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Dynamic Practice Guidelines for Emergency General Surgery

Committee on Acute Care Surgery, Canadian Association of General Surgeons

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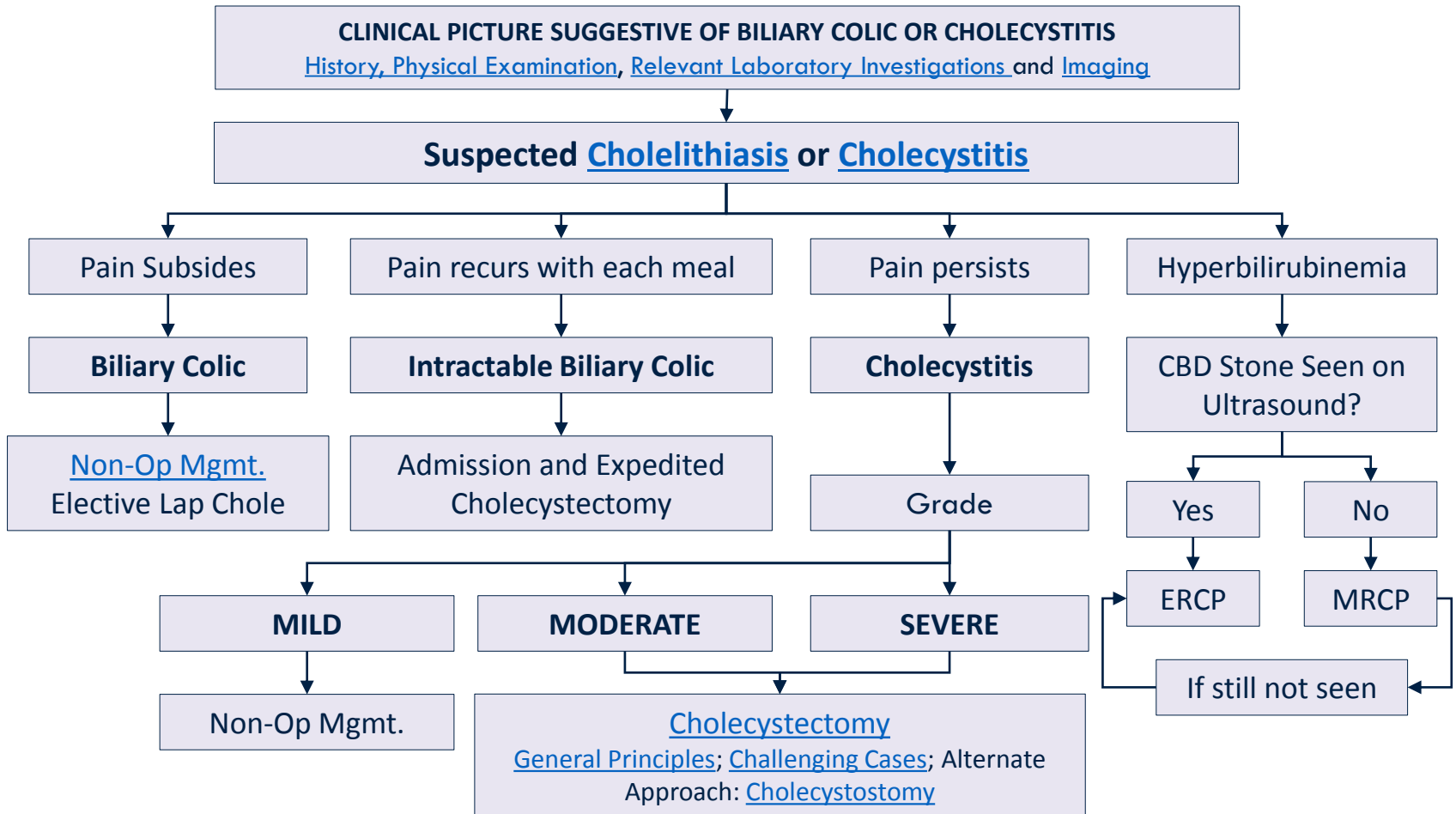
BILIARY COLIC & CHOLECYSTITIS

Dynamic Practice Guidelines for Emergency General Surgery

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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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BILIARY COLIC & CHOLECYSTITIS

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Risk Factors

Non-modifiable

Age

Sex

Ethnicity

Surgically altered anatomy*

Family history

Cirrhosis, Crohn's disease

Modifiable

Obesity

Rapid weight loss†

Diet

Drugs‡

Biliary stasis§

* 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



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.



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

THIRD STAGE (7-10 DAYS)

Suppurative cholecystitis

Progression of necrosis, areas of suppuration. Intra-mural and pericholecystic abscesses seen

SECOND STAGE (3-5 DAYS)

Necrotizing cholecystitis

Edematous with areas of hemorrhage and non-transmural necrosis from vascular occlusion/thrombosis

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

1. Murphy's sign
2. RUQ mass/pain/tenderness

B) Systemic signs of inflammation

1. Fever
2. Elevated CRP
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

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. Acute cholecystitis in a healthy patient without organ dysfunction and only mild inflammatory changes involving the gallbladder. Cholecystectomy deemed a safe and low-risk surgery.
Grade 2 (Moderate)	Associated with any one of: <ol style="list-style-type: none">1. WBC count $>18\,000/\text{mm}^3$2. Palpable, tender abdominal mass in the right upper quadrant3. Duration of symptoms >72 hours4. Marked local inflammation (gangrenous cholecystitis, pericholecystic abscess, hepatic abscess, biliary peritonitis, emphysematous cholecystitis)
Grade 3 (Severe)	Associated with one or more organ/system dysfunction: <ol style="list-style-type: none">1. Cardiovascular: hypotension requiring dopamine $\geq 5\text{mcg}/\text{kg}/\text{min}$ or any use of norepinephrine2. Neurological: decreased level of consciousness3. Respiratory: $\text{PaO}_2/\text{FiO}_2$ ratio <3004. Renal: Oliguria, creatinine $>2.0\text{mg}/\text{dl}$5. Hepatic: PT-INR >1.56. Hematological: Platelet count $<100\,000/\text{mm}^3$

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 Early Lap Chole
Grade II - Moderate	Antibiotics and supportive care	Consider early Lap Chole Emergency surgery Delayed/elective Lap Chole GB drainage
Grade III - Severe	Antibiotics and supportive care	GB drainage Delayed/elective Lap Chole

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.

Bile Duct

Enteric (Duodenum)

Sulcus of Rouvier

Artery (Hepatic A.)

Fissure (Umbilical Fissure)

Environment [back camera for improved perspective]

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

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 1 mm 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

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

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

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

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%



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, \pm operative cholecystostomy or cholecystectomy feasible for surgeons trained in/facile with advanced laparoscopy, wide drainage
 - Laparotomy, \pm operative cholecystostomy or cholecystectomy, wide drainage
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