

# **Investigation 3.2**

**3.2A: Abdominal Pain**

**3.2B: Microbes**

# 3.2A: Abdominal Pain

### 1. Introduction:

Patients commonly come to see their physician complaining of **abdominal pain**. We often call the body cavity below our rib cage our “stomach.” Actually the **abdominal cavity** contains several important organs in addition to the actual stomach. Because many of these organs work together to turn our food into energy and raw materials for sustaining life, malfunction of any organ in this cavity appears to invoke similar **symptoms**. **Diagnosing** the exact cause of illness can prove quite challenging. You, as the treating physician, must look for subtle details in the symptoms in order to reduce your differential diagnosis to a manageable list.

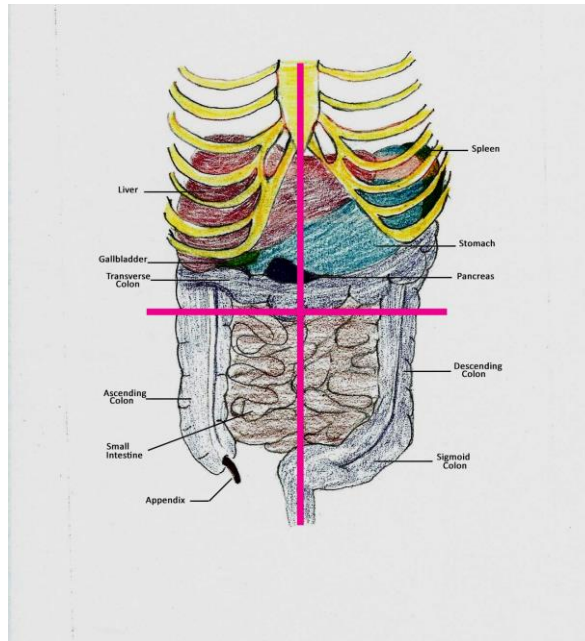
Often the patient has pain in a specific region of the **abdomen** so that we can focus our attention on the organ located there. Physicians commonly divide the abdomen into four quadrants with each **quadrant** containing a different list of organs. This four-zone map of the abdomen helps us think about what organs and other structures are located inside the painful area and thus guides us to possible causes of the illness. Look at the chart and learn which structures are located in each quadrant.

**RUQ = right upper quadrant** containing liver, right kidney, gall bladder, and parts of colon and pancreas.

**LUQ = left upper quadrant** containing stomach, left kidney, spleen, and parts of colon and pancreas.

**RLQ = right lower quadrant** containing appendix, small intestine, major artery and vein to right leg, and parts of ureter and colon.

**LLQ = left lower quadrant** containing major artery and vein to left leg and parts of colon, small intestine, and ureter



Remember the patient's right side sits on your left side when you face that patient, as if you were looking at yourself in the mirror. The patient's heart lies on the right as you see the patient, even though it is located on their left side. The same principle applies to the organs located in the abdomen.

It is almost time to call it a day and prepare for the weekend as you finish up your shift in the local emergency room of your small rural-community hospital. You have only one more patient to see before you begin two days of relaxation with your family. When you pull back the curtain you find a thirteen-year-old girl doubled over in pain, accompanied by a very worried mother. The girl is crying so you ask the mother what has happened.

## 2. Chief Complaint:

The mother, Mrs. Nguyen, reports that earlier today her daughter complained of a stomach ache. The stomach ache grew worse as the day progressed. She thinks maybe something her daughter Crystal ate is causing the problem. The mother reports her daughter has been healthy in the past. The daughter painfully confirms she felt fine yesterday and in the previous weeks. Last night she had dinner with friends at a local fast-food restaurant before going with them to see a movie. None of her friends seem to have any stomach problems.

The girl describes her pain as alternating in intensity between 7/10 and 10/10 since this morning, pointing to the lower right portion of her abdomen near her **umbilicus** and running her hand around to her right side as the area of concern. She has felt nauseated most of the day and she threw up twice. She feels bloated, has no appetite, and had chills and then sweating a few hours ago. She feels as though she needs to pass gas, but cannot. The pain increases if she gets up to walk or makes any sudden movement.

