
# 2018 Dynamic Practice Guidelines for Emergency General Surgery

Committee on Acute Care Surgery, Canadian Association of General Surgeons

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# BILIARY COLIC & CHOLECYSTITIS

## Dynamic Practice Guidelines for Emergency General Surgery

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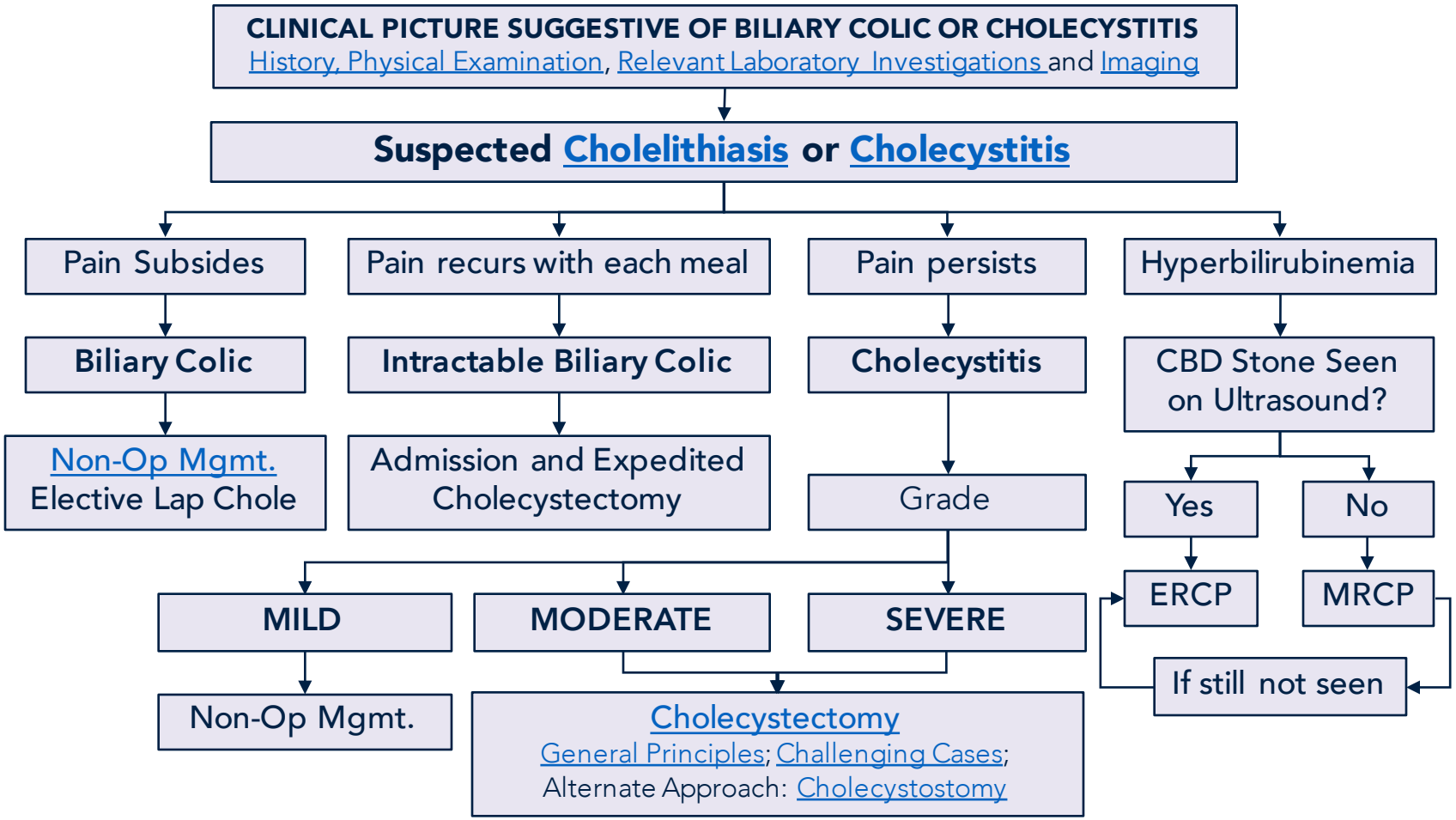
Clinical Practice Guideline

# BILIARY COLIC & CHOLECYSTITIS




Other Related Topics

Gall Bladder Disease in Pregnancy | Gangrenous Gall Bladder | Gall Bladder Perforation

# BILIARY COLIC & CHOLECYSTITIS

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## DEFINITION:

### Cholelithiasis

- The presence of solid concretions in the biliary tract, most typically the in the gall bladder

