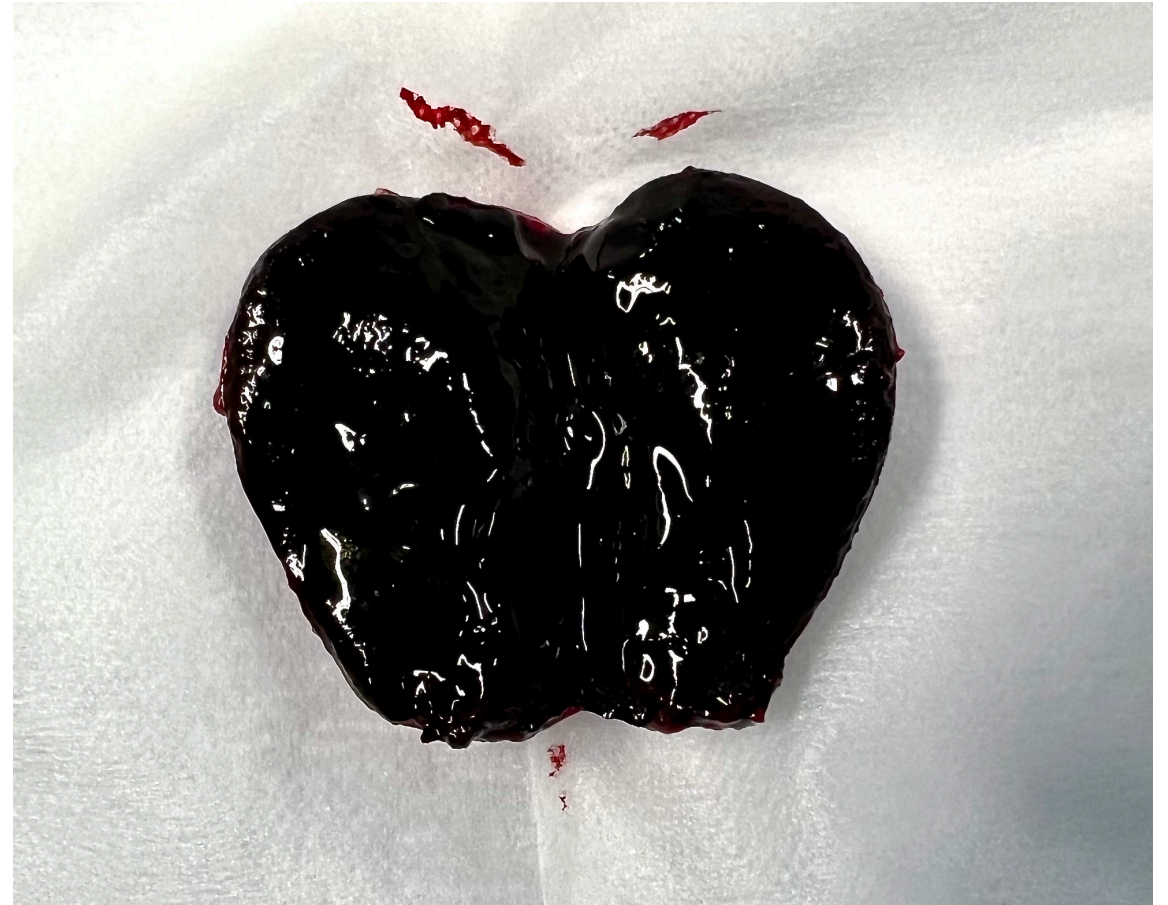
# Banjo

- Abdominal ultrasound
  - Gallbladder distension
  - Non-gravity dependent sludge
  - Diffuse gallbladder wall thickening
  - Peri-gallbladder steatitis
  - CBD ~3.4 mm
- Cholecystectomy
  - Multifocal gallbladder wall necrosis
  - Thick mucinous bile within CBD
  - Cholecystitis with extensive necrosis



