This chapter discusses acute calculus cholecystitis and ascending cholangitis together, because they have several similarities:
• Similar epidemiology and presentation
• Same antibiotic therapies
• Similar imaging modalities
• Plus, they can rarely occur together

That being said, there are obviously important differences between them. As foci of septic shock, they behave in fundamentally different ways:

• Cholecystitis is usually *self-contained*:
  • The disease process is usually *limited* to the gallbladder.
  • Tends to have a more gradual, smoldering disease course (unless it progresses to gangrenous or emphysematous cholecystitis).
  • Patients more often respond to medical management.

• Ascending cholangitis is *never* self-contained:
  • Bacteria under pressure spread readily up bile ducts, across hepatic sinusoids, and into the blood. This physiology generates characteristic *bacteremia* and *rigors*.
  • Ascending cholangitis has a greater tendency to evolve rapidly into septic shock.
  • Timely source control in ascending cholangitis may be more important, as this decompresses the biliary tree and stops the reflux of bacteria into the blood.
  • Patients are less likely to respond to medical management alone (although in some cases the obstructing stone may pass spontaneously).

**clinical presentation & differential diagnosis**

**symptoms**

• Both may cause similar symptoms
  • Right upper quadrant pain
  • Nausea/vomiting, anorexia
  • Fever

• Ascending cholangitis
  • *Bacteremia* is common, often leading to frank *rigors*. Occasionally, patients may present with sepsis and bacteremia (typically gram-negative organisms, most often E. coli) in the *absence* of any localizing symptoms.
  • Jaundice is more common.

**common causes of both**

• Most often due to gallstones.
• Can be caused by strictures (e.g., primary sclerosing cholangitis) or malignancy (e.g., pancreatic cancer).
  • Among patients with known biliary pathology or recent biliary procedures, there should be a higher index of suspicion for biliary sepsis.
differential diagnosis

- Combination diagnoses:
  - (a) Simultaneous cholecystitis plus ascending cholangitis
  - (b) Simultaneous ascending cholangitis plus pancreatitis
- Pancreatitis
- Pyelonephritis
- Liver abscess(es)
- Septic portal vein thrombosis (pylephlebitis)
- Pelvic inflammatory disease (can extend to cause right upper quadrant pain, fever, and pericholecystic fluid)
- Procedural complication (e.g. bile duct leak s/p laparoscopic cholecystectomy)

labs

liver function tests

- Both cholecystitis and ascending cholangitis may cause elevation of bilirubin and transaminases, with greater derangements suggesting ascending cholangitis.
  - Marked elevation of bilirubin (e.g. >4 mg/dL) is more consistent with cholangitis.
  - Severe elevation of transaminases (occasionally >1,000 mg/dL) is occasionally seen in cholangitis due to acute biliary obstruction.
- Sepsis of any etiology can cause mild cholestasis (“cholestasis of sepsis”) with elevated bilirubin & alkaline phosphatase. Such abnormalities shouldn’t be misinterpreted to mean that the biliary system is the source of infection.

bacteremia

- Blood cultures are frequently positive in ascending cholangitis.
- When gram-negative bacteremia is found without a known source, always consider abdominal sources (especially ascending cholangitis) and pyelonephritis.

neutrophil-to-lymphocyte ratio (NLR)
General
- The neutrophil/lymphocyte ratio may be used as an index of physiologic stress caused by various illnesses (further explanation [here](https://emcrit.org/pulmcrit/nlr/)).
- For both cholecystitis and ascending cholangitis, the performance of the NLR is superior to the white blood count and similar to the performance of C-reactive protein (28032577, 29907228).
- NLR may be conceptualized as a slightly improved version of the white blood cell count.

Cholecystitis
- NLR >3 predicts cholecystitis (~70% sensitivity, 70% specificity)(25428640, 28032577).
- NLR >4 suggests more severe cholecystitis (e.g. empyema, gangrene, or perforation)(30581347, 28032577).
- These cutoff values are lower than cutoff values for acute appendicitis (~5 and ~9), suggesting that cholecystitis usually causes less physiologic stress than appendicitis does.

