

# Top 5 Canine Biliary Diseases

Stefanie M. DeMonaco, DVM, MS,  
DACVIM (SAIM)  
Virginia–Maryland College of Veterinary Medicine



▲ **FIGURE 1** Ultrasonographic image of a GBM showing the classic kiwi-like appearance

The number of dogs diagnosed with biliary disease is increasing.<sup>1-5</sup> Clinical signs and physical examination findings in dogs with biliary disease tend to be nonspecific and overlap with clinical signs of GI and systemic diseases; these can include anorexia, vomiting, abdominal pain, jaundice, and fever. Clinicopathologic abnormalities are similarly nonspecific and can include cholestatic to mixed liver enzyme elevations, hyperbilirubinemia, hypercholesterolemia, and neutrophilic leukocytosis.<sup>1,2,6-8</sup> Diagnosis of biliary disease usually involves ultrasonography with or without collection of liver and bile samples. Treatment with urgent surgical care versus conservative medical management should be determined based on the cause and severity of disease.

Following are 5 of the most common canine biliary diseases according to the author.

**1 Gallbladder Mucoceles**  
Gallbladder mucoceles (GBMs) result from an accumulation of semisolid mucus masses and inspissated bile in the gallbladder and are associated with high morbidity and mortality.<sup>3,6-11</sup> Affected dogs are typically older

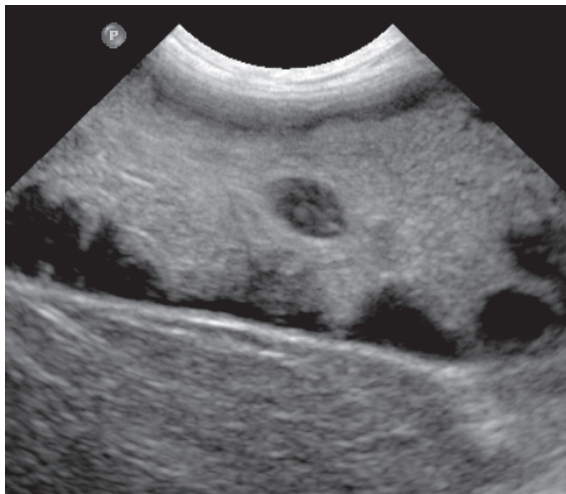
## TOP 5 CANINE BILIARY DISEASES

1. Gallbladder Mucoceles
2. Extrahepatic Biliary Obstruction
3. Cholecystitis
4. Cholelithiasis
5. Biliary Neoplasia

GBM = gallbladder mucocele

(median age, 10 years) and of a predisposed breed (ie, cocker spaniel, Shetland sheepdog, miniature schnauzer, border terrier, Pomeranian).<sup>2,3,6-16</sup> Additional risk factors for GBMs include gallbladder dysmotility, dyslipidemias, and endocrinopathies (eg, hyperadrenocorticism, hypothyroidism).<sup>14,17,18</sup>

Abdominal ultrasonography is key to diagnosis of GBMs. The classic description of GBMs is a kiwi-like appearance of intraluminal gallbladder contents with hyperechoic immobile striations of inspissated bile in hypoechoic mucus structures (*Figure 1*, previous page). Other ultrasonographic



▲ **FIGURE 2** Ultrasonographic image of a GBM displaying a stellate pattern

## GALLBLADDER RUPTURE

Ultrasonography can help determine the presence of concurrent gallbladder rupture and/or extrahepatic biliary obstruction. Pericholecystic hyperechoic fat, pericholecystic fluid, a discontinuous gallbladder wall, and an unidentifiable discrete gallbladder with free-floating mucocoeles in the peritoneum are supportive of gallbladder rupture.<sup>1,6,7</sup> The specificity and sensitivity of ultrasonography in determining gallbladder rupture in dogs with GBMs varies from 91.7% to 100% and 56.1% to 85%, respectively.<sup>3,10</sup>

appearances of GBMs include echogenic immobile biliary sludge filling the gallbladder or a stellate pattern (*Figure 2*).<sup>6,10,11</sup> These different GBM appearances on ultrasonographic images likely represent a continuum of early to mature mucocoeles.<sup>6</sup> Ultrasonography cannot be used alone to determine the clinical significance of GBMs or guide treatment decisions unless there is clear evidence of biliary rupture or obstruction that warrants urgent surgical intervention (see *Gallbladder Rupture*).<sup>1,3,10</sup>

Preoperative biliary rupture and bile peritonitis can increase the risk for death, but some studies have shown that long-term survival (ie, 2-5 years) is possible in patients that survive the perioperative period.<sup>3,7,8,19,20</sup> Common postoperative complications include pancreatitis and bile peritonitis.<sup>2,7,19</sup> Patients with biliary infection at the time of rupture tend to have a higher mortality rate.