# Gallbladder Mucoceles

- Immobile, mucinous bile
- Gallbladder distention



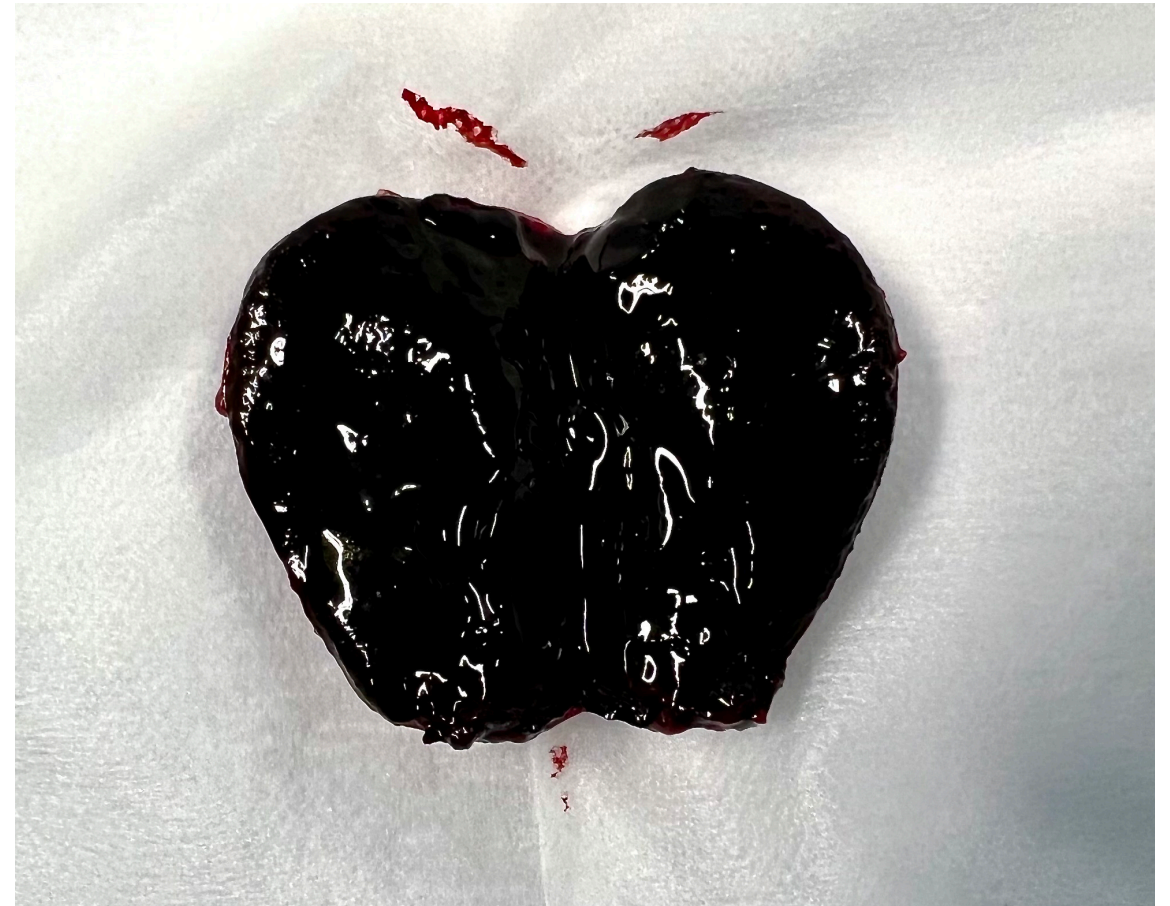
# Gallbladder Mucoceles

- Immobile, mucinous bile
- Gallbladder distention
- Wall necrosis, rupture, extrahepatic biliary tract obstruction



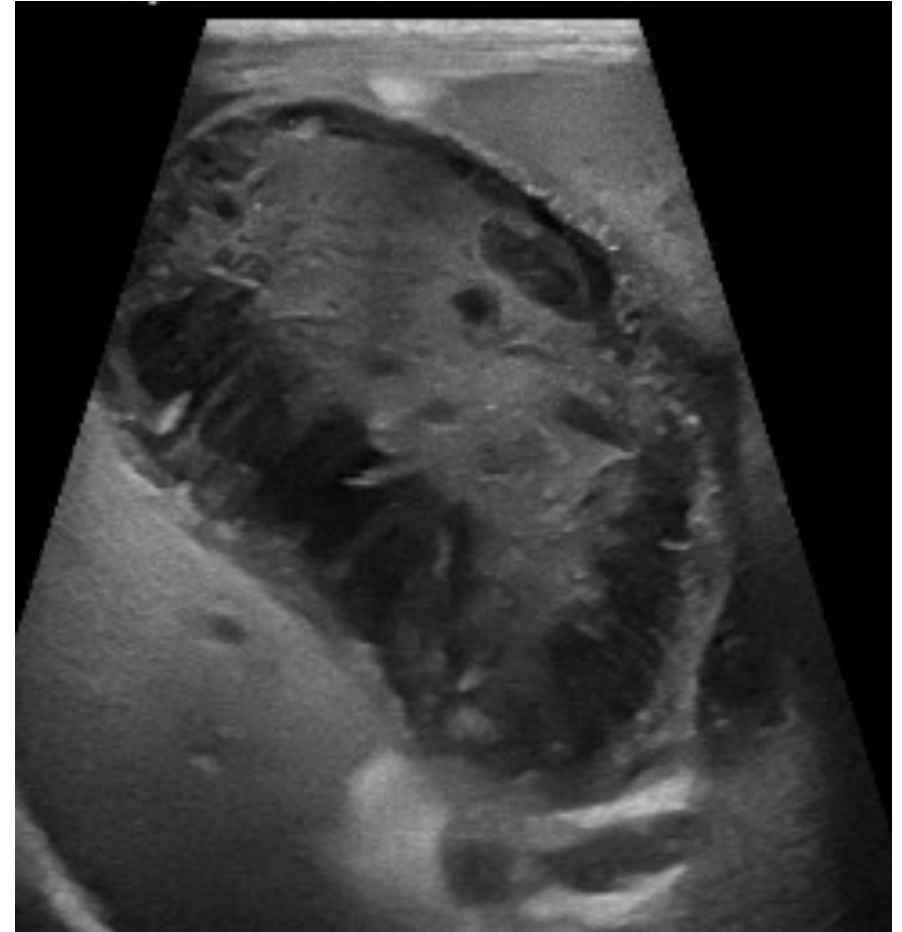
# Gallbladder Mucocoeles – Aetiology

- Cystic mucosal hyperplasia
- Cholestasis
- Cholecystitis
- Bile composition
- Breed
- Hyperadrenocorticism
  - 29x odds of mucocoele
  - No causative relationship identified
  - ~10% of dogs undergoing cholecystectomy