- Cholelithiasis is most commonly **asymptomatic** but individuals with incidental gallstones are at risk of developing complications, such as cholecystitis, cholangitis, or gallstone pancreatitis

## OTHER QUICK TERMINOLOGY

- **Cholelithiasis:** Gallstones in the gall bladder
- **Choledocholithiasis:** Gallstones in the common bile duct (CBD)
- **Cholecystitis:** Inflammation of the gall bladder commonly as a result of a gallstone in the neck
- **Cholangitis:** Infection of the biliary tract
- **Cholangiocarcinoma:** Adenocarcinoma of the biliary ducts

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## EPIDEMIOLOGY OF CHOLELITHIASIS

- Approximate incidence of 10% in the general population
- **Gallstone disease is one of the most common diagnoses requiring admission**

- Prevalence:
  - ***Highest*** (>70%) in certain Native Americans (Pima, Chippewa, Canadian Micmac) and South American aboriginal populations.
  - ***Intermediate*** in Caucasian, Asian, African American populations (5-21.9%).
  - ***Lowest*** (<5%) in Native Africans

- Approximately **1-3%** of individuals with asymptomatic or mildly symptomatic cholelithiasis will **develop significant symptoms annually**

- These symptoms may include biliary colic, cholecystitis, cholangitis, obstructive jaundice or pancreatitis.

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## Risk Factors

| Non-modifiable | Modifiable |
|---|---|
| Age | Obesity |
| Sex | Rapid weight loss† |
| Ethnicity | Diet |
| Surgically altered anatomy* | Drugs‡ |
| Family history | Biliary stasis§ |
| Cirrhosis, Crohn's disease | |

* Post-terminal ileum resection, results in poor absorption of bile salts, leads to cholesterol supersaturation of bile

† Rapid weight loss associated with bariatric surgery leads to cholesterol-based gallstones

‡ Ceftriaxone, total parenteral nutrition

§ Pregnancy, total parenteral nutrition, spinal cord injury lead to biliary hypoactivity and deposition of microlithiasis

## QUICK MEMORY AID FOR RISK FACTORS (6 F's)

**Fair:** More prevalent in the Caucasian population
**Fat:** BMI > 30
**Female**
**Fertile:** > 1 child
**Forty:** Age ≥ 40
**Family History**

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## HISTORY OF PRESENTING ILLNESS

- Concomitant to taking a history, a survey of the general state of the patient is carried out; signs of sepsis/SIRS should be noted and addressed expeditiously
- Quality, severity, duration and location of pain clarified
  - Acute and unrelenting vs. chronic, transient and gradually subsiding
  - RUQ pain, Right subscapular referred pain, Epigastric referred pain
  - May be associated with meals especially intake of fatty foods
- Frequency of symptoms; a history of milder symptoms can often be elucidated
- High index of suspicion in patients at high risk of complications
- Advanced age, male sex, diabetic, immunosuppressed
- Signs of obstructive jaundice: yellowing of eyes or skin, paler stools, dark urine, itchy skin

## PHYSICAL EXAMINATION

- Positive Murphy's Sign
- Painful palpable gallbladder
- RUQ tenderness
- Assess for signs of jaundice
- Worrisome findings on exam should raise suspicion of complication (perforation, gangrenous gallbladder, Mirizzi syndrome, cholangitis)
  - Expedited, synchronous resuscitation and investigations should ensue

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## LABORATORY INVESTIGATIONS

**Basic labs should be ordered for all patients presenting with signs and symptoms of biliary colic or cholecystitis, including:**

1. Complete blood count (CBC): evaluation elevated WBC
2. Complete blood chemistry: electrolyte/ acid-base imbalance, elevated creatinine
3. Liver enzymes and function tests (INR, PTT, AST, ALT, ALP, GGT and Bilirubin)

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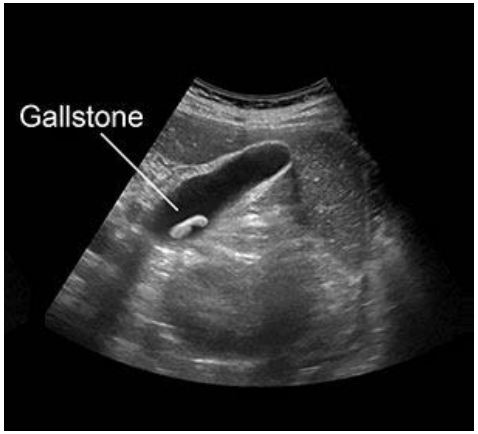
## IMAGING

- Ultrasonography is the initial modality of choice as it is easily accessible, low cost, and has a sensitivity of 90-95%
- Cross-sectional imaging used to rule out complication or other diagnosis
  - Delay in diagnosis and/or treatment may occur when pursuing further investigations, should be considered carefully as it may result in worsening of inflammatory process of cholecystitis.