Ascending cholangitis
- NLR > 5.3 predicts cholangitis in one study with 68% sensitivity and 95% specificity (29907228).
- This cutoff is higher than the cutoff for cholecystitis (~3), reflecting that ascending cholangitis typically causes greater physiologic stress.

Neutrophil-to-lymphocyte ratio (NLR) outperforms the white blood cell count in the diagnosis of both acute cholecystitis and ascending cholangitis.

Fugures from PMID 28032577 and 29907228.
Community acquired biliary sepsis (ascending cholangitis & calculus cholecystitis) - EMCrit Project

Findings in acute calculus cholecystitis

[1] Stones (~95% sensitivity)
- Cholecystitis is usually caused by stone impaction in the gallbladder neck or cystic duct.
- An impacted stone won’t move if the patient is repositioned.

[2] Sonographic Murphy’s sign (~90% sensitivity; may be absent in gangrenous cholecystitis).
- Most specific sign.
- Should replace traditional (blind) Murphy’s sign.

[3] Distended gallbladder should be seen (unless the gallbladder has already perforated).
- Distention is part of the pathophysiology of cholecystitis.
- A contracted gallbladder with thick-appearing wall may be a normal finding after eating.

[4] Adjunctive signs: Thickened gallbladder wall (50-75% sensitive) and peri-cholecystic fluid
- Relatively nonspecific.
- Has a variety of possible causes (e.g. volume overload, ascites, hepatitis).

J. Christian Fox
@jchristianfox

Acute “calculus” cholecystitis: gallstones, anterior wall >3mm and + sonographic Murphy’s sign. “Integral” in managing patients as they pour in through triage. #PoCUS #gallstonechair

Dallas Holladay, DO
@Dallas_Holladay

9:03 PM - Dec 6, 2017
47 people are talking about this

Gangrenous cholecystitis

- May lack sonographic Murphy’s sign (gallbladder is dead and insensate).
- Irregular wall thickening.
- Intraluminal membranes or perforation may be seen.

Dallas Holladay, DO
@Dallas_Holladay

https://emcrit.org/ibcc/biliary/
emphysematous cholecystitis

- Gas in gallbladder wall may appear as patchy areas of bright signal casting dirty shadows.
- Can be difficult or impossible to distinguish from:
  - (a) Intra-luminal air (pneumobilia)
  - (b) Adjacent loops of bowel
  - (c) Dense calcified stones within the gallbladder (Wall Echo Sign)
  - (d) Calcification of the entire gallbladder wall (“Porcelain gallbladder”)
- When in doubt, a CT scan is needed (emphysematous cholecystitis is an indication for surgery).

In this clip: note subtle signs of portal vein gas (micro-bubbles) and gas accumulating in the liver. Portal vein gas is often an ominous sign, which may be caused by a variety of intra-abdominal catastrophes.
findings in ascending cholangitis

- Key finding is dilation of common bile duct. Nobody agrees about the normal size of a common bile duct. >7 mm is probably dilated in most patients (Zimmer 2015). Patients who have undergone cholecystectomy may have somewhat larger common bile duct dimensions (e.g. up to 10 mm).
- Sonography may be negative very early in the disease course, before the bile ducts have had time to dilate.

serial ultrasonography

- An ultrasound exam represents a single snapshot in time. In reality, findings will evolve dynamically.
- The power of ultrasonography may be amplified substantially by serial exams over time. This may be a useful approach to patients with ambiguous examination findings.
  - A case series by Bosch et al. describes two cases of cholecystitis which evolved dramatically over hours. This is requisite reading for anyone doing biliary POCUS (PDF is here).
- Serial ultrasonography may be especially useful in ascending cholangitis:
  - The common bile duct may initially have a normal diameter (in the hyper-acute phase), with progressive dilation over time.
  - Occasionally the stone will pass spontaneously, so the common bile duct size will decrease over time.

acute cholecystitis

- As with ultrasonography, sensitivity is often greater than specificity. For example, thickening of the gallbladder wall is nonspecific and must be taken into clinical context.
- Strengths of CT scanning include the following:
  - (1) Provides more global imaging of the abdomen, allowing exclusion of more entities (e.g. pancreatitis).
  - (2) Superior to ultrasonography for detection of complicated cholecystitis:
    - (a) Gangrenous cholecystitis (lack of enhancement of the gallbladder wall following IV contrast indicates gangrenous tissue).
    - (b) Emphysematous cholecystitis: CT is excellent at determining the precise location of gas and differentiating this from porcelain gallbladder.
    - (c) Perforated gallbladder.
    - (d) Abscess adjacent to gallbladder, liver abscess.