The best approach to treating GBMs (medical vs surgical) in dogs is controversial. When clinical signs and serum chemistry abnormalities (eg, increased ALP,  $\gamma$ -glutamyl transferase, ALT, and total bilirubin) are supportive of GBMs, cholecystectomy is generally recommended over medical management.<sup>1,6,10,21,22</sup> A retrospective study found a longer survival time in dogs that underwent surgery as compared with those that received medical management.<sup>20</sup> Medical therapy is best reserved for clinically inapparent cases of GBMs and when surgery is not an option. Medical therapy includes ursodiol, a low-fat diet, antibiotics, and treatment of concurrent diseases associated with GBMs (eg, hyperadrenocorticism, hypothyroidism, dyslipidemias) and, in most cases, is unlikely to resolve GBMs. A few cases of resolution or improvement with medical management have been reported, with other cases having static disease.<sup>2,10,23</sup> Follow-up ultrasonography and serum chemistry profile performed within 2 to 3 months of diagnosis to assess response to treatment and identify complications are recommended, regardless of whether the patient is treated medically or surgically.

## 2 Extrahepatic Biliary Obstruction

The most common cause of extrahepatic biliary obstruction (EHBO) in dogs is pancreatitis. In acute pancreatitis patients, pancreatic edema and/or inflammation affecting the bile duct results in obstruction, whereas in chronic pancreatitis patients, fibrosis results in duct obstruction. Other causes can include GBMs, cholangiohepatitis, neoplasia, and cholelithiasis.<sup>4,13,24</sup>

Diagnosis of EHBO is usually made via ultrasonography and/or exploratory laparotomy. Ultrasonographic characteristics of EHBO include gallbladder enlargement, dilation of the cystic and/or bile ducts, and, in cases of obstruction lasting >5 days, intrahepatic duct dilation.<sup>9</sup> Because ultrasonography may not always discern the cause of obstruction, surgery may be necessary to confirm biliary obstruction and further characterize and address the cause.<sup>9</sup>

Treatment of EHBO should be aimed toward addressing the underlying cause of obstruction and, if necessary, include biliary decompression. Whether surgical or ultrasound-guided percutaneous biliary decompression is necessary in patients with EHBO secondary to pancreatitis is controversial. Most dogs with EHBO secondary to pancreatitis improve with medical management as acute pancreatitis resolves. Serum chemistry abnormalities (eg, liver enzymes, bilirubin) can worsen despite improvement in clinical signs and should not be confused with worsening of the patient's condition. Unpublished data suggest that bilirubin levels peak in dogs with pancreatitis-associated EHBO when clinical signs of pancreatitis are improving.

## 3 Cholecystitis

Cholecystitis can have acute or chronic presentations. Anorexia, vomiting, abdominal pain, and fever are typical signs of acute cholecystitis.<sup>25,26</sup> Patients with chronic cholecystitis may have milder signs of chronic intermittent vomiting, anorexia, weight loss, and/or abdominal pain or no clinical signs at all. Cholecystitis may be present alone or in combination with cholangiohep-

atitis, which is typically characterized by chronic neutrophilic inflammation.<sup>4,5</sup> Abdominal radiography can aid in the diagnosis of cholecystitis, particularly if emphysematous cholecystitis is present with a gas-filled gallbladder or gas opacities in the pericholecystic region. Nonspecific radiographic findings may reveal a right quadrant abdominal mass effect, poor serosal detail, and/or choleliths.<sup>9,27</sup> The following abdominal ultrasonographic findings can be suggestive of cholecystitis and/or cholangiohepatitis: thickened, hyperechoic, irregular and/or laminar gallbladder wall; echogenic intraluminal contents; pericholecystic fluid or echogenic abdominal effusion; distended bile duct; and/or heterogeneous or hyperechoic hepatic parenchyma.<sup>4,9</sup> Bile samples can be obtained with percutaneous ultrasound-guided cholecystocentesis to assess for inflammation, infectious agents, and culture and susceptibility. Culture and susceptibility testing is particularly important, as resistance can occur with empiric broad-spectrum antimicrobials.<sup>5</sup> Common bacterial isolates include *Escherichia coli*, *Enterococcus* spp, *Klebsiella* spp, *Clostridium* spp, and *Bacteroides* spp.<sup>4,5,25,28</sup>