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## BILIARY COLIC

- Symptoms of biliary colic are typically due to brief impaction of the cystic duct by cholelithiasis or sludge. This results in temporary increase in intra-luminal pressure within the gallbladder, consequent distention of the organ, leading to stretch of its' wall and the sensation of pain.
- Pain subsides as the occlusion of the cystic duct is relieved.
- Typically, pain is localized in the right upper quadrant or epigastric area, in a post-prandial timeframe. It may radiate to the back, and is often associated with nausea and emesis.
- Triggering of symptoms with ingestion of fatty foods is often reported by patients.
- Biliary colic typically has a duration of 30 minutes to 4 hours, and will often present as an acute rise in the severity of the pain, followed by a plateau of persistent pain, which will eventually subside (colic pattern).
- Persistence of symptoms beyond this timeframe would suggest evolution towards the diagnosis of cholecystitis.

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## INTRACTABLE BILIARY COLIC

- Patients present with a clinical picture of biliary colic. (See Biliary colic)
- However, symptoms recur with each meal/attempt at oral intake.
- Typically, a stone impacted in the gallbladder neck is seen on imaging.
- These patients require admission and cholecystectomy due to their inability to tolerate a sustainable diet.

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## CHOLECYSTITIS

- Symptoms of acute calculous cholecystitis are on a continuum from biliary colic.
- The cystic duct becomes occluded by a stone, resulting in increased pressure within the gallbladder lumen. The stretch of the organ causes pain, however the process of cholecystitis continues as the occlusion is maintained.
- The increased luminal pressure leads to vascular obstruction and thrombosis, initiating a progressively ischemic process, potentially leading to necrotic or gangrenous wall of the gallbladder.

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## PATHOPHYSIOLOGY OF CHOLECYSTITIS

- A pathological classification is described linking duration of symptoms with severity of cholecystitis (Kimura et al.)

**FIRST STAGE (2-4 DAYS)**
Edematous cholecystitis
Gall Bladder wall remains intact however it becomes increasingly edematous

**SECOND STAGE (3-5 DAYS)**
Necrotizing cholecystitis
Edematous with areas of hemorrhage and non-transmural necrosis from vascular occlusion/thrombosis

**THIRD STAGE (7-10 DAYS)**
Suppurative cholecystitis
Progression of necrosis, areas of suppuration. Intra-mural and pericholecystic abscesses seen

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## CHOLECYSTITIS

- Symptoms are typically described as pain localized in the right upper quadrant or epigastric area, in a post-prandial timeframe, commonly radiates to the back, and is associated with nausea and emesis.
- Triggering of the pain by ingestion of fatty foods is often reported by patients.
- A history of biliary colic can often be elucidated.
- Physical exam will reveal a focally tender area, in the right upper quadrant or epigastrium.
- Murphy's sign is attributed to an underlying cholecystitis, and is defined as the arrest of inspiration while palpating the gallbladder during a deep breath.
- More worrisome findings on assessment and physical examination should trigger concern for a complication of cholecystitis or an alternate diagnosis.

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## CHOLECYSTITIS

### Diagnosis

- 2013 Tokyo Guidelines provide criteria for the diagnosis of acute cholecystitis
- Other diagnoses, acute hepatitis and chronic cholecystitis should be ruled out

| TOKYO GUIDELINES 2013 CRITERIA FOR ACUTE CHOLECYSTITIS |
|---|
| A) Local signs of inflammation<br>1. Murphy's sign<br>2. RUQ mass/pain/tenderness |
| B) Systemic signs of inflammation<br>1. Fever<br>2. Elevated CRP<br>3. Elevated WBC count |
| C) Imaging findings characteristic of acute cholecystitis |
| Suspected diagnosis: One item in A + one item in B |
| Definite diagnosis: One item in A + one item in B + C |