## 3. Review of Systems:

Height = 64 inches Weight = 108 pounds

No history of allergies

Vaccinations up to date

No current medications

No previous surgeries

**Chief Complaint: Abdominal Pain**

**4. Examination:**

- You begin your exam with Crystal sitting on the side of the **gurney**:
- Height and weight deferred due to patient's discomfort on standing.
- Temperature: 101.9 F.
- **Pulse**: 92 bpm
- **Respirations**: 22 / minute
- Heart: **sinus rhythm**
- Lungs: Clear
- A slight yellowish color of her eye **sclera** and skin is noted.

You then ask Crystal to lie back in a **supine** position on the exam table so you can perform a more thorough examination of her abdominal area. Abdominal exam findings:

- **Abdominal distention** is noted. **Bowel sounds** are absent.
- **Rebound tenderness** is elicited in the right lower quadrant.

**5. Differential Diagnosis:**

Many things can cause abdominal pain, so the differential diagnosis can be extensive:

Symptoms:

	Jaundice	Abdom Pain	Bloating	Weight Loss	Appetite Loss	Stool Change	Urine Dark	Acute/Chronic	Nausea	Fever	New Diabetes	Pain Radiates
Acute Pancreatitis		X	X	X	X		X	A	X	X	X	X
Cholangitis	X	X		X	X	X	X	A	X	X	X	X
Peptic Ulcer Disease		X		X	X	X	X	C	X	X		X
Cholecystitis	X	X		X	X	X	X	AC	X	X	X	X
Food Poisoning	X		X		X	X		A	X	X		X
Gastric Cancer	X	X	X	X	X	X		C	X	X		X
Pancreatic Cancer	X	X	X	X	X	X	X	C	X	X	X	X

Hepatoma	X	X		X	X	X	X	C	X	X		X
Appendicitis	X	X	X		X	X		A	X	X		X
Intestinal Ischemia		X	X	X	X	X	X	A	X	X		
Abdominal Aortic Aneurysm		X		X				C	X	X		X
Chronic Pancreatitis	X			X		X	X	C	X		X	X
<b>Patient Crystal</b>												

You might have noticed that many of the symptoms for each illness listed in the (partial) differential diagnosis chart are the same. When attempting to eliminate conditions from the list you might look at whether a condition is **acute** or **chronic**. But always remember, chronic conditions had their beginnings as an acute condition. So that criteria may not help.

Look more closely at **subtle** differences in symptoms, such as where in the abdomen the patient located the discomfort, or what type of changes she reports related to her stools, to help focus your differential diagnosis.

The chart below can help you use the information from your examination of the patient's abdomen. You pressed on her abdomen and then quickly released that pressure which produced in one location a painful response. You called that finding "rebound tenderness" in the LR.

Condition	Quadrant
Acute <b>Pancreatitis</b>	UL, UR
<b>Cholangitis</b>	UR
Peptic <b>Ulcer</b> Disease	UL
Cholecystitis	UR
Food Poisoning	UL,UR,LR
<b>Gastric</b> Cancer	UL
Pancreatic Cancer	UL,UR
Hepatoma	UR
<b>Appendicitis</b>	LR
Intestinal <b>Ischemia</b>	UL,UR,LR
Abdominal Aortic <b>Aneurysm</b>	MIDLINE
Chronic Pancreatitis	UL,UR

The color and texture of our stools (poop) change with diet and health. Changes in a patient's stools might lead you to consider some diagnoses more likely than others:

Condition	Stool appearance/symptom
Acute Pancreatitis	constipation
Cholangitis	constipation
Peptic Ulcer Disease	Red, maroon, black color
Cholecystitis	constipation
Food Poisoning	diarrhea

Gastric Cancer	constipation or diarrhea
Pancreatic Cancer	oily, smelly, pale, yellow
Hepatoma	White, clay-like
Appendicitis	constipation or diarrhea
Intestinal Ischemia	constipation or diarrhea
Abdominal Aortic Aneurysm	normal
Chronic Pancreatitis	Oily, smelly, pale, yellow

We need to better understand our differential diagnostic list before moving forward with tests. Remember, the final diagnosis often results from ruling out diseases from the differential diagnosis list until only a few remain.