Treatment of cholecystitis includes medical management, but surgical intervention may be necessary depending on the severity of signs and gallbladder rupture. Cholecystectomy can reduce morbidity and mortality in dogs with cholangiohepatitis and/or cholecystitis.<sup>4</sup> Medical therapy includes antimicrobial administration guided by either culture and

**Cholecystectomy can reduce morbidity and mortality in dogs with cholangiohepatitis and/or cholecystitis.<sup>4</sup>**

EHBO = extrahepatic biliary obstruction  
GBM = gallbladder mucocele

susceptibility results or, when culture and susceptibility results are unavailable, empiric treatment against common isolates (eg, amoxicillin/clavulanic acid and enrofloxacin). Additional treatment options include ursodiol and supportive care.<sup>9,25</sup> Cholecystectomy is typically the surgical treatment of choice when surgery is required and in cases in which only the gallbladder is affected.<sup>9,29</sup>

## 4 Cholelithiasis

Choleliths are stones in the biliary system and can have varying presentations (ie, mixed stones, pigment stones, cholesterol stones). In dogs with mixed stones, pigment stones are most commonly seen, with cholesterol stones being less frequent.<sup>9,30,31</sup> Middle-aged to older, female, small-breed dogs are predisposed to choleliths, and an increased incidence of cholelithiasis has been observed in miniature poodles and miniature schnauzers.<sup>9,26,29,30,32,33</sup> Choleliths are usually found incidentally on abdominal ultrasonographic images or necropsy and can lead to EHBO or cholecystitis.

Diagnosis is made via ultrasonography, which can detect stones >2 mm in size.<sup>9,26,27</sup> Medical dissolution of choleliths is usually unsuccessful. Medical therapy includes ursodiol, S-adenosylmethionine, antimicrobials, vitamin E, and anti-inflammatory medications based on liver histopathology results (eg, chronic nonsuppurative hepatitis). Surgery is the treatment of choice in patients with concurrent cholecystitis and/or bile duct obstruction.

## 5 Biliary Neoplasia

Hepatobiliary neoplasia accounts for 0.6% to 1.3% of all canine neoplasms.<sup>34</sup> Hepatocellular carcinoma is the most common form of hepatobiliary neoplasia, followed by biliary carcinoma. Labrador retrievers and female dogs are predisposed to biliary carcinomas.<sup>34-37</sup>

EHBO = extrahepatic biliary obstruction

Ultrasonographic findings are nonspecific but can include a solitary mass or diffuse nodules with or without target lesions.<sup>38</sup> Histopathology with or without immunohistochemical markers is necessary to confirm diagnosis.

The treatment of choice for biliary carcinomas is surgical resection unless the disease is diffuse or multifocal in nature. Overall survival is generally poor, with survival times typically being ≤6 months.<sup>34,39</sup> Metastasis to regional lymph nodes and lungs occurs in ≤88% of dogs.<sup>35,36</sup> Cholecystoduodenostomy can be performed in patients with secondary EHBO as a palliative option. ■

### POLL

**Have you ever suspected or diagnosed any of the following biliary diseases via ultrasonography? Check all that apply.**

- A. Gallbladder mucocele**
- B. Extrahepatic biliary obstruction**
- C. Cholecystitis**
- D. Cholelithiasis**
- E. Biliary neoplasia**
- F. I have never suspected/diagnosed any of these via ultrasonography.**

Scan the QR code to submit your answer and see the other responses! The poll is located at the bottom of the article.



Using QR codes from your mobile device is easy and quick!

Simply focus your phone's camera on the QR code as if taking a picture (but don't click!). A notification banner will pop up at the top of your screen; tap the banner to view the linked content.

