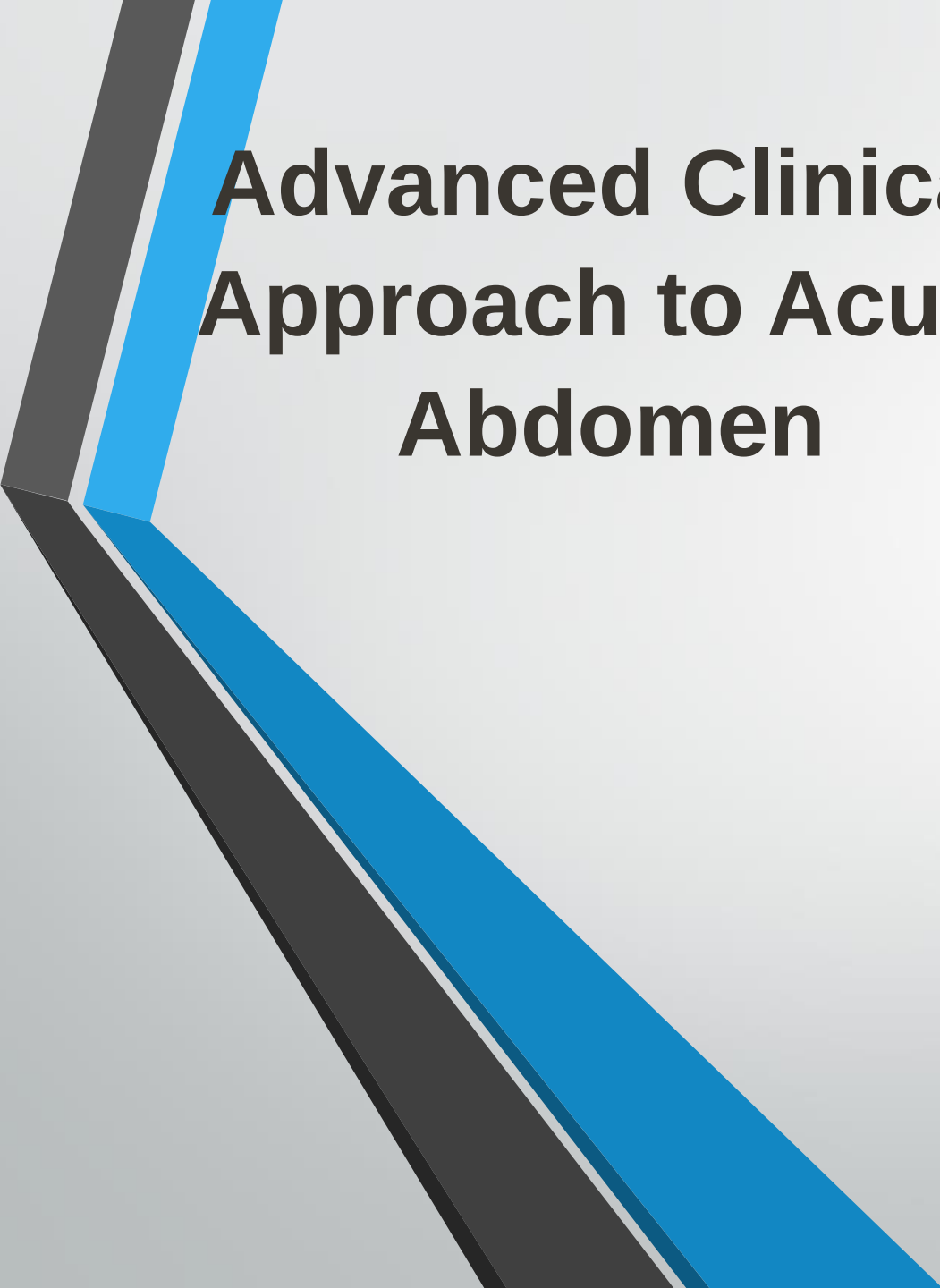




IN THE NAME OF GOD

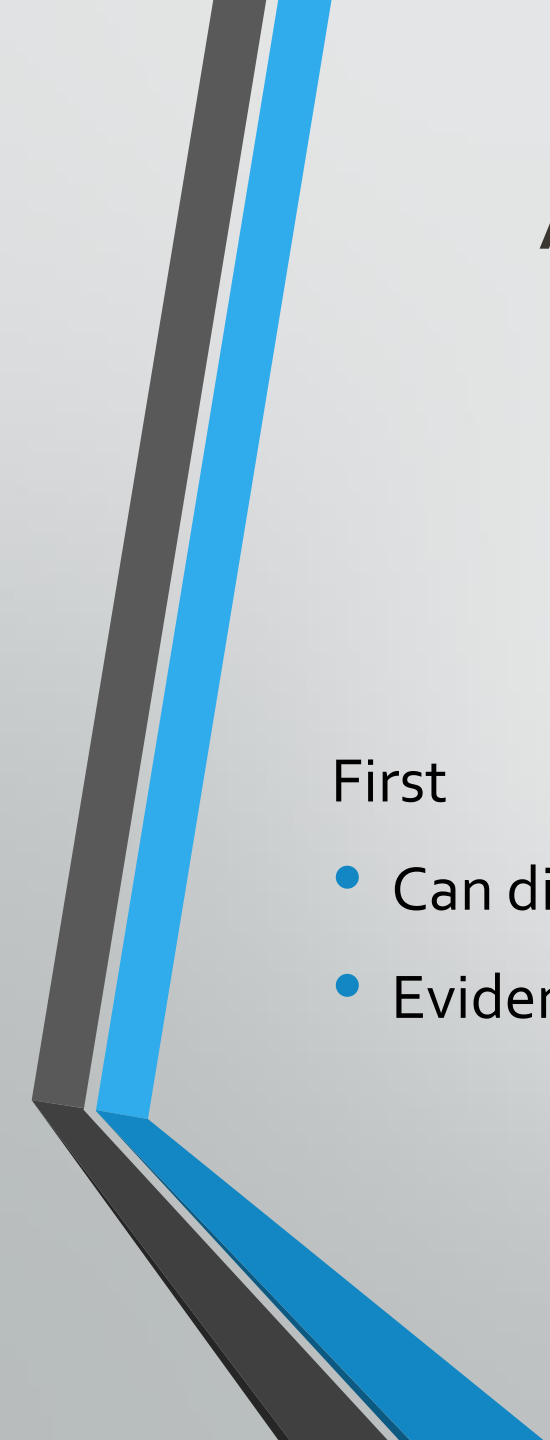


Advanced Clinical Approach to Acute Abdomen

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Definition

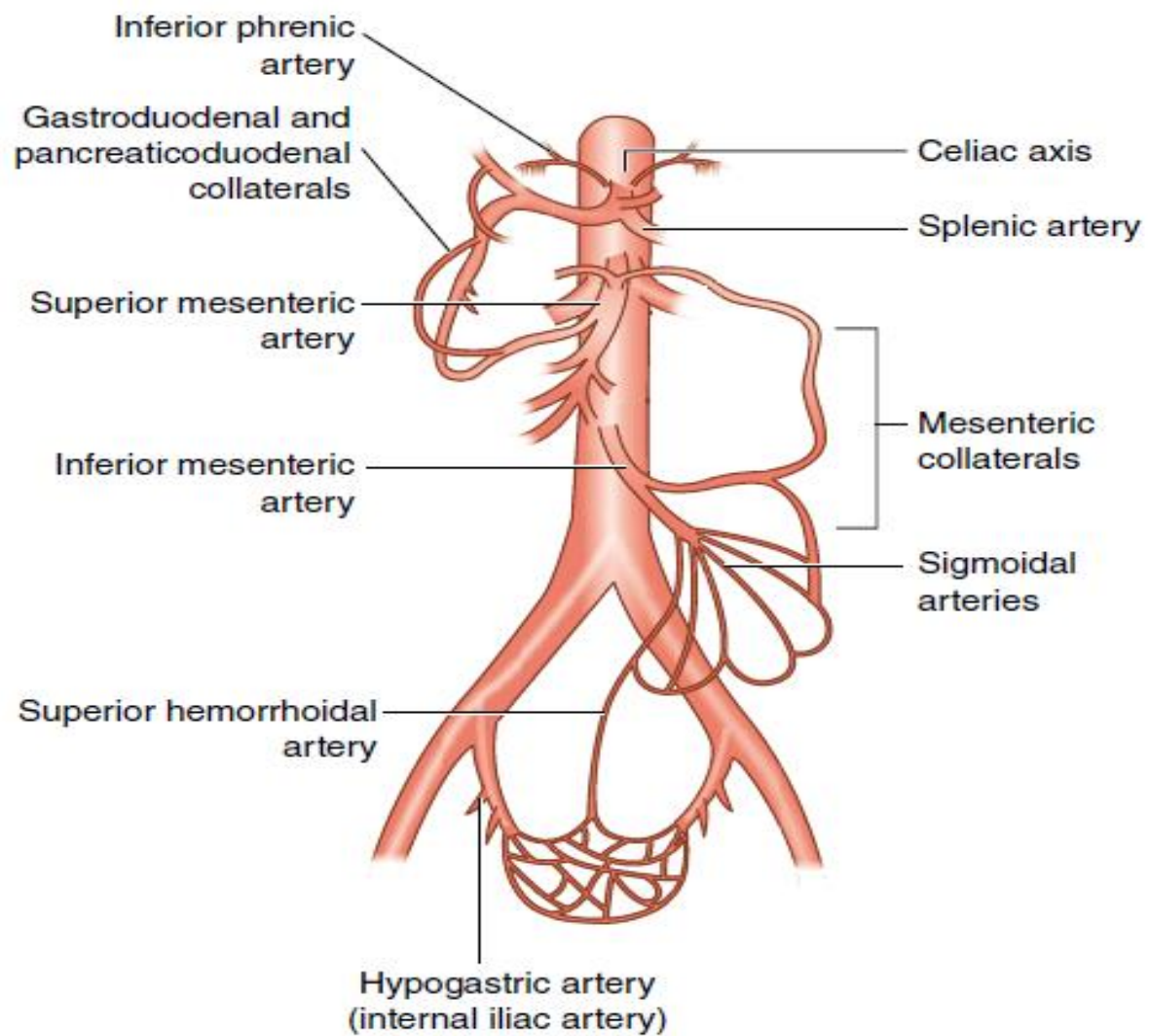
- The term **acute abdomen** refers to signs and symptoms of abdominal pain and tenderness, which **often** represents an underlying surgical problem that requires prompt diagnosis and surgical treatment
- **Common emergency room complaint**
- **Ranging from benign to life threatening**
- **DDx is broad**
- **Need diagnostic test based on clinical presentations**



A safe approach moves from threats to reassessment

First

- Can differentiate between benign and life threatening conditions
- Evidence base strategies for imaging utilization.



Anatomy and physiology

- **Visceral pain**

(vague and poorly localized in epigastrium, periumbilical region, or hypogastrium depending on its origin from the primitive foregut, midgut, or hindgut, It is usually the result of distention of a hollow viscus)

- **Parietal pain**

(corresponds to the segmental nerve roots innervating the peritoneum and tends to be sharper and better localized)..stimulation of parietal nerve fiber cause somatic pain

- **Referred pain**

Pain changes character as pathology reaches the parietal peritoneum

- **Referred pain**

Distant pain from shared pathways; classic in splenic injury.

- **Somatic / parietal pain**

Sharper and localized when parietal peritoneum is involved.

- **Visceral pain**

Poorly localized, often midline; driven by distension or inflammation.



Migration from vague visceral pain to localized parietal pain can signal progression.