Emphysematous cholecystitis is the acute inflammation of the gallbladder wall due to infection by gas-forming bacteria (e.g. Clostridium, E.coli). Watch this video and hear

https://emcrit.org/ibcc/biliary/
Community acquired biliary sepsis (ascending cholangitis & calculus cholecystitis) - EMCrit Project

10/29/2019

ascending cholangitis

- The primary value of CT scanning is in providing a survey of the entire abdomen and excluding other possible foci of sepsis.
- CT may be less sensitive than ultrasound for detection of stones in the common bile duct (depending on body habitus and sonographic windows).
- CT scan is superior to ultrasound for determination of some causes of biliary stenosis (e.g. pancreatic cancer).

HIDA scan

Approach to diagnosis of community-acquired biliary sepsis

Concern for biliary sepsis (e.g. due to localizing symptoms or elevated bilirubin)

RUQ ultrasonography (+/- CT scan if poor windows or equivocal pathology)

Possible cholecystitis [but nondiagnostic]

Dilation of the common bile duct & Laboratory evidence of cholestasis

Patient diagnosed with ascending cholangitis

Obstructed cystic duct

HIDA scan

General schema for approaching biliary sepsis. Occasionally this can get a bit more complicated (e.g. rare patients can have both ascending cholangitis and cholecystitis simultaneously, due to a stone impacted in the common bile duct).

HIDA scan to evaluate for acute calculus cholecystitis

- Some findings of cholecystitis on ultrasound are nonspecific (e.g. wall thickening and pericholecystic fluid).
- If ultrasonography is equivocal, HIDA scan can be performed. This is a nuclear medicine test which evaluates the ability of the gallbladder to be filled by bile (reflecting patency of the cystic duct).
  - If the gallbladder fails to fill with radiolabeled bile, this supports the diagnosis of cholecystitis.
  - If the gallbladder fills normally with radiolabeled bile, this largely excludes the possibility of cholecystitis.
- HIDA scan is ~97% sensitive and ~90% specific for acute calculus cholecystitis.
- Causes of false-positives (failure of the gallbladder to fill with radiolabeled dye, in the absence of cholecystitis):
  - Severe liver disease with inability to secrete radiolabeled tracer into bile.
  - Prolonged fasting with distention of the gallbladder.
  - Prior biliary sphincterotomy, which promotes drainage of bile directly into intestine.
  - Cystic duct obstruction without superimposed acute cholecystitis.

https://emcrit.org/ibcc/biliary/
Formal diagnostic criteria aren't perfect for every patient (e.g. a patient with severely altered mentation may lack localizing signs). However, these criteria may provide an organized structure for thinking about these diagnoses.

**diagnostic criteria for ascending cholangitis**

- **Definite diagnosis requires at least one item in each of three categories (based on Tokyo Guidelines 2018):**
  1. Evidence of systemic inflammation (any of the following)
     - Fever
     - Rigors
     - WBC outside the range of 4,000-10,000 /μL
     - Elevated C-reactive protein > 10 mg/L (neutrophil/lymphocyte ratio may be considered as alternative)
  2. Laboratory evidence of cholestasis (any of the following)
     - Bilirubin > 2 mg/dL
     - Elevated alkaline phosphatase, AST, or ALT (above 1.5 times the upper range of normal)
  3. Imaging evidence of dilation of the common bile duct
     - Bolstered by finding a cause of obstruction (e.g. stone or stricture)

**diagnostic criteria for acute cholecystitis**

- **Definite diagnosis requires at least one item in each of three categories (based on Tokyo Guidelines 2018):**
  1. Systemic signs of inflammation
     - Fever
     - Rigors
     - WBC outside the range of 4,000-10,000 /μL
     - Elevated C-reactive protein > 10 mg/L (neutrophil/lymphocyte ratio may be considered as alternative)
  2. Local signs of inflammation
     - Murphy's sign
     - Right upper quadrant pain, mass, or tenderness
  3. Imaging findings characteristic of acute cholecystitis