## References

1. Pike FS, Berg J, King NW, Penninck DG, Webster CR. Gallbladder mucocele in dogs: 30 cases (2000-2002). *J Am Vet Med Assoc.* 2004;224(10):1615-1622.
2. Aguirre AL, Center SA, Randolph JF, et al. Gallbladder disease in Shetland sheepdogs: 38 cases (1995-2005). *J Am Vet Med Assoc.* 2007;231(1):79-88.
3. Jaffey JA, Graham A, VanEerde E, et al. Gallbladder mucocele: variables associated with outcome and the utility of ultrasonography to identify gallbladder rupture in 219 dogs (2007-2016). *J Vet Intern Med.* 2018;32(1):195-200.
4. Harrison JL, Turek BJ, Brown DC, Bradley C, Callahan Clark J. Cholangitis and cholangiohepatitis in dogs: a descriptive study of 54 cases based on histopathologic diagnosis (2004-2014). *J Vet Intern Med.* 2018;32(1):1418-1422.
5. Tamborini A, Jahns H, McAllister H, et al. Bacterial cholangitis, cholecystitis, or both in dogs. *J Vet Intern Med.* 2016;30(4):1046-1055.
6. Besso JG, Wrigley RH, Gliatto JM, Webster CR. Ultrasonographic appearance and clinical findings in 14 dogs with gallbladder mucocele. *Vet Radiol Ultrasound.* 2000;41(3):261-271.
7. Worley DR, Hottinger HA, Lawrence HJ. Surgical management of gallbladder mucoceles in dogs: 22 cases (1999-2003). *J Am Vet Med Assoc.* 2004;225(9):1418-1422.
8. Crews LJ, Feeney DA, Jessen CR, Rose ND, Matise I. Clinical, ultrasonographic, and laboratory findings associated with gallbladder disease and rupture in dogs: 45 cases (1997-2007). *J Am Vet Med Assoc.* 2009;234(3):359-366.
9. Center SA. Diseases of the gallbladder and biliary tree. *Vet Clin North Am Small Anim Pract.* 2009;39(3):543-598.
10. Choi J, Kim A, Keh S, Oh J, Kim H, Yoon J. Comparison between ultrasonographic and clinical findings in 43 dogs with gallbladder mucoceles. *Vet Radiol Ultrasound.* 2014;55(2):202-207.
11. Uno T, Okamoto K, Onaka T, Fujita K, Yamamura H, Sakai T. Correlation between ultrasonographic imaging of the gallbladder and gallbladder content in eleven cholecystectomised dogs and their prognoses. *J Vet Med Sci.* 2009;71(10):1295-1300.
12. Malek S, Sinclair E, Hosgood G, Moens NM, Baily T, Boston SE. Clinical findings and prognostic factors for dogs undergoing cholecystectomy for gall bladder mucocele. *Vet Surg.* 2013;42(4):418-426.
13. Newell SM, Selcer BA, Mahaffey MB, et al. Gallbladder mucocele causing biliary obstruction in two dogs: ultrasonographic, scintigraphic, and pathological findings. *J Am Anim Hosp Assoc.* 1995;31(6):467-472.
14. Mesich ML, Mayhew PD, Paek M, Holt DE, Brown DC. Gall bladder mucoceles and their association with endocrinopathies in dogs: a retrospective case-control study. *J Small Anim Pract.* 2009;50(12):630-635.
15. Gookin JL, Correa MT, Peters A, et al. Association of gallbladder mucocele histologic diagnosis with selected drug use in dogs: a matched case-control study. *J Vet Intern Med.* 2015;29(6):1464-1472.
16. Allerton F, Swinbourne F, Barker L, et al. Gall bladder mucoceles in border terriers. *J Vet Intern Med.* 2018;32(5):1618-1628.
17. Kutsunai M, Kanemoto H, Fukushima K, Fujino Y, Ohno K, Tsujimoto H. The association between gall bladder mucoceles and hyperlipidaemia in dogs: a retrospective case control study. *Vet J.* 2014;199(1):76-79.
18. Tsukagoshi T, Ohno K, Tsukamoto A, et al. Decreased gallbladder emptying in dogs with biliary sludge or gallbladder mucocele. *Vet Radiol Ultrasound.* 2012;53(1):84-91.