Liver and
gallbladder

Liver and
gallbladder

Lung and diaphragm

Spleen

Heart

Stomach

Pancreas

Small intestine

Ovaries

Appendix

Colon

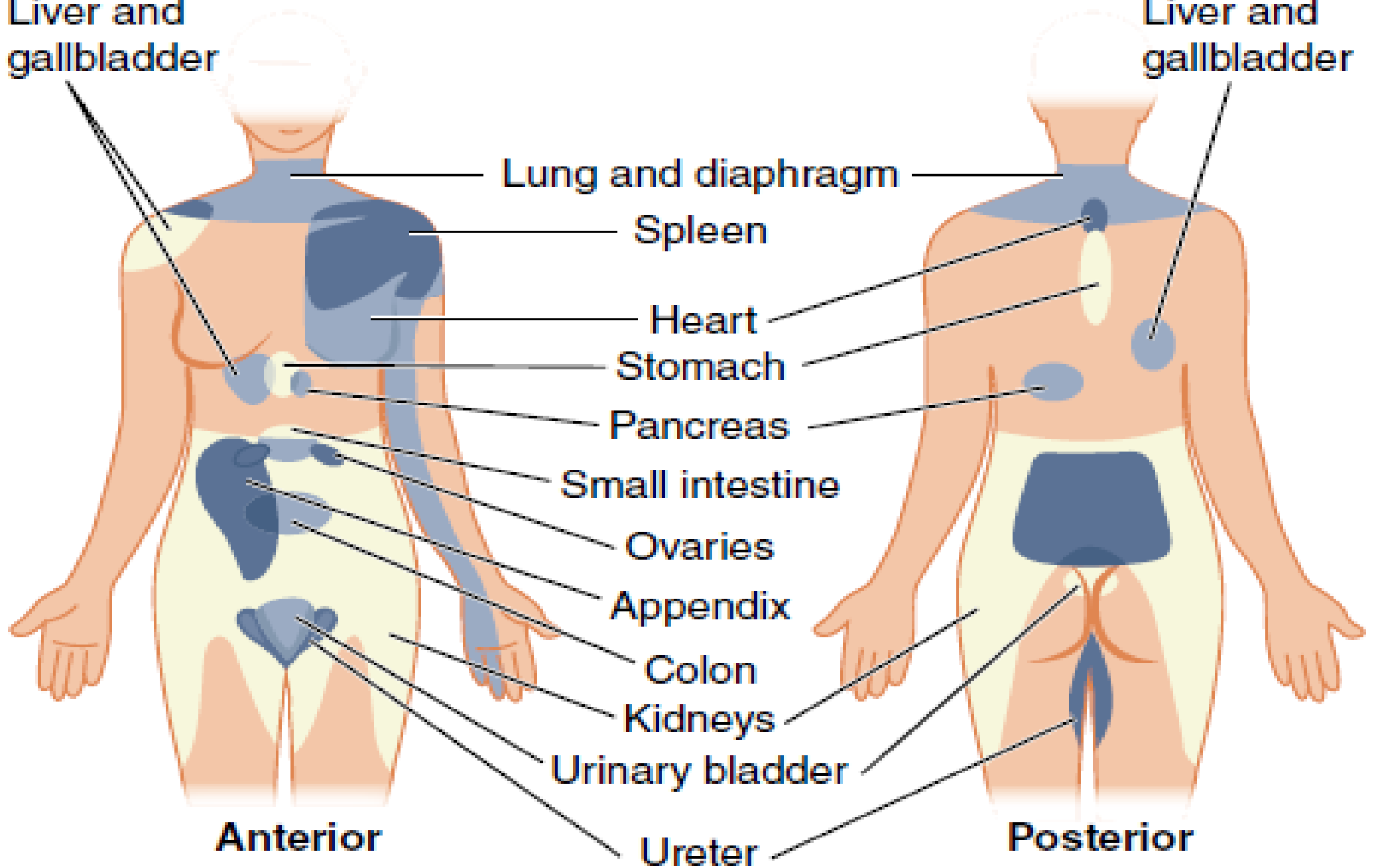
Kidneys

Urinary bladder

Ureter

Anterior

Posterior



Peritonitis

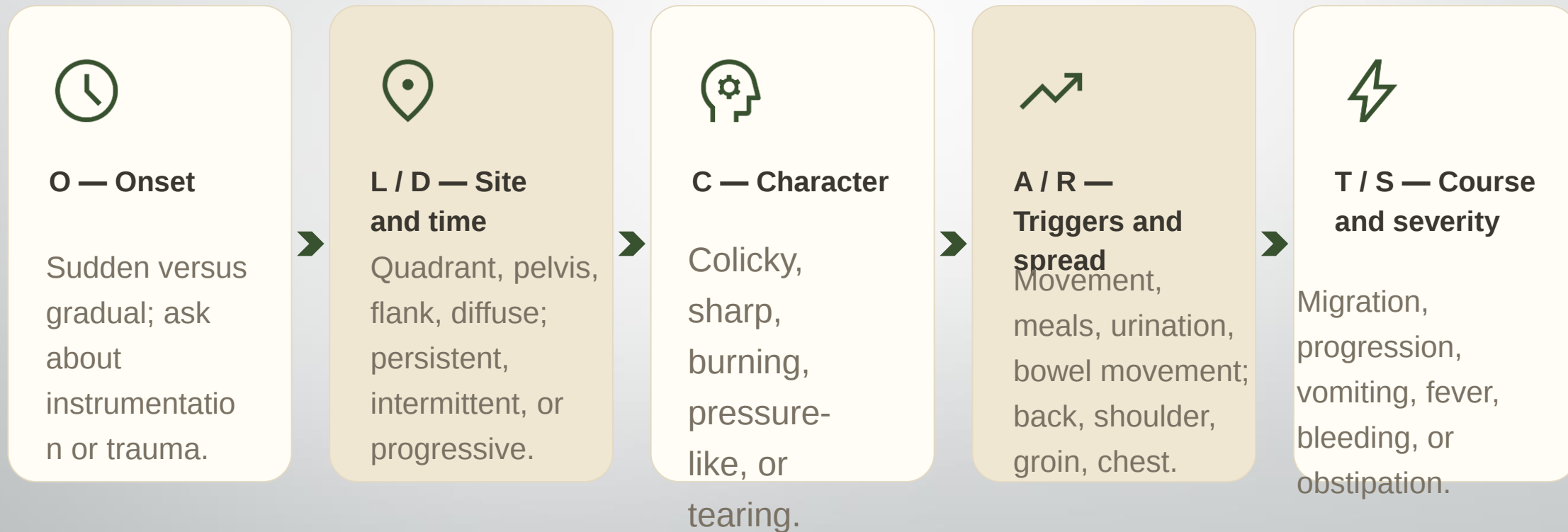
- *Introduction of bacteria or irritating chemicals* ➡ *outpouring of fluid from the peritoneal membrane* ➡ *increased blood flow, increased permeability, and the formation of a fibrinous exudate on its surface* ➡ *bowel paralysis and adherence between the bowel and omentum or abdominal wall* ➡ *localize inflammation*
- *Localized..*
- *Diffused...*
- *Primary (SBP) vs secondary*

severe tenderness in palpation, with or without rebound tenderness, and guarding

History

- *the onset, character, location, duration, radiation, and chronology of the pain experienced, relieving or aggravating cause (OLD CART)*
- *Is the pain sharp?.....or How does the pain feel to you??*
- *Drugs....narcotic.....nsaid.....steroid.....anticoagulant....alcohol....
cocaine*

OLDCARTS turns an unstructured complaint into a diagnostic signal



A structured history should change the differential before testing begins.

- ***Questioning style***

- 1. how the patient describes the pain*
- 2. The intensity and severity of the pain*
- 3. location and radiation*
- 4. Activities that exacerbate or relieve the pain*
- 5. Associated symptoms: vomiting, diarrhea, constipation, melena, ...*
- 6. Past medical history*
- 7. Medications: narcotics, NSAIDs, steroids, anticoagulants, ...*
- 8. Gynecologic and menstrual history*

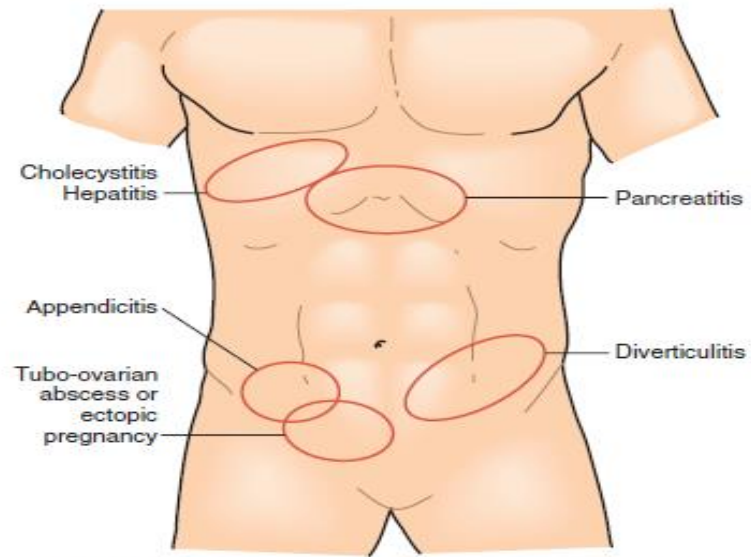


FIGURE 45-2 Character of pain: gradual, progressive pain.

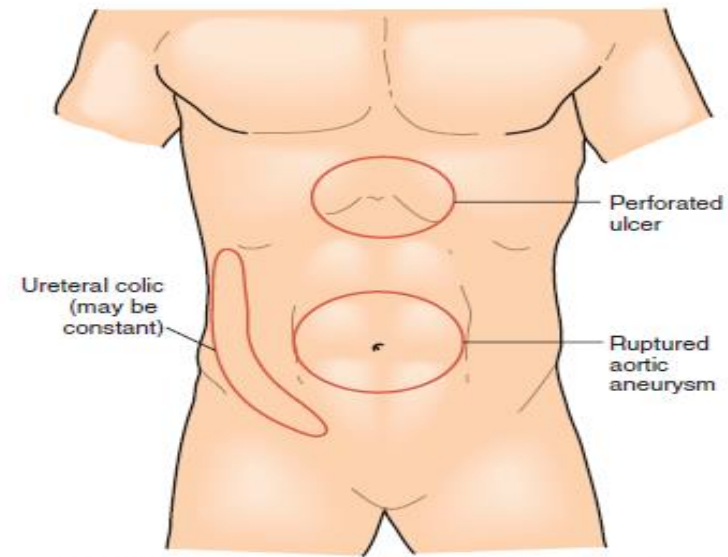


FIGURE 45-4 Character of pain: sudden, severe pain.