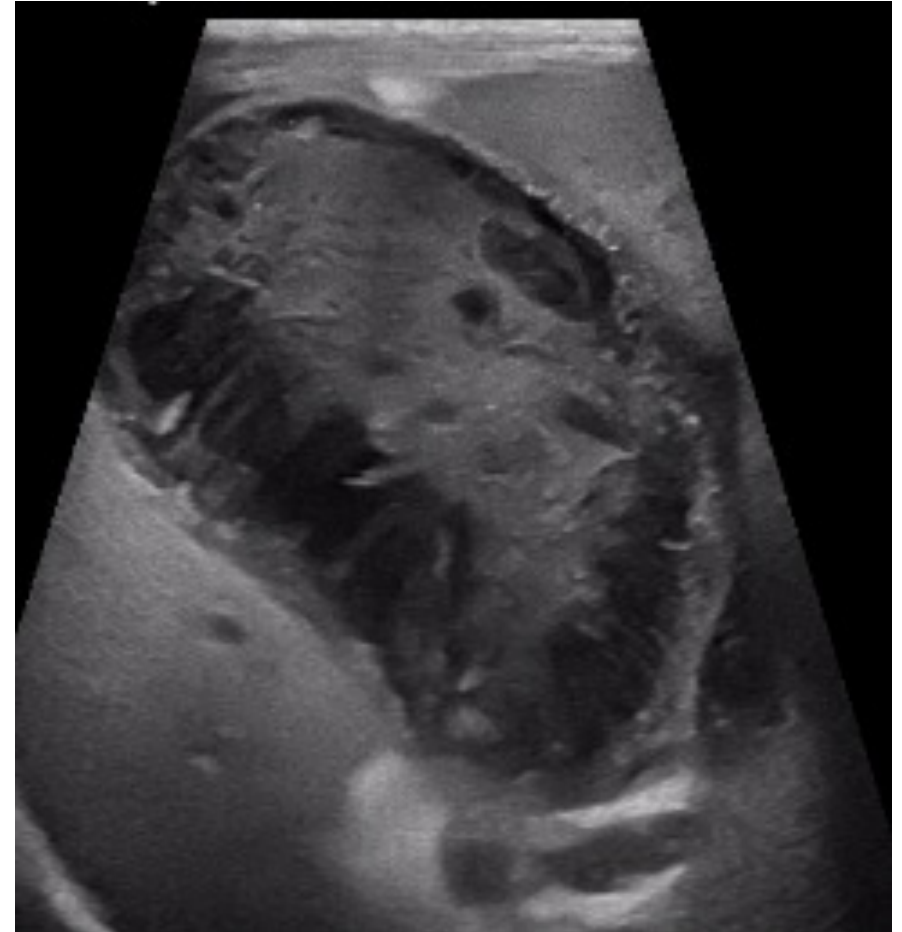
# Gallbladder Mucoceles – Clinical Signs & Diagnosis

- Clinical
  - Vomiting, lethargy, anorexia, diarrhoea, abdominal pain, jaundice
  - Extrahepatic biliary tract obstruction
  - Bile peritonitis



# Gallbladder Mucoceles – Clinical Signs & Diagnosis

- Clinical
  - Vomiting, lethargy, anorexia, diarrhoea, abdominal pain, jaundice
  - Extrahepatic biliary tract obstruction
  - Bile peritonitis
- “Incidental”
  - No reported clinical signs



# Gallbladder Mucoceles – Clinical Signs & Diagnosis

- Abdominal ultrasound
  - 6 types



# Gallbladder Mucococoeles – Clinical Signs & Diagnosis

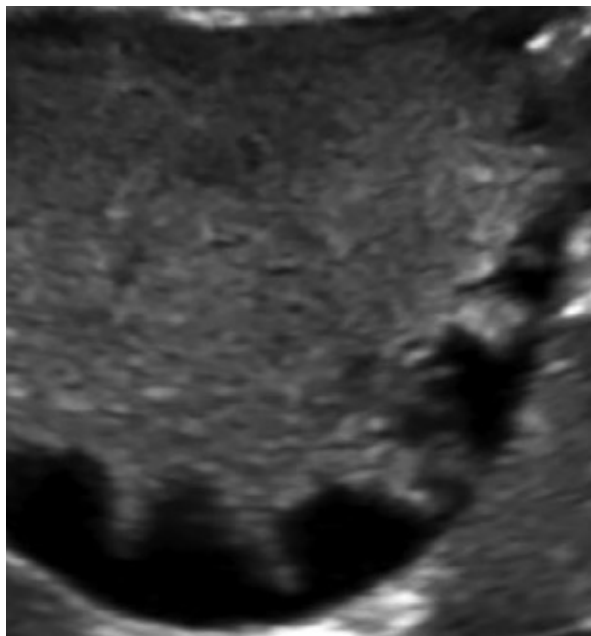
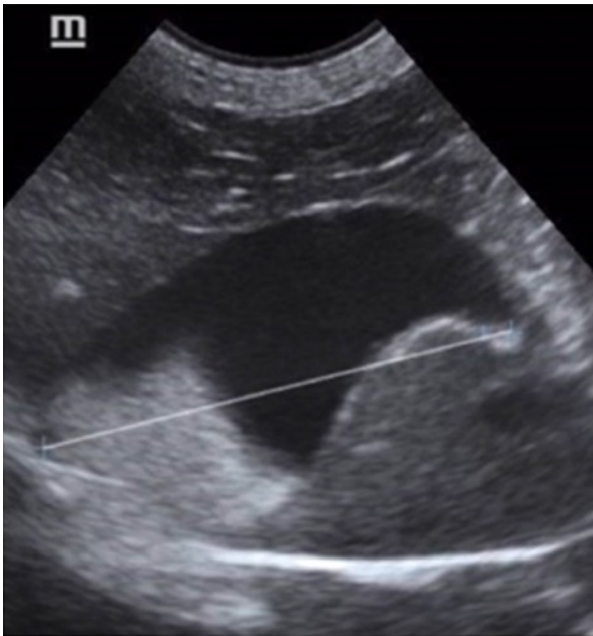
- Abdominal ultrasound
  - 6 types
  - Non-dependent sludge