19. Amsellem PM, Seim HB 3rd, MacPhail CM, et al. Long-term survival and risk factors associated with biliary surgery in dogs: 34 cases (1994-2004). *J Am Vet Med Assoc.* 2006;229(9):1451-1457.
20. Parkanzky M, Grimes J, Schmiedt C, Secret S, Bugbee A. Long-term survival of dogs treated for gallbladder mucocele by cholecystectomy, medical management, or both. *J Vet Intern Med.* 2019;33(5):2057-2066.
21. Hottinger HA. Canine biliary mucoceles. In: Bonagura JD, Twedt DC, eds. *Kirk's Current Veterinary Therapy XV.* St. Louis, MO: Elsevier Saunders; 2014:221-223.
22. Ludwig LL, McLoughlin MA, Graves TK, Crisp MS. Surgical treatment of bile peritonitis in 24 dogs and 2 cats: a retrospective study (1987-1994). *Vet Surg.* 1997;26(2):90-98.
23. Walter R, Dunn ME, d'Anjou MA, Lécuyer M. Nonsurgical resolution of gallbladder mucocele in two dogs. *J Am Vet Med Assoc.* 2008;232(11):1688-1693.
24. Fahie MA, Martin RA. Extrahepatic biliary tract obstruction: a retrospective study of 45 cases (1983-1993). *J Am Anim Hosp Assoc.* 1995;31(6):478-482.
25. Rivers BJ, Walter PA, Johnston GR, Merkel LK, Hardy RM. Acalculous cholecystitis in four canine cases: ultrasonographic findings and use of ultrasonographic-guided, percutaneous cholecystocentesis in diagnosis. *J Am Anim Hosp Assoc.* 1997;33(3):207-214.
26. Aguirre A. Diseases of the gallbladder and extrahepatic biliary system. In: Ettinger SJ, Feldman EC, Côté E, eds. *Textbook of Veterinary Internal Medicine.* St Louis, MO: Elsevier; 2010:1689-1695.
27. Partington BP, Biller DS. Hepatic imaging with radiology and ultrasound. *Vet Clin North Am Small Anim Pract.* 1995;25(2):305-335.
28. Wagner KA, Hartmann FA, Trepanier LA. Bacterial culture results from liver, gallbladder, or bile in 248 dogs and cats evaluated for hepatobiliary disease: 1998-2003. *J Vet Intern Med.* 2007;21(3):417-424.
29. Mehler SJ, Bennett RA. Canine extrahepatic biliary tract disease and surgery. *Compend Contin Educ Vet.* 2006;28(4):302-314.
30. Kirpensteijn J, Fingland RB, Ulrich T, Sikkema DA, Allen SW. Cholelithiasis in dogs: 29 cases (1980-1990). *J Am Vet Med Assoc.* 1993;202(7):1137-1142.
31. Schall WD, Chapman WL Jr, Finco DR, et al. Cholelithiasis in dogs. *J Am Vet Med Assoc.* 1973;163(5):469-472.
32. Cosenza SF. Cholelithiasis and choledocholithiasis in a dog. *J Am Vet Med Assoc.* 1984;184(1):87-88.
33. Mallowney P, Tennant BC. Choledocholithiasis in the dog; a review and a report of a case with rupture of the common bile duct. *J Small Anim Pract.* 1982;23(10):631-638.
34. Selmic LE. Hepatobiliary neoplasia. *Vet Clin North Am Small Anim Pract.* 2017;47(3):725-735.
35. Patnaik AK, Hurvitz AI, Lieberman PH. Canine hepatic neoplasms: a clinicopathologic study. *Vet Pathol.* 1980;17(5):553-564.
36. Patnaik AK, Hurvitz AI, Lieberman PH, Johnson GF. Canine bile duct carcinoma. *Vet Pathol.* 1981;18(4):439-444.
37. Hayes HM, Morin MM, Rubenstein DA. Canine biliary carcinoma: epidemiological comparisons with man. *J Comp Pathol.* 1983;93(1):99-107.
38. Gaschen L. Update on hepatobiliary imaging. *Vet Clin North Am Small Anim Pract.* 2009;39(3):439-467.
39. Fry PD, Rest JR. Partial hepatectomy in two dogs. *J Small Anim Pract.* 1993;34(4):192-195.