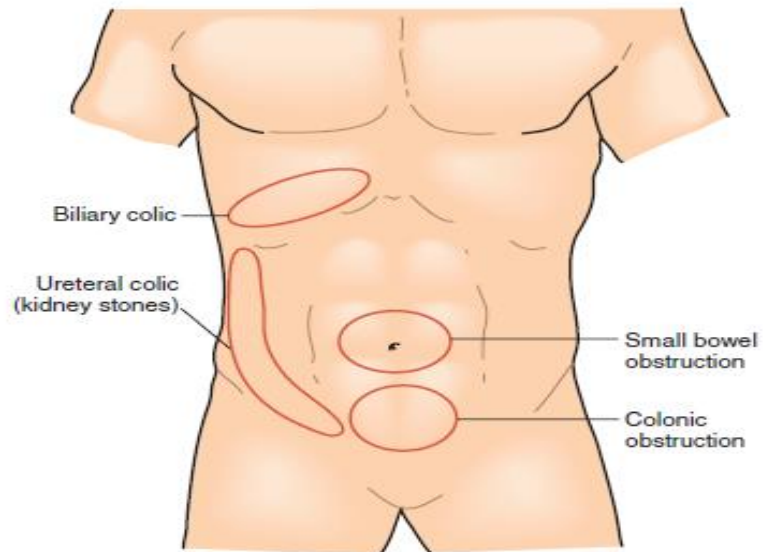


FIGURE 45-3 Character of pain: colicky, crampy, intermittent pain.

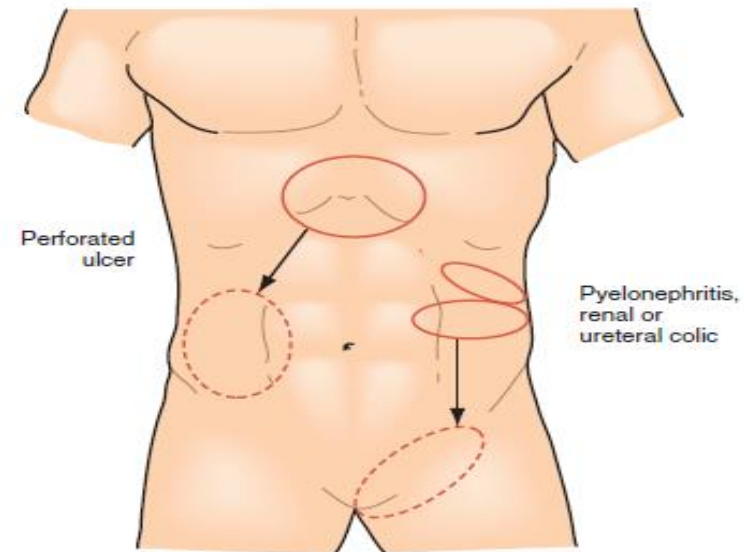


FIGURE 45-5 Referred pain. *Solid circles are primary or most intense sites of pain.*

Pain out of proportion is an ischemia warning until proven otherwise

Disproportion



The mismatch matters

Severe diffuse pain with limited early tenderness should increase concern for mesenteric ischemia.

01

Do not wait for peritonitis

Early examination may understate bowel injury.

02

Look for context

Vascular risk, embolic sources, shock, and hematochezia raise concern.

03

Escalate the question

When ischemia is plausible, choose vascular imaging and urgent consultation.

The same pain location means different things across patient contexts

Characterize the symptom

- Onset and trajectory: sudden, migrating, progressive
- Quality: colicky versus constant; sharp versus pressure-like
- Radiation: back, shoulder, groin, chest
- Associated features: vomiting, fever, bleeding, distension, obstipation

Reweight the differential

- Pregnancy possibility and gynecologic symptoms
- Prior surgery, instrumentation, hernia, and trauma
- Vascular disease, atrial fibrillation, and aneurysm risk
- NSAIDs, steroids, ulcer, gallstone, IBD, urinary, cardiac, and respiratory history

Red flags are found in the history before the scan



Perfusion

Syncope, hypotension, diaphoresis, or altered mentation.



Peritoneal threat

Signs of worsening, movement pain, rigid or guarded abdomen.



Hemorrhage

GI bleeding, ectopic risk, trauma, or suspected ruptured AAA.



Obstruction / ischemia

Vomiting, distension, obstipation, or severe pain out of



Context triggers

Pregnancy, torsion symptoms, prior surgery, vascular disease, or



Physical examination

Examine in a fixed sequence—and preserve the abdominal exam

Appearance and ABCs

1
Observe distress, immobility, writhing, airway, breathing, and mental status.

Vitals and perfusion

2
Identify shock, fever, hypoxia, tachycardia, and poor peripheral perfusion.

Inspect

3
Look for distension, scars, bruising, masses, hernias, peristalsis, and jaundice.

Auscultate first

4
Listen before palpation changes bowel activity or tenderness.

Percuss and palpate

5
Assess tympany, dullness, tenderness, guarding, rebound, and rigidity.

Extend the exam

6
Add cardiopulmonary, rectal, pelvic, testicular, and hernia examinations



Inspection, auscultation, and percussion generate different signals

1

Inspection

Distension, scars, bruising, masses, hernias, visible peristalsis, jaundice.

2

Auscultation

Absent or hypoactive sounds may accompany serious pathology; tinkling, high-pitched sounds can suggest obstruction.

3

Percussion

Tympany suggests distended bowel; dullness may suggest mass or ascites; pain with percussion supports peritoneal irritation.

➤ Inspection

- Attention is focused on the contour of the abdomen and skin abnormalities

Distention, bulging, scar, erythema, ecchymosis, hernia, asymmetria, edema, striae, dilated veins

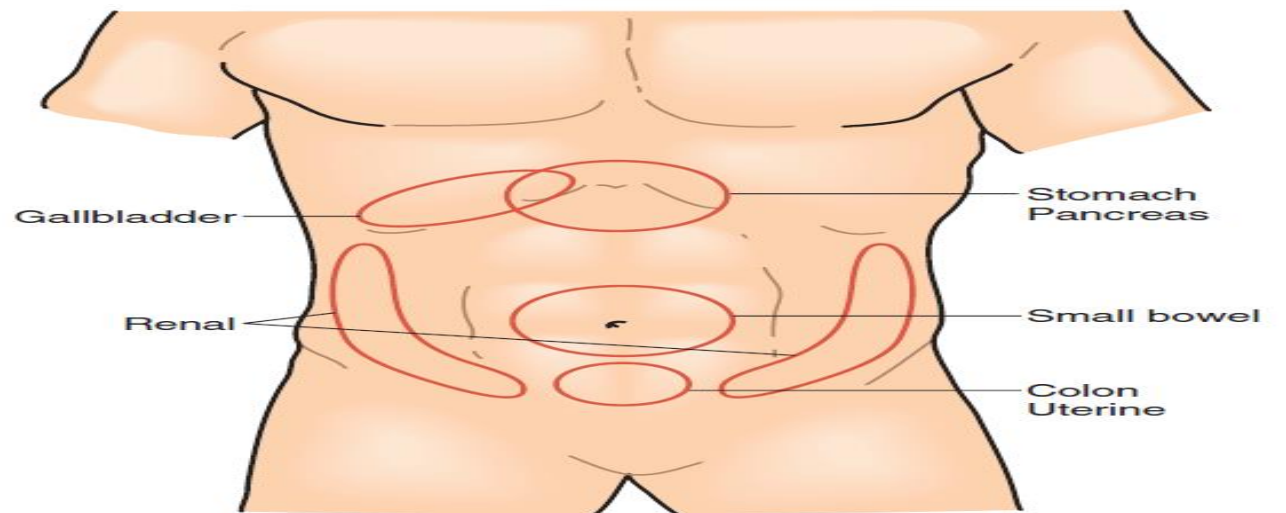


FIGURE 45-7 Common locations for visceral pain.