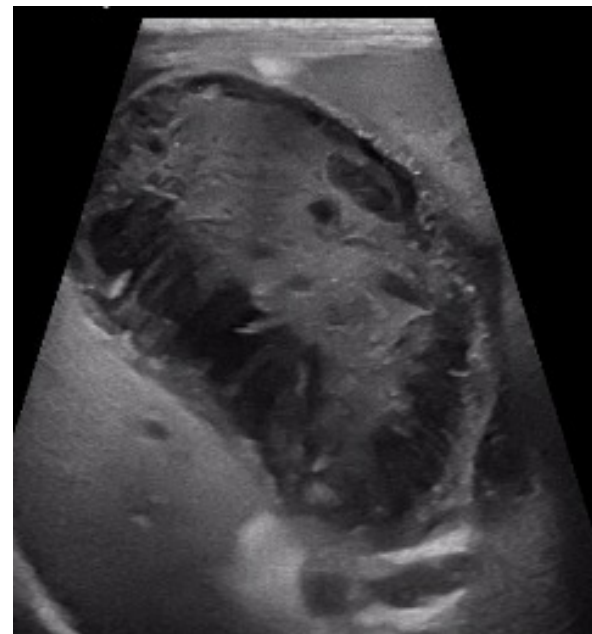
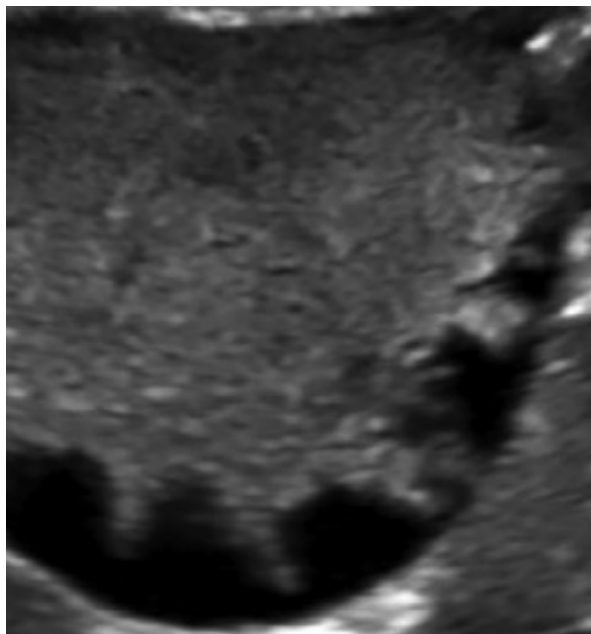
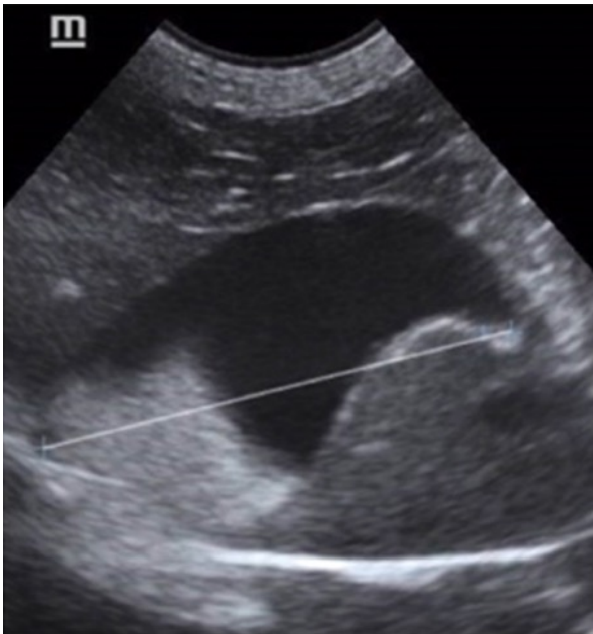
# Gallbladder Mucococoeles – Clinical Signs & Diagnosis

- Abdominal ultrasound
  - 6 types
  - Non-dependent sludge → stellate



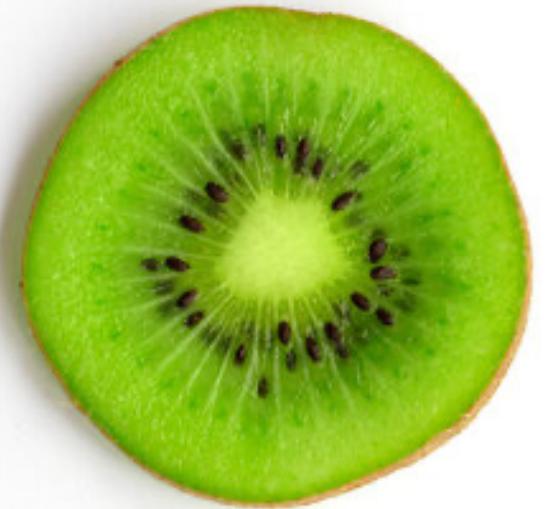
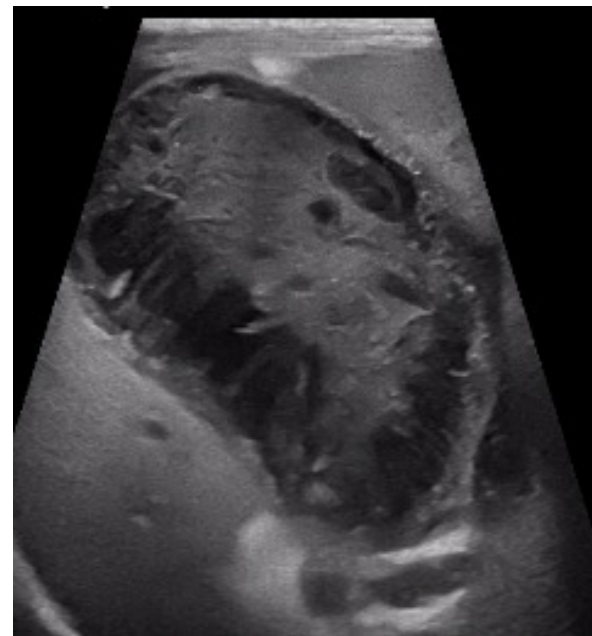
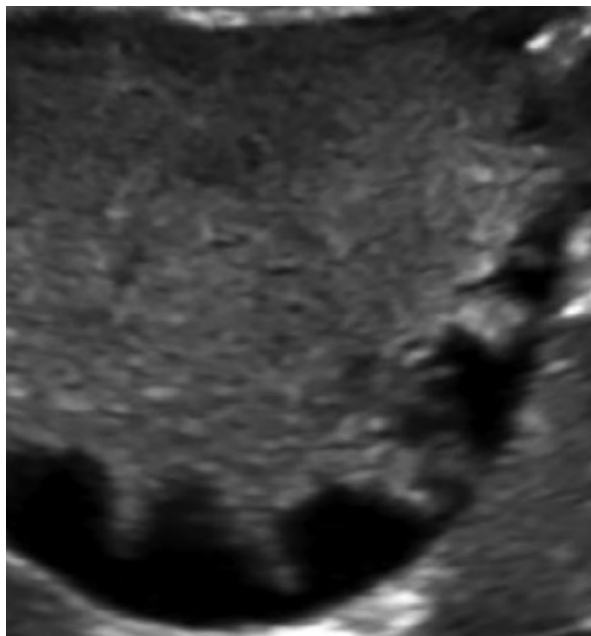
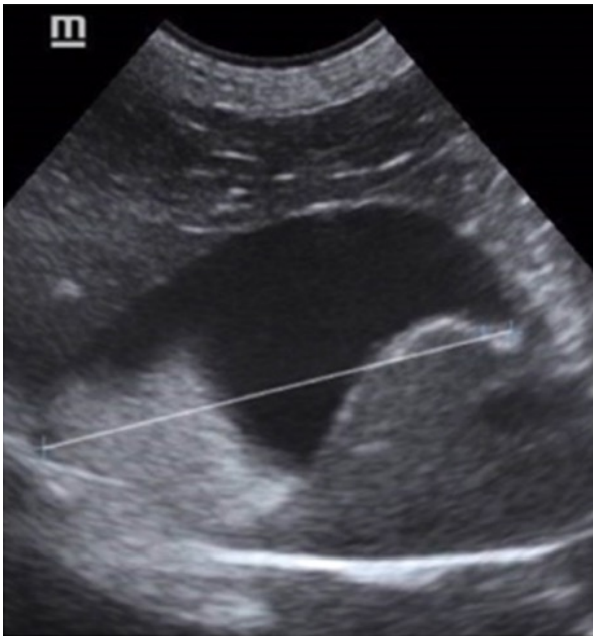
# Gallbladder Mucococoeles – Clinical Signs & Diagnosis

