



What Does A Gall Bladder Mucocele (GBM) Mean To Me?

Seasoned Veterinary Clinical Sonographers Clarifying The GB Mucocele Mystery

A SonoPath.com survey of 8 of the top clinical sonographers in the United States and how they interpret a GBM, and gall bladder disease in general, from the sonographic perspective.

We in the ultrasound field run into controversy regarding what is a gall bladder mucocele and when should we recommend surgery or medical therapy or no therapy at all for cases of diseased gall bladders in dogs and cats.



Last September, SonoPath.com, New Jersey Mobile associates, and collaborators presented an abstract on surgical biliary disease regarding the clinical parameters associated with cases where surgical intervention resolved the clinical signs associated with biliary disease in 39 dogs. This abstract can be seen at <http://www.sonopath.com/presentations.html#ecvim>

To help clarify things further, we decided to poll the 8 seasoned clinical sonographers listed below with 4 simple questions that we have to ask ourselves each time we evaluate a gall bladder in our small animal patients.

Entry criteria for the clinical sonographer: Primary duties of clinical sonography in large caseload settings for at least 5 years.

These clinical sonographers, credentials and associations are listed here and have provided their opinion on what they do, based on the literature and experience, when faced with sonographically relevant gall bladder disease. We find the results interesting:

(LY) Lee Yanik DVM, DACVR. Illumipet.com, Seattle, WA.

(EL) Eric Lindquist DMV, DABVP (Canine & Feline Practice, SonoPath.com/NJ Mobile Associates, Sparta NJ

(JF) Johanna Frank, Johanna Frank DVM DVSc Dip American College of Veterinary Internal Medicine. Furlong, PA



(GR) Gretchen Row DVM, President International Veterinary Ultrasound Society (IVUSS), Minneapolis, MN

(MH) Marty Henderson DVM, Sonovet Inc, San Antonio, TX.

(SK) Shawn Keri DVM, VetImage Inc, Los Angeles, CA.

(LD) Lindsey Daniels DVM, Mobile Ultrasound & Relief Services, Atlanta, GA

(AP) Andi Parkinson RVT, RDMS, Intrapet Mobile Imaging, Baltimore, MD

(Note: The role of an RDMS in clinical sonography is to present and characterize sonographic images to a veterinarian specialized in clinical sonography for interpretation and diagnosis)

Q1: Aside from the literature, how would you classify a gall bladder mucocele? Is it only the "kiwi" appearance that counts or are there other forms that you have encountered?

LY: I also use the peripherally stellate or starburst appearance.

EL: Unfortunately many veterinarians are stuck on the "Kiwi" fruit appearance before they decide that a mucocele is a mucocele or even if the gall bladder has clinical significance. Unfortunately, the current literature is just now addressing this issue with larger studies that better characterize GBM. Dilation of the cystic duct, immobile debris, rounded contour for me is a mucocele and ironically resembles a full anal gland sonographically; which is the analogy I often use to create a visual of what is going on between the liver lobes in cases of GBM. If inflamed, the GBM will often create a + Murphy sign (point the probe at the Gb an the patient has discomfort) as well as lack of curvilinear detail in the Gb wall and inflamed pericystic fat.

JF: A mucocele is a sludge filled gall bladder, which has solid concretions in the center of the gall bladder with small extensions towards the periphery in a stellate form or/ kiwi appearance. A mature mucocele typically encompasses the majority of the gall bladder with only a small amount or little anechoic bile around the periphery. Sometimes, we document what I would call a developing or early mucocele, where the sludge is starting to form in the center with a spoke wheel/ stellate appearance but only encompasses a small portion of the gall bladder with a reasonable amount of normal bile around it.



GR: I will call a mucocele either "developing, early, or mature" depending on how much of the contents of the gall bladder appear mucoid, i.e. the rim of hypoechoic to anechoic material with the echogenic bile sludge riding on top of it/centrally.

MH: Mucoceles do not have to have the classic cut kiwi appearance. They generally have what I describe as very organized sludge that can have a very complex appearance (sometimes also very dense coarse heterogeneous echotexture) without being a cut kiwi. The gallbladder and cystic duct are generally very large and round in shape. Evidence of

perforation/leakage as evidenced by ventral hyperechoic mesenteric fat and liver periphery along the gallbladder margin is extra support that this gallbladder has ruptured and is creating localized regional bile peritonitis.

SK: In my experience, mucoceles often are merely aggressively heteroechoic and mass like. The most consistent finding is hyper-reflective serosal surfaces and thick hypoechoic walls of the gall bladder. Kiwi fruit appearance is classic and easy for rDVM's to understand and act on, but most mucoceles are not Kiwi fruit appearing.

LD: I also use the peripherally stellate or starburst appearance.

AP: Any spiculated, non-dependent, hyperechoic material in the GB lumen.