- **Auscultation**

Clicks or gurgles...Hyper or hypobruit....frequency.???

(Ileus when fewer than one bowel sounds every 15 seconds per quadrant)

- ***Percussion***

- **Palpation**

(tenderness, rebound, cough sign)

- ***Voluntary versus involuntary guarding***

- ***DRE*** (should be performed in all patients with acute abdominal pain, checking for the presence of a mass, pelvic pain, or intraluminal blood)

Pelvic exam (female with pain below abdomen)

Right upper quadrant

Liver
Gallbladder
Duodenum
Right kidney
Right ureter
Right lung/pleura

Right lower quadrant

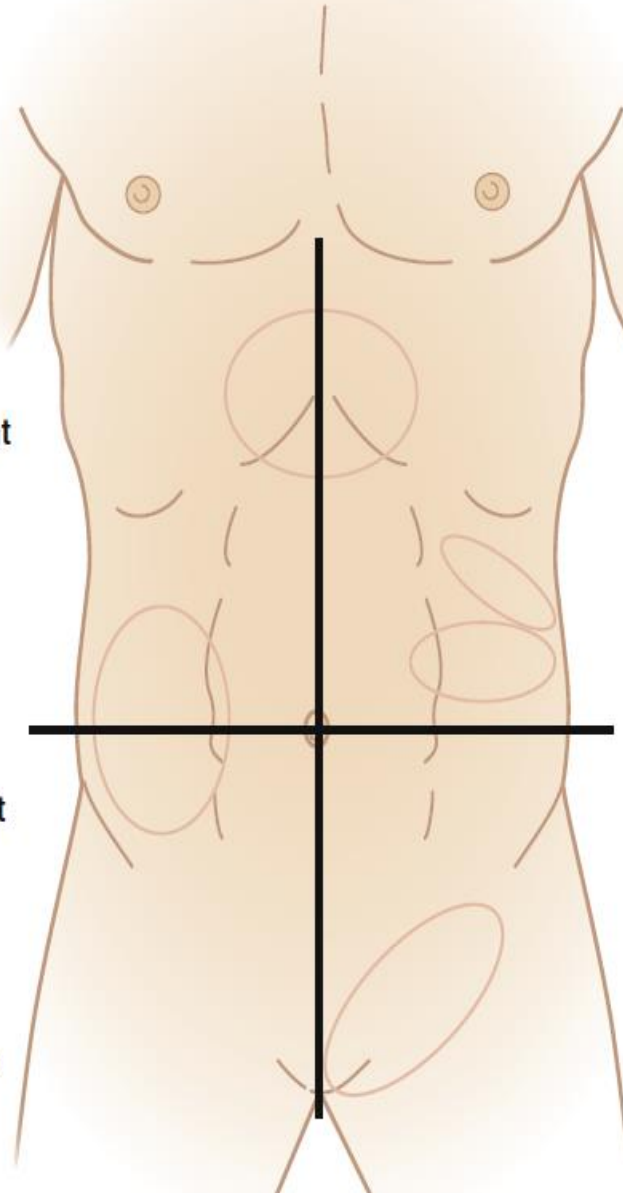
Appendix
Ileum
Right colon
Right ureter
Bladder
Right ovary or testicle

Left upper quadrant

Stomach
Spleen
Pancreas
Left kidney
Left ureter
Left lung/pleura

Left lower quadrant

Sigmoid colon
Rectum
Left ureter
Bladder
Left ovary or testicle



Quadrant localization narrows the field—but never replaces physiology

Immediate threat potential

RUQ

Biliary disease, liver pathology, pancreatitis; consider lower thoracic causes.

LUQ

Splenic disease, pancreatic/epigastric causes, infarction, abscess, rupture.

RLQ

Appendicitis, incarcerated hernia, urinary disease, ectopic, torsion.

LLQ

Diverticulitis, urinary disease, hernia, pelvic pathology, colonic ischemia.

Anatomic localization

RUQ pain prioritizes biliary disease; epigastric pain keeps the heart in play

RUQ: biliary first

- Cholecystitis or biliary colic; also liver disease and pancreatitis
- Cholecystitis pattern: persistent pain >4–6 hours, fever, guarding, positive Murphy sign, elevated WBC
- Initial tests: CBC, electrolytes, liver enzymes, alkaline phosphatase, bilirubin, lipase; ultrasound

Epigastrium: do not miss ACS

- Peptic ulcer disease, pancreatitis, biliary disease, acute coronary syndrome
- If dyspnea, exertional symptoms, diaphoresis, nausea, or cardiac risk: ECG, troponin, chest radiograph
- Endoscopy may be appropriate when peptic ulcer disease is suspected

LUQ and lower abdominal pain demand organ-specific and sex-specific questions

LUQ: spleen and referred pain

- Splenic infarction, abscess, rupture, or infiltrative disease
- Early satiety and abdominal fullness are useful clues
- Ultrasound assesses splenic size; CT/MRI may characterize focal lesions
- Kehr sign: left shoulder pain from diaphragmatic irritation

Lower abdomen: broaden early

- Appendicitis: periumbilical pain migrating toward McBurney point
- Diverticulitis, hernia, urinary obstruction or infection
- Pregnancy must be excluded in all patients with childbearing potential
- PID, ectopic pregnancy, tubo-ovarian abscess, ovarian torsion, and testicular torsion

TABLE 45-1 Abdominal Examination Signs

Aaron sign	Pain or pressure in epigastrium or anterior chest with persistent firm pressure applied to McBurney point	Acute appendicitis
Bassler sign	Sharp pain created by compressing appendix between abdominal wall and iliacus	Chronic appendicitis
Blumberg sign	Transient abdominal wall rebound tenderness	Peritoneal inflammation
Carnett sign	Loss of abdominal tenderness when abdominal wall muscles are contracted	Intra-abdominal source of abdominal pain
Chandelier sign	Extreme lower abdominal and pelvic pain with movement of cervix	Pelvic inflammatory disease
Charcot sign	Intermittent right upper abdominal pain, jaundice, and fever	Choledocholithiasis
Claybrook sign	Accentuation of breath and cardiac sounds through abdominal wall	Ruptured abdominal viscus
Courvoisier sign	Palpable gallbladder in presence of jaundice	Periampullary tumor
Cruveilhier sign	Varicose veins at umbilicus (caput medusae)	Portal hypertension
Cullen sign	Periumbilical bruising	Hemoperitoneum
Danforth sign	Shoulder pain on inspiration	Hemoperitoneum
Fothergill sign	Abdominal wall mass that does not cross midline and remains palpable when rectus is contracted	Rectus muscle hematomas
Grey Turner sign	Local areas of discoloration around umbilicus and flanks	Acute hemorrhagic pancreatitis
Iliopsoas sign	Elevation and extension of leg against resistance create pain	Appendicitis with retrocecal abscess
Kehr sign	Left shoulder pain when supine and pressure placed on left upper abdomen	Hemoperitoneum (especially from splenic origin)
Mannkopf sign	Increased pulse when painful abdomen is palpated	Absent if malingering
Murphy sign	Pain caused by inspiration while applying pressure to right upper abdomen	Acute cholecystitis
Obturator sign	Flexion with external rotation of right thigh while supine creates hypogastric pain	Pelvic abscess or inflammatory mass in pelvis
Ransohoff sign	Yellow discoloration of umbilical region	Ruptured common bile duct
Rovsing sign	Pain at McBurney point when compressing the left lower abdomen	Acute appendicitis
ten Horn sign	Pain caused by gentle traction of right testicle	Acute appendicitis

Special examinations close the dangerous blind spots



Hernia exam

Look for incarceration or strangulation in every relevant presentation.