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## CHOLECYSTITIS

### Criteria for Grading

- Provides criteria to attribute a severity grade to acute cholecystitis

| 2013 TOKYO GUIDELINES – SEVERITY GRADES IN ACUTE CHOLECYSTITIS | |
|---|---|
| Grade 1 (Mild) | Acute cholecystitis does not meet criteria of Grade 2 or 3.<br>Acute cholecystitis in a healthy patient without organ dysfunction and only mild inflammatory changes involving the gallbladder.<br>Cholecystectomy deemed a safe and low-risk surgery. |
| Grade 2 (Moderate) | Associated with any one of:<br>1. WBC count >18 000/$mm^3$<br>2. Palpable, tender abdominal mass in the right upper quadrant<br>3. Duration of symptoms >72 hours<br>4. Marked local inflammation (gangrenous cholecystitis, pericholecystic abscess, hepatic abscess, biliary peritonitis, emphysematous cholecystitis) |
| Grade 3 (Severe) | Associated with one or more organ/system dysfunction:<br>1. Cardiovascular: hypotension requiring dopamine ≥5mcg/kg/min or any use of norepinephrine<br>2. Neurological: decreased level of consciousness<br>3. Respiratory: $Pa0_2/FiO_2$ ratio <300<br>4. Renal: Oliguria, creatinine >2.0mg/dl<br>5. Hepatic: PT-INR >1.5<br>6. Hematological: Platelet count <100 000/$mm^3$ |

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## CHOLECYSTITIS

### Management

- 2013 Tokyo Guidelines provide management options according to grade
- Management options are influenced by institution and experience of surgeon
- Surgeons should be wary of risk factors for complicated cholecystitis (See Gangrenous Gallbladder)

| GRADE | INITIAL MANAGEMENT | MANAGEMENT |
|---|---|---|
| Grade I - Mild | Antibiotics and supportive care | Observation<br>Early Lap Chole |
| Grade II - Moderate | Antibiotics and supportive care | Consider early Lap Chole<br>Emergency surgery<br>Delayed/elective Lap Chole<br>GB drainage |
| Grade III - Severe | Antibiotics and supportive care | GB drainage<br>Delayed/elective Lap Chole |

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## NONOPERATIVE MANAGEMENT

- Consider in patients presenting with >5-7 days of symptoms or Grade III
- NPO, analgesia, intra-venous fluids
- Antibiotics
  - Up to 20% of cultures from acute cholecystitis have been found to be positive.
  - Broad coverage of gram-positive, gram-negative and anaerobic bacteria is recommended.
  - Institutional variations exist according to regional microbial sensitivities.
- Cholecystostomy may be required (particularly in Grade III)
- Plan for elective cholecystectomy

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## OPERATIVE MANAGEMENT

### Cholecystectomy

- Definitive treatment of symptomatic cholelithiasis and cholecystitis
- Laparoscopic approach typically employed; conversion to open in challenging cases, abnormal anatomy, complications
- Typically 4 ports are employed
  - Supra/infra umbilical (laparoscope)
  - Epigastric (Dissecting instrument)
  - Right anterior axillary line (Fundus retraction)
  - Right mid-clavicular line or midline between camera and epigastric port (Infundibulum retraction, gallbladder manipulation

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## OPERATIVE MANAGEMENT

### Cholecystectomy: General Principles

- Fundus retracted towards patient's right shoulder
- Obtain critical view of safety
  - Clear the Triangle of Calot of fat and fibrous tissue
  - Lower 1/3 of gallbladder dissected off cystic plate
  - Only 2 structures are seen entering the gallbladder
- Review location of landmarks to ensure proper orientation and guide dissection

**B.E. S.A.F.E.**

**B**ile Duct
**E**nteric (Duodenum)
**S**ulcus of Rouvier
**A**rtery (Hepatic A.)
**F**issure (Umbilical Fissure)
**E**nvironment [back camera for improved perspective]

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## OPERATIVE MANAGEMENT

### Cholecystectomy: Challenging Cases

- Review location of landmarks – B.E. S.A.F.E.
- Ask for help from a Senior colleague and/ or HPB Surgeon
- Tailor tissue handling technique
  - Gangrenous gallbladders are friable, push the distended gallbladder to create tension rather than pull
  - Use atraumatic graspers
- Decompress a distended/ hydropic gallbladder for improve grasping
- Mobilize lateral leaflet of peritoneum (back of the triangle)
- Identify junction of infundibulum and the cystic duct

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## OPERATIVE MANAGEMENT

### Cholecystectomy: Challenging Cases

- Consider top-down/retrograde approach
  - Follow curve of gallbladder as you approach infundibulum.
  - Do not dissect in a linear, posterior direction as this risks injury to portal structures
- Be wary of branches of middle hepatic vein deep to cystic plate; 16-30% of patients will have branches within 1mm depth
  - Bleeding can be controlled by compressing vein, apposing its' walls and applying high intensity cautery
- Consider conversion to open approach
- Consider subtotal cholecystectomy
  - Fenestration (non-closure of remnant)
  - Reconstitution (closure of remnant)
- Consider operative cholecystostomy