- Abdominal ultrasound
  - 6 types
  - Non-dependent sludge → stellate → partial “kiwifruit”



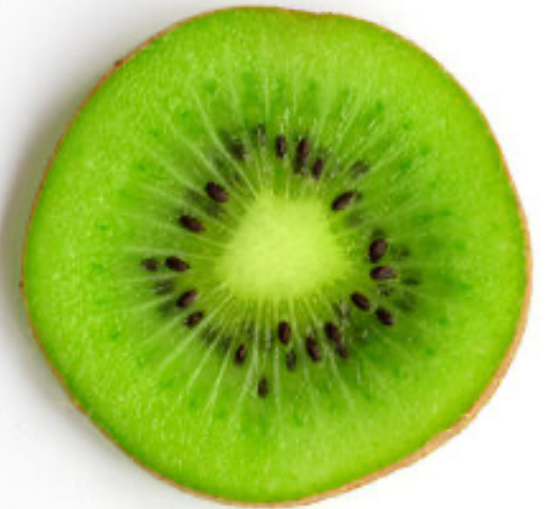
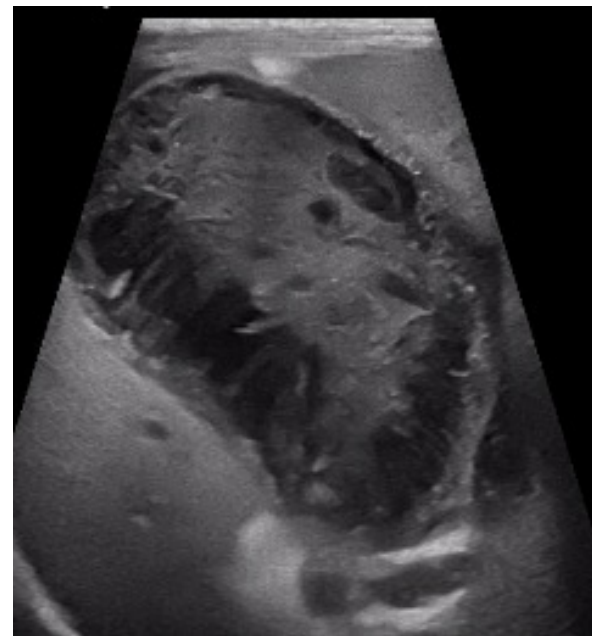
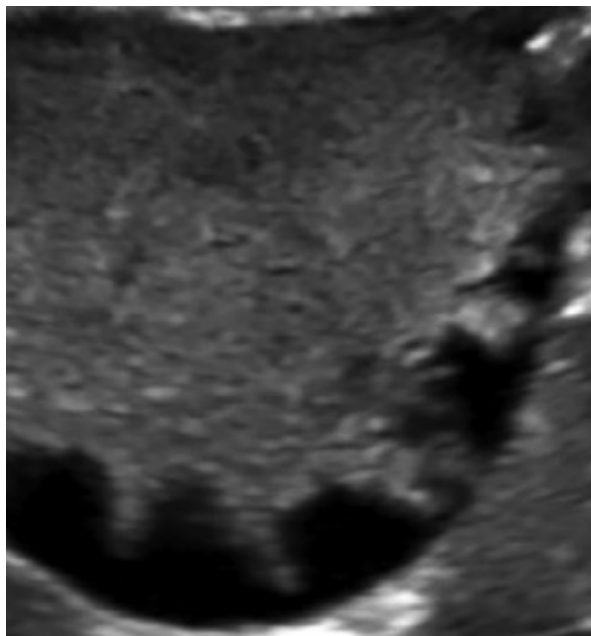
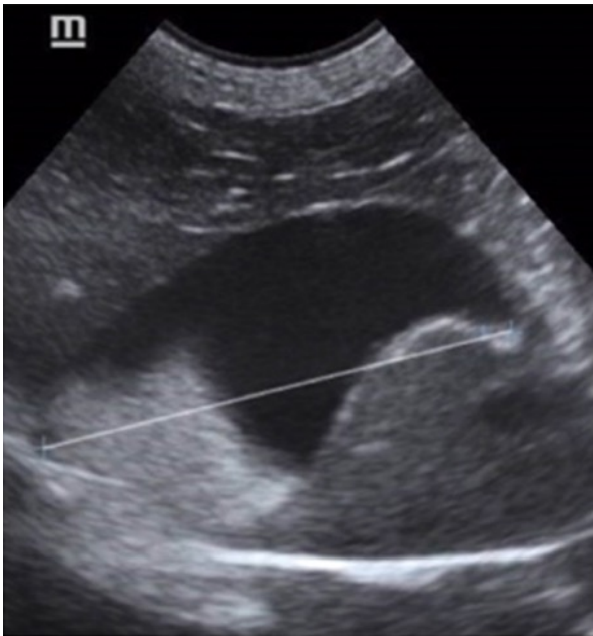
# Gallbladder Mucococoeles – Clinical Signs & Diagnosis

