

BILIARY SURGERY

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ANATOMY



- Canaliculi → interlobar ducts → hepatic ducts → common bile duct
- The common bile duct starts at the point where the cystic duct and the first hepatic duct join







- The common bile duct has 1-2 cm intramural part in the duodenum
- Opens in the duodenum at the major duodenal papilla 3-6 cm aboral of the pylorus
- Dogs:
 - Common bile duct enters close to but not merged with the pancreatic duct
 - Accessory pancreatic duct enters at minor duodenal papilla 2 cm aborally
- Cats:
 - Common bile duct and pancreatic duct merges before opening at major duodenal papilla
 - Only 20% of cats have an accessory pancreatic duct at minor duodenal papilla







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- Blunt abdominal trauma (traffic road accident)
 - Common bile duct, hepatic ducts, avulsion injury
- Penetrating wounds (gunshot, stab, bite)
 - Common bile duct, cystic duct, avulsion injury
- latrogenic





• Dogs:

- Pancreatitis
- Neoplasia
- Gallbladder mucocele
- Cholangitis
- Cholelithiasis
- Cats:
 - Pancreatitis
 - Cholangiohepatitis
 - Cholecystitis w/o cholelithiasis
 - Neoplasia
 - Parasites
 - Diaphragmatic hernia





- Consequences of extrahepatic biliary obstruction:
 - Absence of bile salts leads to bacterial overgrowth and absorption of endotoxin
 - Hypotension
 - Decreased myocardial contractility
 - Acute renal failure
 - renal vasoconstriction and acute tubular necrosis
 - Coagulopathy (including DIC)
 - Gastrointestinal hemorrhage
 - endotoxin-mediated gastric ischemia and increased acid secretion
 - Delayed wound healing
 - Decreased fibroplasia and angiogenesis



BILE PERITONITIS



- Most common causes
 - Trauma
 - Necrotizing cholecystitis
 - Ruptured mucoceles
- Bile salts cause inflammation, hemolysis and tissue necrosis
- Hyperosmolality leads to fluid shift from the vascular space

- Bile is normally sterile
- Infection due to
 - Ascending gastrointestinal contamination
 - Intestinal translocation
 - Colonization by hepatic anaerobes



INITIAL PATIENT STABILIZATION



- Fluid therapy essential
 - Preferably solutions with bicarbonate precursors (lactate, acetate)
 - Colloids may be necessary (monitor total protein and albumin)
 - Vitamin K₁ or fresh frozen plasma if coagulopathy
- Monitor and treat shock





- Bile is normally sterile
- ≈60% positive culture with extrahepatic biliary obstruction or mucocele
- Most common isolates
 - E. coli
 - Enterococcus spp
 - Enterobacter spp
 - Clostridium spp
 - Bacteroides spp
- Cephalosporin +/- ampicillin



DECISION MAKING



- Indications for surgery
 - Progressive dilatation of biliary tract and hyperbilirubinemia over 7-10 days
 - Rupture of biliary tract



CHOLEDOCAL CATHETERIZATION AND LAVAGE

- Crucial to ensure patency of the common bile duct
- Normograde flushing
 - Through cholecystotomy
 - Through cystic duct stump after cholecystectomy
 - Risk of contamination from backflow
- Retrograde (transduodenal) flushing
 - Catheter passed up the common bile duct
 - Important before performing cholecystectomy



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CHOLECYSTOTOMY

- Few indications
 - Removal of choleliths
 - Necessary to access lumen but patency of common bile duct uncertain
- Gallbladder packed off
- Stay sutures through healthy tissue
- 1-2 cm incision in the apex
- All bile suctioned out, bladder lavaged
- Retrograde flushing through major papilla
- Simple continuous inverting pattern
 - 2-0 to 4-0 monofilament suture



CHOLECYSTECTOMY



- Patency of common bile duct must be confirmed
- Indicated for
 - Colelithiasis
 - Biliary mucocele
 - Gallbladder neoplasia
 - Trauma to the gallbladder with patent common bile duct
 - Bile peritonitis with leakage solely from the gall bladder