**Acute Pancreatitis** involves inflammation of the pancreas of recent onset. The pancreas manufactures digestive enzymes and insulin. Insulin controls the absorption of sugar into the cells throughout our body. Malfunction of the pancreas that reduces insulin production causes one form of the disease we call diabetes.

**Cholangitis** is an inflammation of the bile duct system. Usually a bacterial infection causes cholangitis. The infection may occur suddenly and then either resolve or become chronic. The bile duct system carries bile from the liver and gallbladder to the duodenum of the small intestine. Bile has the ability to dissolve the fat in our food and thus allow our stomach to digest and absorb the fat.

**Peptic Ulcer Disease** refers to painful sores or ulcers in the lining of the stomach or first part of the small intestine. Many factors appear to play a role in producing peptic ulcers such as excess stomach acid production from tumors, excessive use of alcohol or tobacco, or exposure to radiation, but we now know the ulceration comes about from the action of a specific bacteria, **Helicobacter pylori**.

**Cholecystitis** is an inflammation of the gallbladder. Your gallbladder is a small, pear-shaped organ on the right side of your abdomen tucked beneath the liver. It stores a digestive fluid made by the liver called bile and releases that bile into your small intestine when you need it for digestion of fat. Gallstones are the most common cause of cholecystitis. Why gallstones form remains a mystery. The most common sign that your patient has acute cholecystitis is abdominal pain that lasts for several hours, although gallbladder problems can produce confusing arrays of symptoms.

**Food Poisoning** is illness caused by ingestion of bacteria or toxins in food; typical symptoms are nausea and vomiting. As you will see when you read the chapter on food-borne illness, the duration of illness depends on which organism your patient ingests.

**Gastric Cancer**, growth of a tumor in the lining of the stomach, constitutes the third most common cause of cancer death in the world. Symptoms begin as indigestion and eventually become chronic stomach pain.

**Pancreatic Cancer**, malignant cells growing in the pancreas, underneath the stomach, commonly spreads (**metastasizes**) before it produces recognizable symptoms, leaving a rather poor prognosis for your patient by the time of diagnosis.

**Hepatoma**, the most common form of cancer to grow in the liver, produces few symptoms and often is diagnosed during a physical exam when palpation reveals an enlarged liver. The long-term prognosis is poor, with death often resulting in as little as one year.

**Appendicitis** occurs when the appendix becomes inflamed, swollen, and filled with **purulence** (commonly called pus). The appendix is a small finger-shaped structure located on the right side of the abdomen attached internally to the first portion of the colon. The exact function of the appendix remains unknown. Why it suddenly becomes infected also remains unknown. Surgeons consider appendicitis an emergency because if not removed it can rupture, spreading a life threatening infection throughout the abdominal cavity. Symptoms of appendicitis include lower right abdominal pain, nausea, vomiting, decreased appetite, and rebound tenderness (pressure applied slowly to the abdomen then suddenly released to produce pain). Appendicitis most commonly occurs in patients between ten and thirty years of age, again for reasons that remain unknown.

**Intestinal Ischemia**, an inadequate blood supply to the small or large intestines caused by a blood clot or mechanical obstruction of blood flow, causes severe unrelenting abdominal pain. Severe pain can occur within minutes, often after eating, and usually in patients over age sixty.

**Abdominal Aortic Aneurysm (AAA)** presents as a bulging enlargement of the largest blood vessel in your body. Subtle signs such as rapid heart rate, dizziness, and sweating can occur; however, most abdominal aortic aneurysms are asymptomatic until they leak or completely rupture. You should suspect a possible AAA in your patient if you hear a rushing sound of blood (**bruit**) when listening carefully with your stethoscope over the central abdomen. Sometimes an examiner can feel an aneurysm by applying pressure over the central abdomen. An abdominal ultrasound can confirm an AAA. You don't want to miss this diagnosis. If the aneurysm ruptures your patient can die too quickly for any treatment to occur. Surgeons and radiologists can now repair many AAA's by introducing collapsed **stents** into arteries in the leg and then expanding them in the aorta.