- Abdominal ultrasound
  - 6 types
  - Non-dependent sludge → stellate → partial “kiwifruit” → “kiwifruit”



# Gallbladder Mucococoeles – Clinical Signs & Diagnosis

- Abdominal ultrasound
  - 6 types
  - Non-dependent sludge → stellate → partial “kiwifruit” → “kiwifruit”
  - Type may be associated with clinical signs



# Gallbladder Mucocele - Treatment

- Cholecystectomy



# Gallbladder Mucocoele - Treatment

- Cholecystectomy
  - Non-elective
    - Mortality 17-23%



# Gallbladder Mucocele - Treatment

- Cholecystectomy
  - Non-elective
    - Mortality 17-23%
  - Elective
    - Mortality - 2-6%



# Gallbladder Mucocele - Treatment

- Cholecystectomy
  - Non-elective
    - Mortality 17-23%
  - Elective
    - Mortality - 2-6%
- Clinical features associated with death
  - Age
  - Owner-assessed jaundice
  - Bilirubin
  - Hyperadrenocorticism



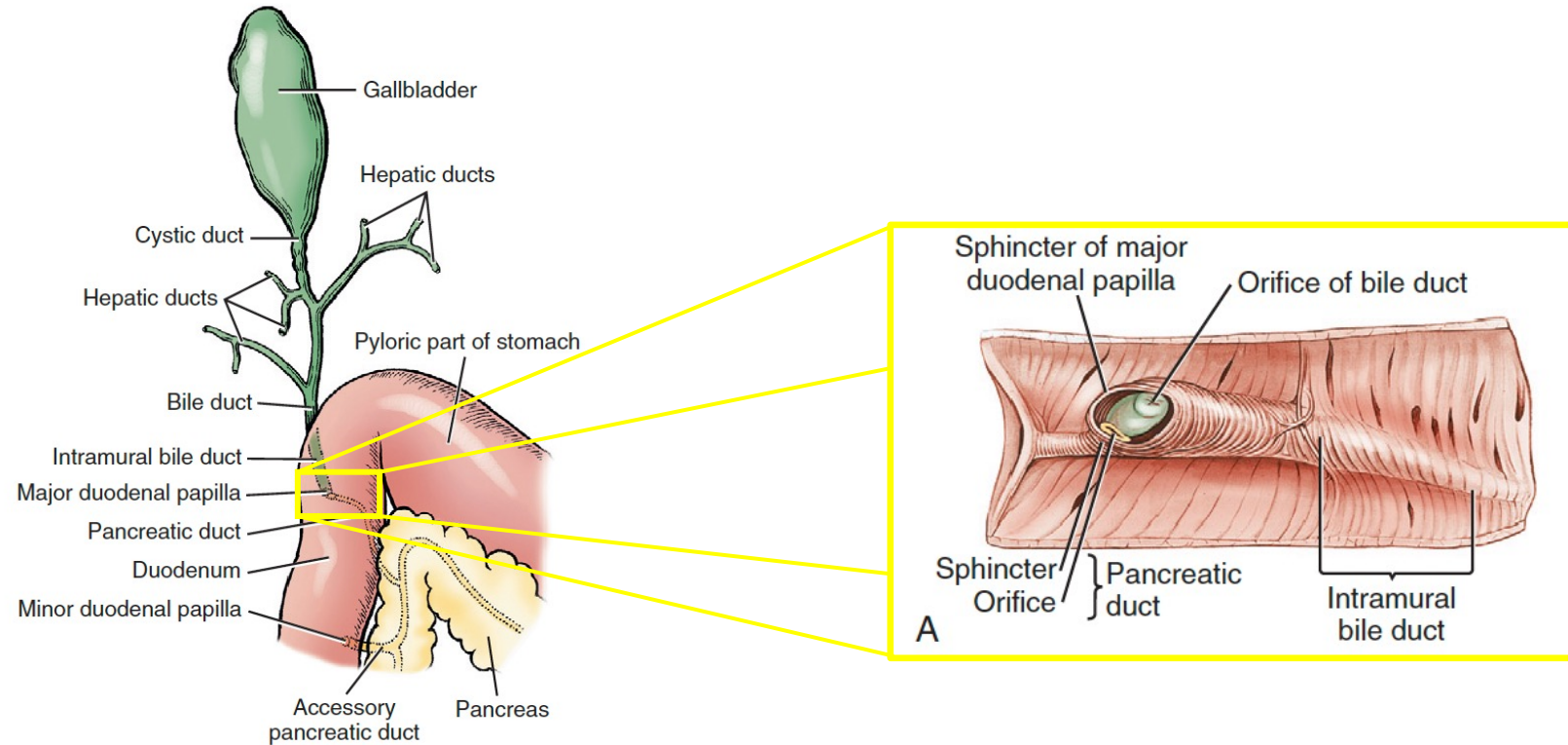


# Outline

1. Anatomy
2. Diagnostic investigation for extrahepatic biliary tract disease in dogs
3. Gallbladder mucocoeles in dogs
4. Cats with extrahepatic biliary tract obstruction