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## OPERATIVE MANAGEMENT

### Cholecystostomy

- Intervention to gain source control in setting of sepsis (Grade III)
- Consider in high-risk surgical patients, delayed presentation
- Resolution of gallbladder distention contributes to control of symptoms (pain)
- Concomitant treatment with antibiotics generally recommended
- High technical success rate; failure may occur in gangrenous cholecystitis, which may still require urgent surgery
- Operative cholecystostomy can be considered if cholecystectomy not possible or fraught with risk
- Plan for tube to remain in situ for prolonged duration
- Contrast study via cholecystostomy tube prior to considering removal
  - Occlusion of cystic duct may lead to recurrent hydropic gallbladder
  - Frequent recurrence of symptoms post removal of cholecystostomy tube

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## HYPERBILIRUBINEMIA

- Suggests occlusion of common hepatic or common bile duct
  - Causes: Mass effect secondary to an edematous gallbladder, choledocholithiasis, or Mirizzi syndrome
- Repeat labs and obtain trend of bilirubin level
- Dilated intra-hepatic or proximal extra-hepatic bile ducts may be seen on ultrasound (US)
- If choledocholithiasis not seen on US or suspected Mirizzi syndrome, proceed with MRCP
- ERCP should be performed prior to cholecystectomy if choledocholithiasis are confirmed
- Presence of Mirizzi syndrome should prompt referral/transfer to tertiary care hospital/HPB Centre for further management

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## GALL BLADDER DISEASE IN PREGNANCY

- 2nd most common cause of acute abdomen in pregnant women
  - 1 in 1600 to 10 000 pregnant women ; 0.1% of pregnant patients develop cholecystitis
  - 1-3% of pregnant women develop gallstones; 30% develop sludge
- Cholelithiasis most common cause of cholecystitis
- Cholecystectomy performed less often than non-pregnant women
- Fetal demise rate in patients undergoing cholecystectomy approx. 2.2%
- Fetal demise rate in patients treated conservatively vary widely (0-12%)
- High recurrence rate of symptoms (40-70%) in patients treated conservatively

## MANAGEMENT OF GALL BLADDER DISEASE IN PREGNANCY

- ***Laparoscopic approach*** preferred and feasible in first two trimesters
- Optimal management in third trimester on a case-by-case basis
- Pneumoperitoneum pressures should not exceed 10-12mmHg
- Duration of procedure ideally <60 minutes
- Consider left lateral tilt to minimize compression of vena cava

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## GANGRENOUS GALL BLADDER

### RISK FACTORS

- Diabetes
- Advanced age
- Male sex
- Immunosuppression
- Prolonged duration of symptoms (>5 days)
- Delay in presentation or diagnosis

### DIAGNOSTIC IMAGING

- Challenging to differentiate from acute cholecystitis
- Perfusion defect and/ or discontinuous, irregular enhancement of GB mucosa
  - PPV (94.4%-100%); Sens. (29.3-70.6%); Spec. (up to 100%); Accuracy 80%

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## GANGRENOUS GALL BLADDER

### EPIDEMIOLOGY

- Occurs in 2-40% of acute cholecystitis
- Increased morbidity (including bile duct injury)
- Increased mortality (4-50%)
- Increased conversion to open approach (up to 70%)

### MANAGEMENT

- Consider involvement of HPB surgeon
- See Cholecystectomy section on challenging cases
- Patients at risk of sepsis/septic shock (Grade III)
- Initial management geared towards fluid resuscitation and obtaining hemodynamic stability
- Septic clinical picture should raise concern for complication of cholecystitis
- Perforation reflects prolonged cholecystitis; progressive ischemia and necrosis/gangrene of gallbladder wall

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## GALL BLADDER PERFORATION

## MANAGEMENT

- **Contained perforation (Pericholecystic, Intra-hepatic)**
  - IV antibiotics
  - Consider cholecystostomy tube
  - Cholecystectomy associated with high risk of conversion to open
  - Recommend against debridement of hepatic collections due to risk of complication

- **Free perforation/bile peritonitis**
  - Clinical picture dictates management
  - Consider:
    - Cholecystostomy and/or percutaneous drainage of peritoneal fluid
    - Laparoscopic washout, ± operative cholecystostomy or cholecystectomy feasible for surgeons trained in/facile with advanced laparoscopy, wide drainage
    - Laparotomy, ± operative cholecystostomy or cholecystectomy, wide drainage