- Gallbladder dissected out
 - Blunt dissection with cotton tips, Metzenbaums
 - Dissection continued down the cystic duct to the junction with the common bile duct
- Cystic duct and artery are doubly ligated
 - 0 to 2-0 nonabsorbable suture
- Aaerobic and anaerobic culture and histopathologic examination
- Possible to perform laparoscopically



CHOLECYSTOENTEROSTOMY



- Indicated if patency of common bile duct cannot be demonstrated
- Cholecystoduodenostomy/cholecystojejunostomy
- Cholecystoduodenostomy preferable if possible



- Gallbladder is dissected out
- Gallbladder is positioned adjacent to the antimesenteric border of the intestine
- Longitudinal incision of gallbladder, enterotomy of similar length
 - >2.5 cm stoma preferred
- Far and near walls sutured separately in simple continuous pattern
 - 3-0 to 4-0 monofilment suture
- Complications
 - Hemorrhage
 - Incisional dehiscence
 - Stoma stricture
 - Ascending cholangitis
 - Gastric ulceration



F V I D E N

CHOLEDOCHAL STENTING

- Requires patent common bile duct
- Treatment of temporary extrahepatic biliary obstruction
- Traumatic rupture of the common bile duct
- Temporary drainage before definitive repair
- (Palliation of malignancy)
- Antemesenteric duodenotomy over major papilla
- Retrograde catheterization of duct
 - Do not enter pancreatic duct







- Stent long enough to bridge the lesion while leaving 2-4 cm of stent in the duodenum
- Duodenal end sutured to the submucosa with 1-2 sutures
 - 2-0 to 3-0 poliglecaprone or polydioxanone if temporary
 - Nonabsorbable suture if permanent
- Better outcome in dogs than in cats
- Stent removal via endoscopy 2-4 months postoperatively



CHOLECYSTOSTOMY TUBE



- Temporary diversion of bile through extracorporeal closed system
- Bladder wall must be healthy
- Open technique
 - Ventral midline celiotomy
 - Pigtail or Foley catheter inserted into the apex
 - All bile aspirated
 - Purse-string suture around base of catheter
 - Pass catheter through hepatic parenchyma
 - Pass catheter through right body wall just caudal to costal arch
 - Catheter secured with Chinese finger trap suture



CHOLEDOCHOTOMY



- Ideally avoided if there is an alternative
- Indicated if unmovable coleliths in the common bile duct
- Small longitudinal incision over the choleliths
- Simple continuous pattern
 - 4-0 to 6-0 monofilament absorbable suture
- Stenting for support
- Risk of dehiscence



GALLBLADDER MUCOCELE



- Most common indication for extrahepatic biliary surgery in dogs
- Cystic mucosal hyperplasia leads to mucus hypersecretion
 - Genetic predisposition (Shetland sheepdog)
 - Hyperadrenocorticism
 - Hypothyroidism
- Medical treatment
 - Famotidine
 - Ursodiol
 - S-adenosyl-L-methionine





- Cholecystectomy treatment of choice
- Important to clear common bile duct of mucus
- Bladder submitted for histopathology
- Bacterial culture from bile and bladder wall biopsy
 - E. coli
 - Enterococcus
- Prognosis favourable
- Complications
 - Leakage
 - Pancreatitis
 - Recurrence of obstruction



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CHOLELITHIASIS

- Etiology unclear
 - Infection
 - Cholestasis
- Medical management usually unsuccessful
- Cholecystectomy treatment of choice
 - Choledocholiths first flushed back into the bladder
 - Patency of common bile duct must be confirmed
- Choledochotomy or cholecystoenterostomy if patency cannot be established
- Aerobic and anaerobic culturing of bile and colelith samples
 - Most common isolates E.coli, Streptococcus spp, Enterococcus spp, Klebsiella spp



CHOLANGIOCELLULAR TUMOURS



- Dogs
 - Cholangiocellular adenomas
 - Cholangiocellular carcinomas
- Cats
 - Biliary cystadenomas
 - Bile duct carcinomas
- Poor prognosis for malignant tumours





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QUESTIONS?