# Extrahepatic Biliary Tract Disease in Cats – Anatomy

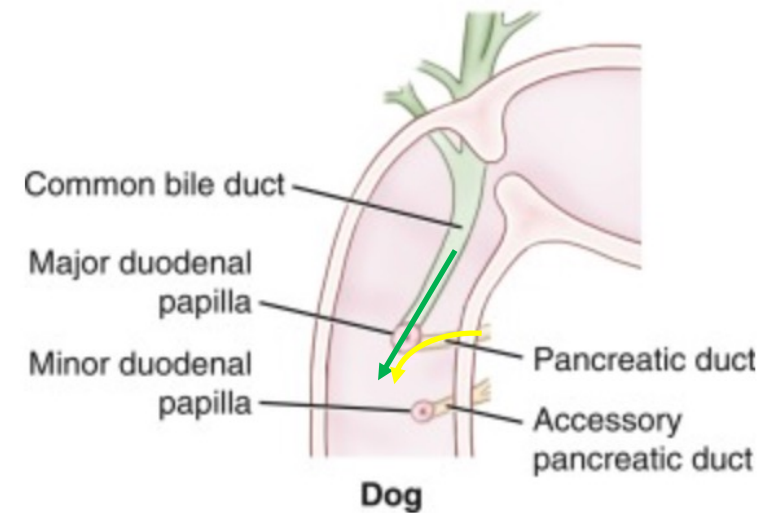
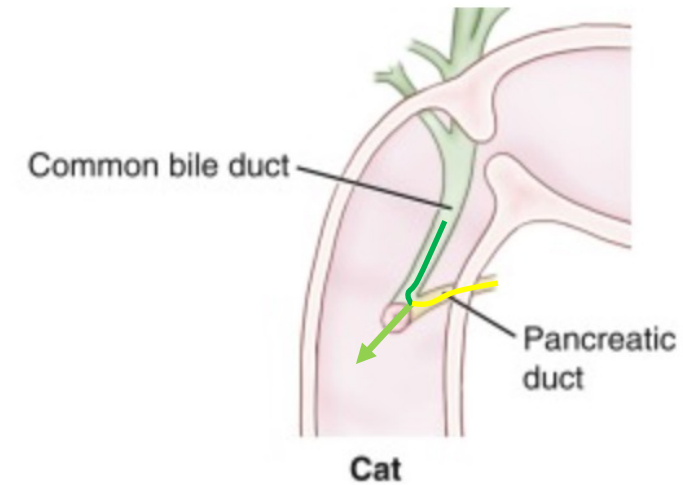
- Cats are not small dogs



From Evans HE, de Lahunta A: Miller's anatomy of the dog, ed 4, St Louis, 2013, Saunders/Elsevier

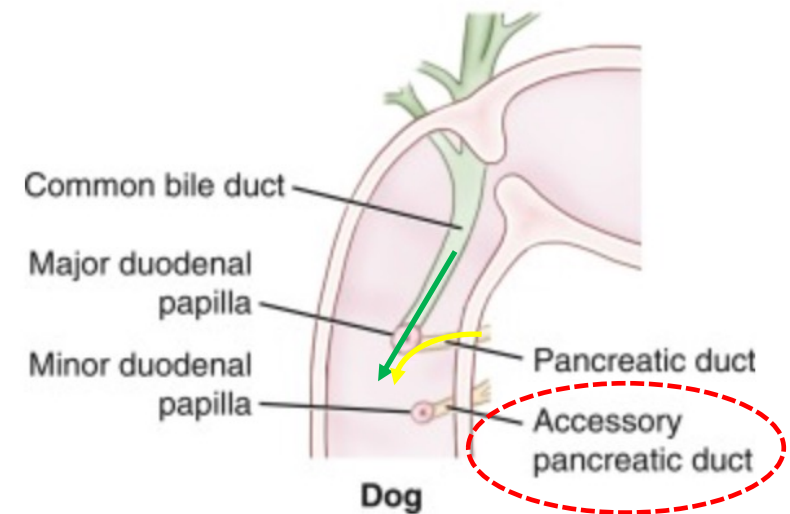
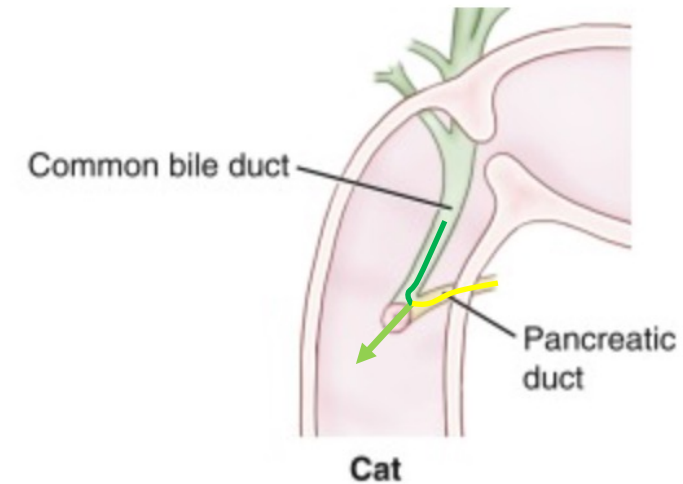
# Extrahepatic Biliary Tract Disease in Cats – Anatomy

- Cats are not small dogs
- Common bile duct and pancreatic duct fuse prior to entering duodenum



# Extrahepatic Biliary Tract Disease in Cats – Anatomy

- Cats are not small dogs
- Common bile duct and pancreatic duct fuse prior to entering duodenum
- Only 20% of cats have an accessory pancreatic duct



# Extrahepatic Biliary Tract Disease in Cats – Aetiology



- Inflammatory disease
  - Cholangitis (neutrophilic, lymphocytic)
  - +/- extrahepatic biliary tract obstruction