Testicular exam

Mandatory in a young male with lower abdominal pain to exclude torsion.



Rectal exam

Prioritize for GI bleeding or suspected prostate pathology; routine use adds little in appendicitis.



Heart and lungs

Assess extra-abdominal causes such as ACS, pneumonia, or pulmonary embolism.



Pelvic exam

Required when lower abdominal or pelvic pathology is possible.



Patient behavior is a physiologic clue, not bedside theater

- Peritonitis pattern
- Colic / ischemia pattern
- Use behavior with the exam

Peritoneal irritation converts tenderness into a surgical urgency signal

Before parietal involvement

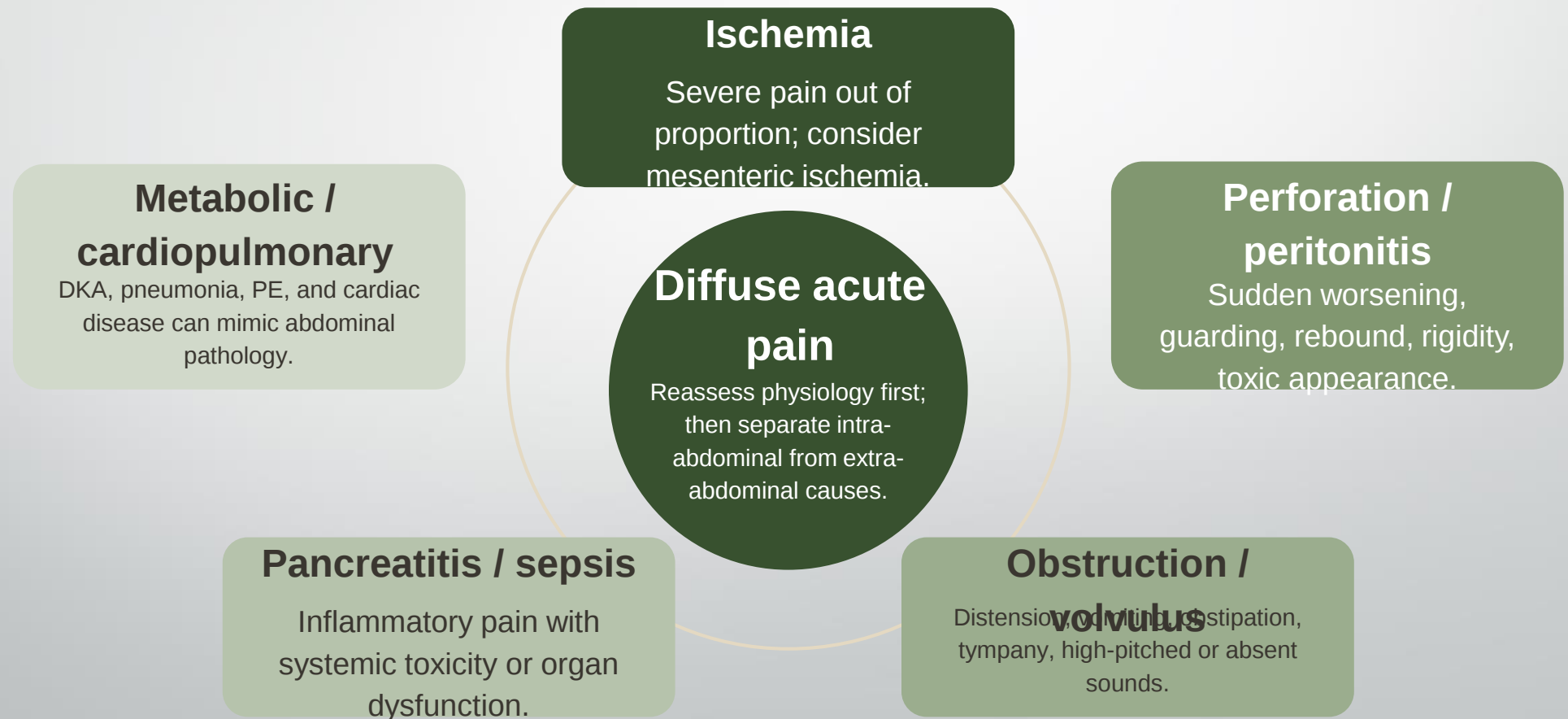
Pain may be vague or visceral; tenderness can be localized without guarding or rebound.

The change in examination should accelerate resuscitation, imaging, and consultation—
not wait for perfect certainty ➤

With peritoneal involvement

Guarding, rebound, rigidity, or movement pain increase concern for peritonitis and a surgical source.

Diffuse pain is a systems problem, not a single-quadrant problem



Start with tests that answer immediate physiologic and bleeding questions

Core laboratory bundle

CBC with differential, electrolytes, BUN/creatinine, glucose, anion gap, urinalysis.

Organ-specific add-ons

Lipase; aminotransferases, alkaline phosphatase, bilirubin; pregnancy test when applicable.

Instability and hemorrhage

Blood cultures when disseminated infection is suspected; type and cross-match for significant hemorrhage.

Extra-abdominal threat

ECG and troponin for possible cardiac disease; fingerstick glucose for possible DKA.



Order tests to resolve a clinical threat—not to accumulate normal results.

LABORATORY STUDIES

BOX 45-4 Helpful Laboratory Studies in the Acute Abdomen

Hemoglobin

White blood cell count with differential

Electrolyte, blood urea nitrogen, and creatinine concentrations

Urinalysis

Urine human chorionic gonadotropin

Amylase and lipase levels

Total and direct bilirubin concentration

Alkaline phosphatase

Serum aminotransferase

Serum lactate levels

Stool for ova and parasites

C. difficile culture and toxin assay

Imaging studies

- *Diagnostic imaging should be **the final step** in the work up of a patient with an acute abdomen*