**Chronic Pancreatitis** represents long-standing inflammation of the pancreas that does not improve or resolve. Long-term alcohol abuse often appears to play a role in causing this condition. Over time pancreatitis impairs the patient's ability to digest food or produce insulin. Symptoms include abdominal pain, digestive problems, and diabetes.

6. Even though chronic diseases begin as acute, you probably still want to rule out acute illnesses first since those conditions benefit from prompt action. **With that in mind, what are you willing to eliminate from your immediate evaluation plan?**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. Based on what you know now, before conducting any tests, what are your top three suspects as the cause of Crystal's distress?

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

### 8. Medical Tests:

You have available a myriad of medical tests for gaining additional information in this investigation. You have to consider not only the amount of information gained, but also the expense and risk to the patient of each test. For example, any test utilizing x-rays requires radiation exposure that carries some risk. You must decide whether the potential information is worth the exposure the patient endures. Some of the tests you might consider for this patient are listed below.

**Complete Blood Test (CBC):** An elevated white cell count demonstrates infection. The CBC requires drawing blood from the patient.

**CT Scan of abdomen:** Utilizes high doses of radiation to provide a layer-by-layer visualization of the structures of the abdomen. Soft tissue resolution may prove lower than MRI. Your patient receives a relatively high radiation exposure.

**Urinalysis:** Test can be helpful in ruling out a urinary tract infection. Test looks for blood or bacteria in the urine. Patient pees into a container.

**Ultrasound of abdomen:** Sound waves are bounced off the abdominal structures, sending back a picture of the abdomen. Sound waves pose no risk to the patient.

**X-ray of abdomen:** X-rays shot through the abdomen provide a contrasting view of boney versus soft tissue structures in the abdomen. Definition of soft tissue abnormality may prove limited. Patient is exposed to x-rays.

**MRI of abdomen:** An MRI uses a strong magnetic field to create high resolution images of soft tissue structures. It is safer than X-rays, but much more expensive than x-rays or ultrasound. MRI cannot be used freely in patients with cardiac pacemakers or metal implants.

**Which medical test or tests would you order for this patient?**

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_



The teacher should note that emergency physicians increasingly use CT scans and sometimes MRI scans to sort out difficult cases of suspected appendicitis. These modalities have a higher accuracy rate than other imaging methods, so you may have a student who underwent one of these studies to sort out acute abdominal discomfort.

**Review of History:** Let's do a quick review of Crystal's history as stated by her Mother.

1. Very recent onset
2. No friends had same symptoms
3. Pain lower right quadrant of abdomen, radiating to right side
4. Nausea & sweating
5. Bloating
6. Increased pain on moving

**Review of Examination findings:** Here is a summary of the exam findings.

1. Temperature 101.9
2. Pulse 92 bpm
3. Respirations 22 / min
4. Yellowish color to eye sclera
5. Absent bowel sounds
6. Rebound tenderness

### **Medical Test Results**

If you ordered a CBC: elevated white cell count Note... a sed rate is not commonly part of a CBC

If you ordered a Urinalysis: no blood or bacteria found in the urine.

If you ordered an Ultrasound of the Abdomen: **dilated** appendix with **peri-appendiceal** fluid. The wall layers of the appendix are visible. Remaining abdominal structures are within normal limits.

**Based on your examination findings and laboratory tests, what is your Preliminary Diagnosis?**

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### **Treatment**

Treatment of appendicitis usually results in surgical removal of the appendix, a relatively minor operation, with the goal of preventing rupture and spread of infection. Patients with mild symptoms and no confirming studies may receive antibiotics, and if symptoms continue or worsen undergo an **appendectomy**.

Any surgery has inherent risks for which your attending surgeon must be vigilant. Fortunately appendectomy enjoys a relatively low frequency of complications, however a ruptured appendix possesses a severe threat to life. Treating appendicitis with antibiotics alone has a 58.3% success rate, meaning about 42% of those patients end up having surgery with a 92.6% success for those patients. A clear diagnosis of appendicitis in an otherwise healthy patient should result in a quick trip to an operating room. Have any of your friends had their appendix removed?