**organisms we need to cover**

| Common microorganisms isolated from bile cultures among patients with acute biliary infections |
|---------------------------------------------------|---------------------------------------------------|
| Isolated microorganisms from bile cultures       | Proportions of isolated organisms (%)             |
| Gram-negative organisms                          |                                                   |
| *Escherichia coli*                                | 31–44                                             |
| *Klebsiella* spp.                                 | 9–20                                              |
| *Pseudomonas* spp.                                | 0.5–19                                            |
| *Enterobacter* spp.                               | 5–9                                               |
| *Acinetobacter* spp.                              | --                                                |
| *Citrobacter* spp.                                | --                                                |
| Gram-positive organisms                           |                                                   |
| *Enterococcus* spp.                               | 3–34                                              |
| *Streptococcus* spp.                              | 2–10                                              |
| *Staphylococcus* spp.                             | 0\(^a\)                                           |
| Anaerobes                                         | 4–20                                              |
| Others                                            | --                                                |

Modified from the 2018 Tokyo Guidelines PMID 29090866

- (1) Gram-negatives are most important
- Pseudomonas should arguably be covered, although it's not very common.
(2) Gram-positives are commonly isolated
- Enterococci are commonly found in the gallbladder, but enterococcus isn't a particularly virulent pathogen.
- Ideally antibiotics should cover enterococcus (note that first through fourth generation cephalosporins lack enterococcal coverage).

(3) Role of anaerobes is variable.
- Anaerobes should be covered in patients with a biliary-enteric anastomosis or gangrenous/emphysematous cholecystitis (29090866).

MRSA is not a community-acquired biliary pathogen
- If the blood cultures reveal gram-positive cocci, these are probably either enterococci or streptococci.
- Adding vancomycin to piperacillin-tazobactam won't help (if the enterococcus is resistant to piperacillin-tazobactam, it is likely a vancomycin-resistant enterococcus).
- Addition of linezolid could be logical to broaden coverage while awaiting speciation. However, this may or may not be necessary depending on the scenario (e.g. clinical trajectory and whether or not source control has been achieved).

penetration of various antibiotics into biliary secretions

<table>
<thead>
<tr>
<th>Good penetration efficiency (ABSCR &gt;= 1)</th>
<th>Low penetration efficiency (ABSCR &lt; 1)</th>
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</thead>
<tbody>
<tr>
<td>Piperacillin/tazobactam (4/8)</td>
<td>Ceftriaxone (0.75)</td>
</tr>
<tr>
<td>Tigecycline (≥ 10)</td>
<td>Cefoxime (0.23)</td>
</tr>
<tr>
<td>Amoxicillin/Clavulanate (1:1)</td>
<td>Meropenem (0.33)</td>
</tr>
<tr>
<td>Ciprofloxacin (≥ 5)</td>
<td>Cefazidine (0.18)</td>
</tr>
<tr>
<td>Ampicillin/Sulbactam (2:4)</td>
<td>Vancomycin (0.41)</td>
</tr>
<tr>
<td>Ceftepime (2/24)</td>
<td>Amikacin (0.63)</td>
</tr>
<tr>
<td>Ceftazidime (≥ 4)</td>
<td>Gentamicin (0.58)</td>
</tr>
<tr>
<td>Pencillin &quot;G&quot; (≥8)</td>
<td></td>
</tr>
<tr>
<td>Imipenem (1:01)</td>
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</tbody>
</table>


- There is no solid evidence to support the use of antibiotics with higher biliary penetration. However, it may be reasonable to give this some consideration.
- Biliary penetration may be somewhat more relevant to ascending cholangitis than cholecystitis (because in cholecystitis, bile doesn’t penetrate into the focus of infection within the gallbladder).