- ***Plain radiography***

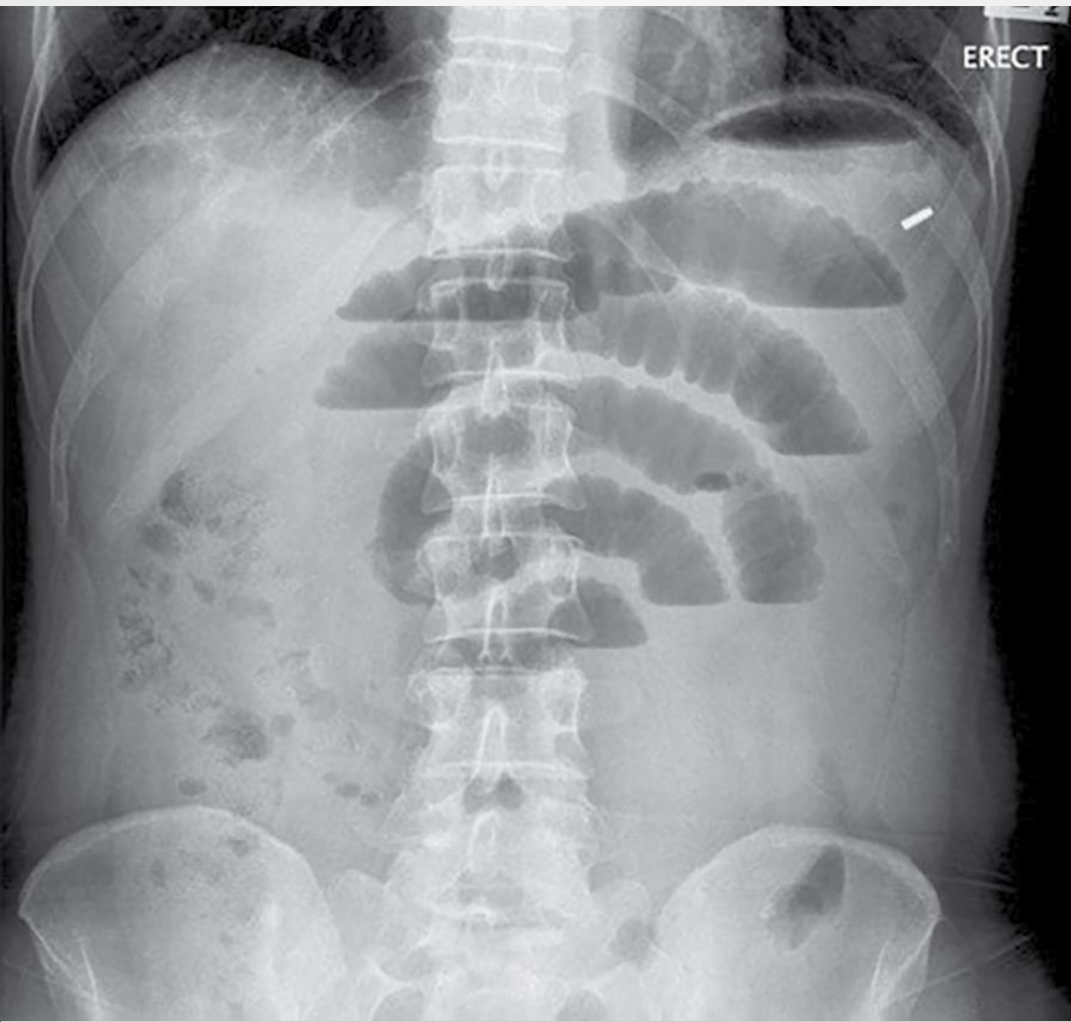
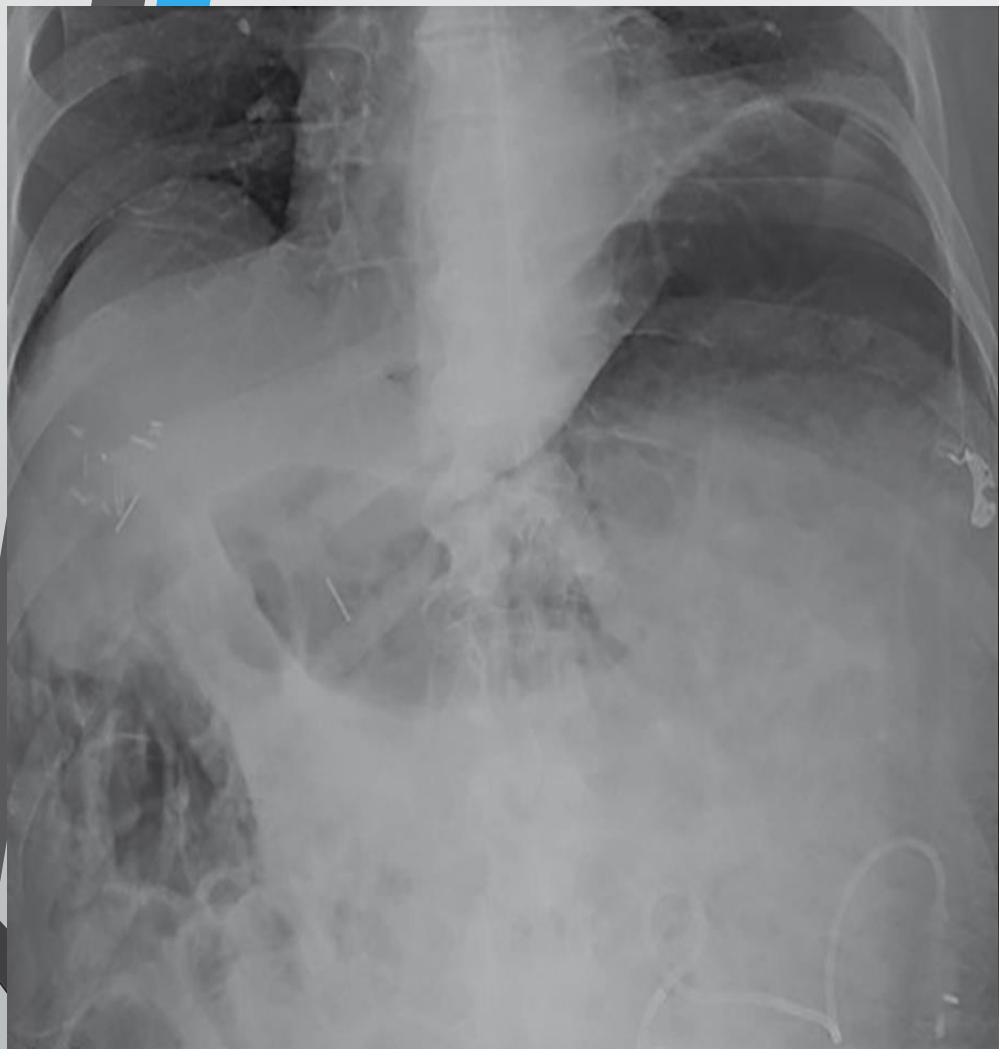
(CXR ,flat upright abdomen ,left lateral decubitus

Free air...calcification....obstruction..volvulus ...

- ***Sonography***

...biliary....GYN....

- ***Ct scan***



Bedside ultrasound is the fastest bridge from instability to action

1

AAA

Rapidly assess the aorta when rupture is suspected, especially in an unstable patient.

2

Free fluid

Look for hemoperitoneum in trauma or suspected intra-abdominal hemorrhage.

3

Obstruction clues

Assess hydronephrosis and selected bowel findings at the bedside.

4

Cardiopulmonary threats

Evaluate pericardial effusion and integrate the cardiac view with the abdominal exam.

Choose imaging by the threat you are trying to confirm

Fast, focused, or radiation-sparing

- Ultrasound: biliary disease, spleen size, AAA, hydronephrosis, hemoperitoneum
- Upright portable chest radiograph: suspected perforation or abdominal-source sepsis
- MRI: pregnancy when ultrasound is inadequate

Cross-sectional and vascular definition

- CT abdomen/pelvis with IV contrast: nondiagnostic initial studies or broad intra-abdominal concern
- CT angiography: suspected mesenteric ischemia or aortic dissection
- Unstable suspected ruptured AAA: do not delay action for a nonessential scan

Match the modality to stability, anatomy, and the decision it must change.