**Q2: When do you think gall bladder disease is clinically significant and necessitating surgery..i.e causing anorexia, lethargy, vomiting, and ALT, SAP, & bilirubin elevations that the sonopath abstract o surgical biliary disease demonstrated at ecvim
(<http://www.sonopath.com/presentations.html#ecvim>)?**

LY: Any of the above coupled with wall thickening, peri-cystic inflammation or a combination there of.

EL: All of the above, + Murphy, ill-defined peri-cystic fat, and/or concurrent disease of the common bile duct.

JF: Surgery is necessary if there are concurrent clinical signs, elevated liver enzymes, elevated white blood cell count and painful in the region of the gall bladder. Not all of these factors need to be present, but if they are all present, I recommend surgery. If there is hyperechoic mesentery surrounding the neck of the gall bladder or a small amount of effusion with pain - surgery must be performed ASAP as there is likely a rupture and localized peritonitis.



GR: Any related clinical signs and/or significant liver enzyme elevations. Also if there is surrounding inflammatory change, i.e. increased echogenicity in the surrounding liver parenchyma or neighboring adipose, and especially if there is any free fluid (stat!)

MH: If there's evidence of perforation (as mentioned above), cholecystectomy is indicated. If T-BILI is increased and the gallbladder is very enlarged, or there is icterus, it needs to come out. When there are clinical signs and the gallbladder has the sonographic look of a mucocele (typical or atypical), but there is no evidence of perforation and TBILI is not

outside the normal range, I have had good success starting these patients on Actigall, Flagyl, Baytril and rechecking in 7-10 days and again in 3-4 weeks.

LD: Any of the above coupled with wall thickening, peri-cystic inflammation or a combination there of.

SK: I see all kinds of potentially pathologic change in the gall bladder, but act clinically only if the bilirubin is elevated and/or clinical signs are present (surgically anyway). We culture a lot of gall bladders if it is safe to do so (no thick walls or over distension) and use medical or dietary management if clinical-pathologic findings but no significant clinical signs.

AP: I like to see them sick (ie: V/D, anorexia), icteric, dilated bile duct, and elevated liver values.

Q3: When do you call a mucocele and "emerging mucocele," "mucocele," and "Inflamed mucocele/bile peritonitis?"

*LY: **Emerging:** evidence of stationary sediment.*

***Mucocele:** no free flowing bile or sediment. Totally stationary sediment.*

***Inflamed:** PAIN (Murphy sign), wall thickening with or without multi-layered appearance, peri-cystic inflammation, free or trapped fluid, adjacent gastroenteritis, extra or intrahepatic duct dilation or a combo there of.*

*EL: **Emerging:** Sludgy Gb, but much of the sediment is immobile and contour is onl mildly altered, cystic duct beginning to dilate. **Mucocele:** dilated cystic duct, rounded contour, immobile debris, significant enlargement may or may not be present. **Inflamed:** Mucocele definition and pericystic inflammation. Fluid associated with the Gb, portal hilus or adjacent liver lobes. Concurrent CBD pathology often occurs.*

*JF: **Mucocele:** Gall bladder almost completely filled with stellate appearing sludge in the center with very little normal bile, non-gravity dependant.*

***Emerging mucocele** - sludge is starting to have a stellate appearance in the center, suspended, non gravity-dependant but only encompasses a small portion of the gall bladder with some normal bile surrounding it.*



Inflamed mucocele/ bile peritonitis - mucocele with hyperechoic mesentery surrounding the neck or a portion of the gall bladder, severe pain +/- localized fluid, +/- sludge located external to the gall bladder wall, +/- lack of continuity of the gall bladder wall.

GR: Emerging mucocele is a rim of anechoic or hypoechoic mucoic material lining the walls with some echogenic at least somewhat mobile bile sludge. "**Mature mucocele**" is Kiwi, and inflamed/bile peritonitis is echogenic pericholecystic tissues, plus or minus free fluid.

MH: Emerging: organized bile sludge with GB enlargement, elevated ALP, history of intermittent/recurrent anorexia, lethargy, & vomiting, but no TBILI elevation.

Mucocele: thick-walled star-like appearance ("cut kiwi"), GB distention, biliary obstruction with/without TBILI elevation

Inflamed: overtly hyperechoic surrounding fat (especially at the ventral aspect) and increased echogenicity of liver tissue surrounding the gallbladder. Often these have percholecystic fluid.

SK: I use **emerging** mucocele more and more often, especially if ultrasonic findings of gall bladder are suggestive (non motile sludge, thick gall bladder walls).

LD: Emerging: evidence of stationary sediment. **Mucocele:** no free flowing bile or sediment. Totally stationary sediment. **Inflamed:** PAIN (Murphy sign), wall thickening with or without multi-layered appearance, peri-cystic inflammation, free or trapped fluid, adjacent gastroenteritis, extra or intra-hepatic duct dilation or a combo there of.

AP: I have been using the term "**early mucocele**" (which may not be a good term to use) for non-dependent ones that are not really spiculated quite yet, but are on their way.

Q4: When do you recommend "Sit and watch?" "Medical therapy?", "Surgery?"