empiric therapy
- **Piperacillin-tazobactam** is generally first-line therapy for empiric treatment of biliary sepsis (good penetration, covers gram-negatives, anaerobes, and enterococci).
- **Meropenem**: In geographic locales with a high incidence of extended-spectrum beta-lactamase resistant (ESBL) E. coli, meropenem could be considered as empiric therapy. This should be based upon the frequency of ESBL (+) E. coli in a local antibiogram, possibly using a cutoff of >10-20% (29090866).
- **For patients with penicillin allergy**:
  - Amoxicillin or Penicillin-G have a different structure from piperacillin-tazobactam. Thus, patients with allergy to "penicillins" should be expected to be able to tolerate piperacillin-tazobactam. However, there isn't solid evidence regarding this. For patients with a dubious history of penicillin allergy, treatment with piperacillin-tazobactam may be considered (using a test-dose strategy).
  - Meropenem is definitely safe in patients with a history of allergy to a penicillin.

de-escalation
- If a single organism is isolated (e.g. from the blood) antibiotics may be narrowed.
- Ascending cholangitis can involve polymicrobial bacterial infection, so narrowing antibiotics based on a single isolated organism should be done with caution.
duration of therapy

- Generally, once source control has been achieved, antimicrobial therapy is recommended for 4-7 days (29090866).
- If gram-positive bacteremia is detected (e.g. Enterococcus or Streptococcus) then therapy should be extended to 14 days (since these bacteria have a tendency to stick to valves).
- If the source has been surgically removed (cholecystectomy), then shorter courses of antibiotics may be adequate.

interventional therapy for ascending cholangitis

<table>
<thead>
<tr>
<th>Table 4</th>
<th>TG18/TG13 severity assessment criteria for acute cholangitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade III (severe) acute cholangitis</td>
<td></td>
</tr>
<tr>
<td>“Grade III” acute cholangitis is defined as acute cholangitis that is associated with the onset of dysfunction at least in any one of the following organs/systems:</td>
<td></td>
</tr>
<tr>
<td>1. Cardiovascular dysfunction: hypotension requiring dopamine ≥5 μg/kg per min, or any dose of norepinephrine</td>
<td></td>
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<tr>
<td>2. Neurological dysfunction: disturbance of consciousness</td>
<td></td>
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<tr>
<td>3. Respiratory dysfunction: PaO₂/FiO₂ ratio &lt;300</td>
<td></td>
</tr>
<tr>
<td>4. Renal dysfunction: oliguria, serum creatinine &gt;2.0 mg/dl</td>
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<tr>
<td>5. Hepatic dysfunction: PT-INR &gt;1.5</td>
<td></td>
</tr>
<tr>
<td>6. Hematological dysfunction: platelet count &lt;100,000/mm³</td>
<td></td>
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</tbody>
</table>

Grade II (moderate) acute cholangitis

*“Grade II” acute cholangitis is associated with any two of the following conditions:*

1. Abnormal WBC count (>12,000/mm³, <4,000/mm³)
2. High fever (>39°C)
3. Age (≥75 years old)
4. Hyperbilirubinemia (total bilirubin ≥3 mg/dl)
5. Hypoalbuminemia (<70% of the lower limit of normal)

Grade I (mild) acute cholangitis

*“Grade I” acute cholangitis does not meet the criteria of “Grade III (severe)” or “Grade II (moderate)” acute cholangitis at initial diagnosis.*

Modified from the 2018 Tokyo Guidelines PMID 29012630

importance of drainage

- Relief of the biliary obstruction is a critical intervention for ascending cholangitis, as this allows pus to drain out of the biliary tree (rather than backing up into the liver and causing bacteremia). This may be required for “source control.”
- Patients who respond well to antibiotics and fluid resuscitation may not require urgent decompression. However, patients who are more severely ill or who fail to respond to medical management do require expedited drainage.
- The Tokyo Guidelines include a staging system (above), with Grade II-III disease suggesting a benefit of urgent decompression (<24 hours).
- Gastroenterology should be consulted early.