DIAGNOSTIC LAPAROSCOPY

A number of studies have confirmed the utility of diagnostic laparoscopy in patients with acute abdominal pain.²¹⁻²³ The purported advantages include high sensitivity and specificity, ability to treat a number of the conditions causing an acute abdomen laparoscopically, decreased morbidity and mortality, decreased length of stay, and decreased overall hospital costs. It may be particularly helpful in the critically ill, intensive care patient, especially if a laparotomy can be avoided.²⁴ Diagnostic accuracy is high, and reports show the accuracy ranges between 90% and 100%, with the primary limitation being recognition of retroperitoneal processes. This compares favorably with other diagnostic studies showing superiority to peritoneal lavage, CT scanning, or ultrasound of the abdomen.²⁵ Because of advances in equipment and increased availability, this technique is being used with greater frequency in these patients.

DIFFERENTIAL DIAGNOSIS

- *The differential diagnosis for acute abdominal pain is extensive*
- *mild and self-limited to the rapidly progressive and fatal*
- *Although many "acute abdomen" diagnoses will require surgical intervention for resolution, it is important to keep in mind that many causes of acute abdominal pain are medical in etiology*

TABLE 85.1 Surgical Causes of Acute Abdomen in Adults**Gastrointestinal**

Perforated gastric/duodenal ulcer	Small/large bowel obstruction
Cholecystitis	Cecal/sigmoid volvulus
Appendicitis	Ischemic colitis
Incarcerated/strangulated hernia	Bowel intussusception
Meckel diverticulitis	Boerhaave syndrome
Colonic/intestinal diverticulitis	Perforated gastrointestinal cancer
Internal hernia	Perforated diverticulitis

Solid Organ

Hepatic abscess	Acute pancreatitis/pancreatic necrosis
Splenic abscess	Pancreatic pseudocyst
Traumatic hepatic/splenic laceration	Spontaneous splenic rupture

Genitourinary

Nephrolithiasis	Tuboovarian abscess
Renal abscess	Pelvic inflammatory disease with abscess
Ectopic pregnancy	Endometriosis
Ovarian/testicular torsion	Hemorrhagic ovarian cyst
Uterine torsion/rupture	Placental abruption

Vascular

Aortoduodenal fistula	Hemoperitoneum
Abdominal aortic aneurysm	Aortic dissection
Arteriovenous malformation	Visceral aneurysms
Mesenteric arterial occlusion	Gastrointestinal bleeding

TABLE 85.3 Nonsurgical Causes of Acute Abdomen in Adults**Metabolic/Endocrine**

Diabetic ketoacidosis	Hypercalcemia
Hyperosmolar hyperglycemic state	Hypophosphatemia
Addison disease	Hypokalemia
Porphyria	Hyperthyroidism
Familial Mediterranean fever	Uremia

Hematologic/Immunologic

Sickle cell crisis	Henoch-Schönlein purpura
Thrombotic thrombocytopenic purpura	Mast cell activation syndrome
Hemolytic uremic syndrome	Hereditary angioneurotic edema
Acute leukemia	

Cardiopulmonary/Vascular

Myocardial infarction	Pulmonary embolus
Aortic dissection	Pneumonia

Infectious

Malaria	Yersinia enterocolitica
Staphylococcal	Dengue fever
Tuberculosis mesenteritis	Spontaneous bacterial peritonitis
Pyelonephritis	

Drugs/Toxins

Salicylate	Anticholinergics
Tricyclic antidepressant overdose	Heavy metals
Cocaine	Narcotic

Neuropsychiatric

Herpes zoster	Abdominal migraine
Radiculopathy	Irritable bowel syndrome
Functional abdominal pain syndrome	

Vasculitis/Connective Tissue

Systemic lupus erythematosus	Scleroderma
Systemic vasculitis	

Findings that suggest need for surgical intervention

Physical Exam Findings

- Abdominal compartment pressure >25 mm Hg
- Involuntary guarding
- Rebound tenderness
- Pain out of proportion to exam
- Unexplained systemic sepsis
- Transabdominal penetrating trauma

Laboratory Findings

- Anemia from gastrointestinal hemorrhage requiring >4 units of blood transfusion
- Evidence of hypoperfusion (acidosis, rising creatinine, rising liver function tests)

Diagnostic Imaging Findings

- Pneumoperitoneum
- Progressive dilatation of stationary loop of intestine (sentinel loop)
- Evidence of bowel perforation (air or contrast near loop of bowel)
- Fat stranding or thickened bowel wall with systemic sepsis
- Bowel wall pneumatosis

Diagnostic Peritoneal Lavage Findings

- Presence of feculent or particulate matter
- >250 white blood cells per milliliter
- >300,000 red blood cells per milliliter
- Peritoneal bilirubin > serum bilirubin (bile leak)
- Peritoneal creatinine > serum creatinine (urine leak)

PREPARATION FOR EMERGENCY OPERATION

- IV access and hydration(electrolyte correction)
- Prophylactic Antibiotic therapy
- NG tube
- Foley
- CVP line

Resuscitation and diagnosis run in parallel from the first minute

1

Monitor and access

Cardiac monitoring; obtain large-bore IV access for peritonitis, hypotension, or toxic appearance.



2

Restore circulation

Give crystalloid; use blood products when hypovolemia or hemorrhage is present.



3

Support threatened organs

Give vasopressors for septic shock; consider stress-dose steroids for adrenal insufficiency or chronic steroid use.



4

Keep diagnosing

Send targeted tests, choose imaging by threat, and involve the appropriate specialty early.



Do not postpone stabilization while waiting for diagnostic certainty.

Analgesia is treatment—and does not invalidate the examination

Treat pain deliberately

- Adequate analgesia is essential and does not alter the assessment.
- Options include acetaminophen, parenteral ketorolac, and opioids.
- Reassess pain, function, perfusion, and examination after treatment.

Choose agents with context

- Use ketorolac cautiously with gastritis, peptic ulcer disease, or acute kidney injury.
- Opioids may be appropriate when pain is severe; pair use with monitoring and reassessment.
- A comfortable patient still requires a complete, repeated evaluation.

Pain control improves humane care; it does not replace diagnostic discipline.

Antibiotics should match contamination risk while source control is pursued

Suspect infection

Fever, toxicity, peritoneal contamination, abscess, or abdominal-source sepsis.

Cover likely flora

Use broad-spectrum coverage targeting enteric gram-negative and anaerobic organisms.

Find the source

Use examination and imaging to identify perforation, infected obstruction, or another focus.

Control the source

Coordinate surgery, interventional radiology, or endoscopy; antibiotics do not replace source control.

Atypical presentation should trigger broader reasoning, not lower urgency

Presentation

01

Severe diffuse pain with limited early tenderness and vascular risk factors.

Clinical move

02

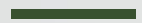
Treat pain and perfusion, obtain focused labs, and escalate to CTA when mesenteric ischemia is plausible.

**No false
reassurance**
Decision principle

Safety outcome

The mismatch is recognized as a warning signal; consultation proceeds before late peritonitis.

Serial reassessment converts a snapshot into a trajectory



**After initial
stabilization**

1

Recheck vitals, perfusion, pain, mental status, urine output, and response to fluids/analgesia.

After focused testing

2

Reconcile laboratory and imaging results with the examination; identify discordance.

At every change

3

New guarding, rebound, distension, vomiting, shock, or organ dysfunction demands escalation.

Before disposition

4

Confirm a credible diagnosis or safe uncertainty plan with explicit follow-up and return precautions.



No fixed interval replaces judgment: repeat whenever physiology or symptoms change.

The winning move is disciplined parallel processing

Recognize threats. Localize pain. Examine systematically.
Test the question. Resuscitate and consult early. Reassess
the situation.

At the bedside: stabilize first, but never stop diagnosing.



Thanks for your attention