LY: Sit and watch: Emerging. **Medical therapy:** Uncomplicated without cystic or CBD distention. **Elective surgery:** Cystic or CBD distended without inflammation or related clinical signs. **Emergency surgery:** See Q3.

EL: Sit & Watch: Most of debris is still mobile. Early emerging mucocele, no clinical signs or rising differential SAP or other liver values. May use actigal, depends on the case.

Medical: 30% or more of the debris is immobile, rising SAP or other values, no signs of perforation or inflammation, contour is rounded but not dramatically so, may have bland clinical signs of partial anorexia or lethargy. I like enrofloxacin if any signs of inflammation and surely actigal for 6 weeks and recheck liver values every 3 weeks, rescan in 6 weeks



*prior to stopping actigal therapy but this tx varies on each case. **Elective or Emergency Sx:** majority of debris is immobile, dilated cystic duct, any evidence of inflammation or free fluid... "once a bad gland always a bad gland"... clinical signs overtly present. Risk of bile peritonitis is often a function of the client being judicious enough to bring in right away of medical Tx not working which usually doesn't when reaching this point.*

***JF: Sit and watch** -almost never - only if very minimal change or normal gravity dependant sludge in gall bladder (non mucocele appearance).*

***Medical therapy:** very mild mucocele - gravity dependant but starting to form*

a stellate appearance - antibiotics and Actigal (Denamarin maybe) or absolutely no clinical signs, no liver enzyme elevation...no pain

*Medical therapy - antibiotics - no actigal - if I am concerned it could rupture but no clinical signs, no liver enzyme elevation, no pain and watch carefully. **Surgery:** advanced mucocele with clinical signs, pain, liver enzyme*

elevation; absolutely if rupture. I also recommend surgery or closer watch on specific breeds such as Shelties and Cocker Spaniels...

The cases which are difficult to call is when you have a well formed mucocele with no signs and no lab work change. For those, I may have the vet watch liver enzymes periodically, and have them discuss clinical signs with the owner...if the dog vomits or goes off its food - it needs to come in immediately for blood and ultrasound - no waiting...Those dogs also get periodic ultrasound evaluations.

***GR: Sit and watch** is recommended by me only when there are no clinical signs or lab abnormalities (incidental finding), and when the owners or patients don't allow medical therapy, which is rare. **Medical therapy** is recommended when the gall bladder changes are incidental findings, not mature mucoceles, no clinical signs, and I feel confident that I can get the chance to repeat the U/S exam and truly keep an eye on it. Also, medical therapy is recommended as a second choice if it is a mature mucocele, not inflamed, only when the clients are strongly opposed to surgery (ancient patient, financial limitations, etc). I have had one case where I have followed an questionably symptomatic intermediate mucocele (still had mobile bile sludge sitting on top of the 1cm rim of mucoid material) that has been doing well and sonographically improving but not yet normal with medical therapy only. That client has been told that a repeat U/S exam and likely surgery will be necessary as soon as the dog burps funny or has any GI clinical signs. Not sure they will follow my advice.*



*MH: If I'm suspicious of an emerging mucocele, I never suggest **sitting & watching**. I always begin **medical** therapy as outlined above. If there's TBILI elevation and/or evidence of perforation, I recommend **surgery**. These patients will wall off the perforation and wax and wane their clinical signs, which can make the practitioner and owner think the patient is improving, but surgery is necessary. Since the bile is so thick, the risk of the bile emptying into the abdomen is low (rather it will be a slow leak), but the patient will remain very uncomfortable and clinical signs will progress necessitating surgery as soon as possible. If the patient is icteric, it is an emergency as the effects on the liver will be significant.*

*SK: **Watch** with Actigall if clin-path signs and no clinical signs. Some gall bladder disease resolves with **medical** therapy, however, it seems more do better with a more aggressive*

*approach. **Surgery** the minute bilirubin comes up, clinical signs are present and ultrasound is suggestive. Often, no clin-path signs, just clinical signs. I am finding I am getting more and more aggressive in surgical recommendations as many of these dogs benefit from more aggressive therapy.*

*LD: **Sit and watch**: Emerging. **Medical** therapy: Uncomplicated without cystic or CBD distention. **Elective surgery**: Cystic or CBD distended without inflammation or related clinical signs. **Emergency surgery**: See Q3.*

*AP: Most I see do well with liver meds (ie: ab's for 4-6 weeks, Denamarin), IV fluids, Actigall if the bile duct is not dilated at all. The few I have seen that needed sx had already ruptured and had a lovely bile peritonitis, or had that nasty hyperechoic tissue around the GB and were very painful to scan. In human GB studies, it is **REQUIRED** that you left decub the patient to see the gb sludge and debris fall into the fundus (sometimes this is the only way to see stones).*

I would like to thank all of these seasoned clinical sonographers from the radiology, internal medicine, ABVP, general practice, and RDMS disciplines for their time and input in this important survey.

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