ERCP

- ERCP is the front-line approach to drainage with high success rates (>90%; Sun 2016 [https://www.ncbi.nlm.nih.gov/pubmed/26961212]).
- ERCP allows for stone removal as well as procedures to keep the bile ducts open (sphincterotomy and/or stent placement).
- Performing ERCP on a septic patient will often require intubation (because this procedure must be performed in the prone procedure with little ability to monitor the patient's ventilation).
  - ERCP shouldn't be delayed substantially because the patient is “too sick” to tolerate the procedure. Severity of illness is an indication for urgent ERCP. Profoundly ill patients should ideally be promptly resuscitated and intubated, stabilized on the ventilator, and then taken expeditiously for ERCP.

percutaneous transhepatic cholangiography (PTC)

- Basics of the procedure:
  - The biliary tree is accessed percutaneously via interventional radiology guidance.
  - The biliary tree may be swept clean of stones.
  - Internal stents may be placed to facilitate drainage. An external drain will often also be inserted.
  - May be roughly conceptualized as similar to ERCP, but with percutaneous access to the biliary tree.
- Generally considered a second-line drainage procedure.
- May be performed among patients in whom ERCP is impossible (e.g. patients who are status post gastric bypass).

interventional therapy for cholecystitis
surgery for the cholecystitis patient with septic shock

- Surgery is uncommonly performed among septic ICU patients.
  - Tokyo 2018 guidelines suggest that early surgery can be performed in selected septic patients with cholecystitis. However, this should be undertaken only by experienced surgeons at high-volume centers. In practice, this doesn't seem to be pursued often.

- Indications to consider immediate surgery:
  1. Emphysematous cholecystitis
  2. Gangrenous/necrotic cholecystitis
  3. Perforated gallbladder

https://twitter.com/SonoStache/status/936810753100734464

percutaneous cholecystostomy drain (via interventional radiology)

- Benefit: Relief of pressure in gallbladder, drainage of pus.
- Drawbacks: ? Spillage of bacteria into peritoneum, patients who aren't operative candidates may be stuck with drain for a while.
- Contraindications: Large-volume ascites, interposed loop of bowel blocking access.
- This is currently an evidence-free zone, with no clear evidence to support percutaneous cholecystostomy.
  - For example, see discussion in the World Society of Emergency Surgery 2016 guidelines (pages 14-15 here).
  - In one RCT of patients with high-risk cholecystitis, there was no benefit to cholecystostomy compared to medical management alone (12111069).
- A reasonable approach might be:
  1. Start with aggressive sepsis resuscitation (antibiotics, vasopressors, fluid, etc.).
  2. If patient is responding to therapy and clinically improving continue medical therapy.
  3. If patient is deteriorating or failing therapy (e.g. not improving after ~1-3 days) percutaneous drain.

failure of percutaneous cholecystostomy drain

- Drainage combined with medical therapy should cause clinical improvement within ~1-3 days.
- Failure to improve may reflect the following:
  1. Gangrenous/necrotic or emphysematous cholecystitis.
  2. Malpositioned or dysfunctional drain.
  3. Liver abscess(es).
  4. Septic portal vein thrombosis (pylephlebitis).
  5. Superimposed pancreatitis or ascending cholangitis.
- Evaluation may include liver function tests, ultrasonography, and contrasted CT scan. Depending on the findings, the need for cholecystectomy may need to be reconsidered (e.g. if gangrenous or emphysematous cholecystitis is found).

simultaneous ascending cholangitis and cholecystitis

simultaneous ascending cholangitis & cholecystitis

- Rarely, these two diseases may occur together.
- The pathophysiology may be a proximal stone lodged in the common bile duct, which causes distention of both the gallbladder and the biliary tree.

- treatment options may include the following:
  1. ERCP may be ideal (to allow for stone removal and stenting of the common bile duct).
  2. If the patient is too unstable to tolerate ERCP, then placement of a percutaneous drain in the gallbladder may be adequate to drain both the gallbladder and biliary tree. This has the advantage of being a simple and quick procedure, but it doesn't allow definitive treatment (stone removal).
Community acquired biliary sepsis (ascending cholangitis & calculus cholecystitis) - EMCrit Project

- (3) Percutaneous transhepatic cholangiography (PTC) is another percutaneous procedure which may be a bit more involved than a gallbladder drain, but it offers more definitive therapy (stone removal and sweeping of the common bile duct).