# Extrahepatic Biliary Tract Disease in Cats – Aetiology

- Inflammatory disease
  - Cholangitis (neutrophilic, lymphocytic)
  - +/- extrahepatic biliary tract obstruction
- Cholelithiasis
- Cholecystitis
- Neoplasia
- Mucocoeles uncommon



# Extrahepatic Biliary Tract Disease in Cats – Diagnosis



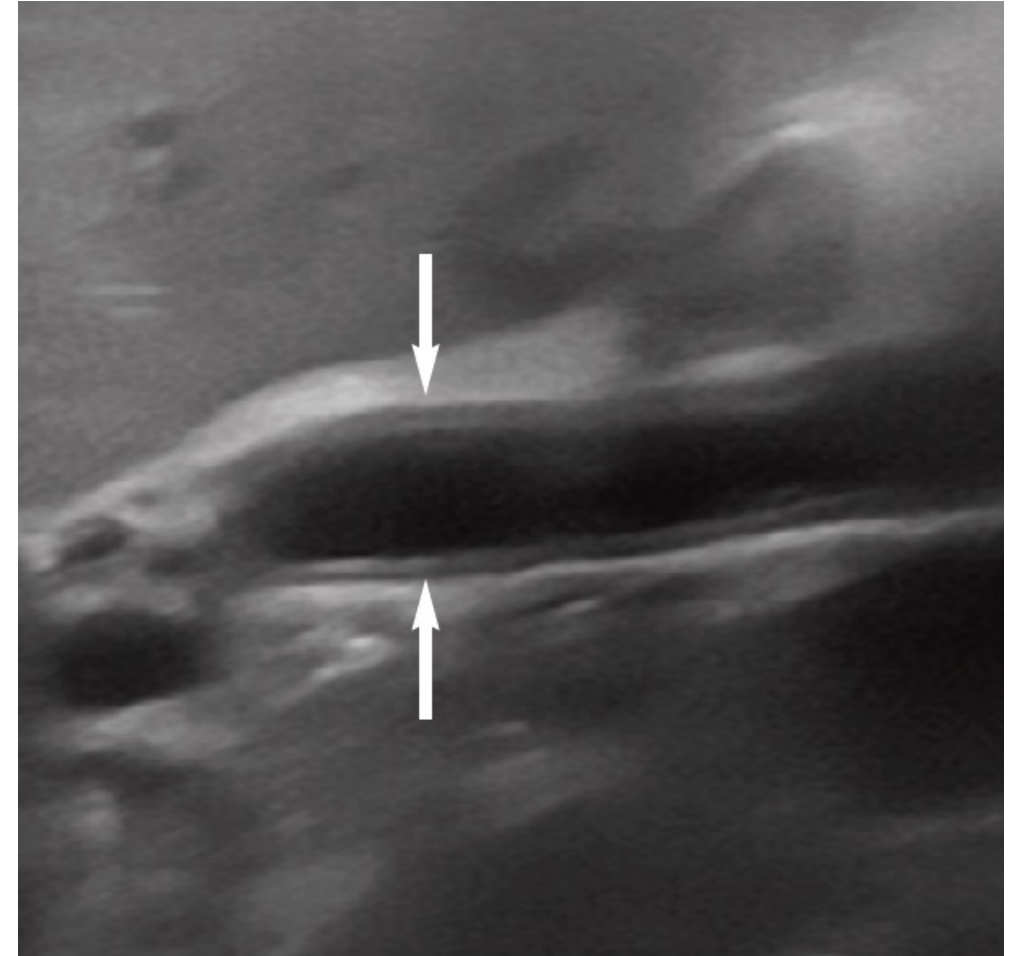
- Clinical signs
  - Vomiting, icterus, abdominal pain, lethargy, anorexia
  - Chronic waxing and waning vs fulminant disease



<https://www.thesprucepets.com/jaundice-in-cats-5186415>

# Extrahepatic Biliary Tract Disease in Cats – Diagnosis

- Clinical signs
  - Vomiting, icterus, abdominal pain, lethargy, anorexia
  - Chronic waxing and waning vs fulminant disease
- Diagnosis
  - CBC: +/- anaemia and leukocytosis
  - Biochemistry: ALT, ALKP, GGT, Tbil, SBA
  - Ultrasound
  - CT
  - Cytology, histology, cultures





# Extrahepatic Biliary Tract Disease in Cats – Treatment

- Surgical biliary tract disease uncommon
- Indications for surgery
  - Extrahepatic biliary tract obstruction
    - Cholelithiasis
      - Cholecystectomy, re-routing, choledochotomy
    - Inflammatory
      - Re-routing, choledochal stent
    - Neoplasia
      - Cholecystectomy



# Extrahepatic Biliary Tract Disease in Cats – Treatment

- Surgical outcomes
  - High mortality reported
    - Up to 40% for non-neoplastic lesions for cats undergoing rerouting procedures
    - Recurrence of signs in surviving cats



# Extrahepatic Biliary Tract Disease in Cats – Treatment

- Surgical outcomes
  - High mortality reported
    - Up to 40% for non-neoplastic lesions for cats undergoing rerouting procedures
    - Recurrence of signs in surviving cats
  - 22% in cats undergoing cholecystectomy (+/- choledochotomy +/- stenting) for cholelithiasis
  - Excellent long-term outcomes



# Learning Objectives

- Understand the pertinent anatomy of the biliary system and understand the relevant species differences between dogs and cats
- Describe the diagnostic approach to extrahepatic biliary tract disease in dogs
- Understand the indications for surgery in dogs with gallbladder mucocoeles
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- List the expected outcomes following extrahepatic biliary tract surgery in dogs and cats

# Key points



1. Gallbladder mucocoeles are a surgical disease in dogs
2. Elective cholecystectomy has a better prognosis than non-elective in dogs (2-6% versus 17-23%)
3. Complete, refractory extrahepatic biliary tract obstruction in cats is an indication for surgery

# Questions?



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