checklist

Community-acquired biliary septic shock checklist

- Investigations
  - Electrolytes, CBC with differential, Coags, Liver function tests (including direct bilirubin), Lipase
  - Pregnancy test PRN
  - Urinalysis with reflex culture if positive
  - Blood cultures
  - Procalcitonin, Lactate
  - Right upper-quadrant ultrasonography [more (#ultrasonography)]
  - CT abdomen/pelvis if diagnosis unclear or possible gangrene/emphysema [more (#CT_scan)]

- Antibiotics [more (#antibiotics)]
  - Piperacillin-tazobactam generally front-line therapy.
  - High-risk for ESBL species: may consider meropenem instead.

- Hemodynamics
  - Fluid, vasopressors, inotrops, echocardiography – optimize at bedside.
  - Don’t give >3 liters fluid unless there is a compelling reason.

- Adjunctive therapies considered in septic shock
  - Hydrocortisone 50 mg IV q6hr unless contraindicated.
  - Consider ascorbic acid 1.5 g IV q6hr & thiamine 200 mg IV q12hr.

- Source control – Ascending cholangitis [more (#interventional_therapy_for_ascending_cholangitis)]
  - Consult gastroenterology for ERCP.

- Source control – Cholecystitis [more (#interventional_therapy_for_cholecystitis)]
  - If not improving with medical therapy, place percutaneous drain.

Approach to diagnosis of community-acquired biliary sepsis

Concern for biliary sepsis (e.g. due to localizing symptoms or elevated bilirubin)

RUQ ultrasonography (+/- CT scan if poor windows or equivocal pathology)

Diagnostic for acute cholecystitis

Obstructed cystic duct

Possible cholecystitis (but nondiagnostic)

Cholecystitis excluded. Look for alternative diagnosis (consider CT abdomen if not already performed)

HIDA scan

Patient diagnosed with acute cholecystitis

Cholecystitis confirmed

Patient diagnosed with ascending cholangitis

Dilation of the common bile duct & Laboratory evidence of cholecystitis

General schema for approaching biliary sepsis. Occasionally this can get a bit more complicated (e.g. rare patients can have both ascending cholangitis and cholecystitis simultaneously, due to a stone impacted in the common bile duct).

The Internet Book of Critical Care, by @EMCrit

podcast


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https://emcrit.org/ibcc/biliary/
Under-utilization of repeat right upper-quadrant sonogram in equivocal situations (exam changes over time!).
Failure to consider ascending cholangitis in patients with unexplained gram-negative bacteremia.
Vancomycin is over-utilized for community-acquired biliary sepsis.
Over-utilization of percutaneous drains for cholecystitis, due to the misconception that if the patient has cholecystitis then they must receive an immediate drain.
Under-utilization of ERCP for ascending cholangitis (misconception that patient is "too sick" for ERCP).

One-minute recap:
https://twitter.com/PulmCrit/status/1149268192247898112

Going further:

- **Ascending cholangitis**
  - [Cholangitis](https://coreem.net/core/cholangitis/) (Anand Swaminathan, CoreEM)
  - [Ascending cholangitis](http://www.emdocs.net/em3am-ascending-cholangitis/) (Erica Simon, emDocs) & [Cholangitis Pearls & Pitfalls](http://www.emdocs.net/cholangitis-pears-pitfalls/) (Rachel Ely, emDocs)
  - [Acute cholangitis](https://radiopaedia.org/articles/acute-cholangitis) (Drs. Derek Smith and Henry Knipe, Radiopaedia)

- **Acute cholecystitis**
  - [Acute cholecystitis](https://coreem.net/core/acute-cholecystitis/) (Anand Swaminathan, CoreEM)
  - [Acute cholecystitis](https://radiopaedia.org/articles/acute-cholecystitis) (Dr Hamish Smith and Radswiki et al, Radiopaedia)
  - [Acute calculus cholecystitis](https://wikem.org/wiki/Acute_calculous_cholecystitis) (WikiEM)

The Internet Book of Critical Care is an online textbook written by Josh Farkas (@PulmCrit), an associate professor of Pulmonary and Critical Care Medicine at the University of Vermont.