Abdominal Pain in the Prehospital Environment
-A Case Based Approach

Nathan VanderVinne
Medical Student III / MPH Candidate
Edward Via College of Osteopathic Medicine
Objectives

• Students will be able to identify the four major abdominal quadrants and the pathophysiological conditions associated with each.

• Students will be able to recognize life threatening abdominal conditions requiring transportation to a specialized facility.

• Students will be able to make effective transport decisions based on the facility required to treat the suspected underlying medical condition to ensure the greatest possible patient outcome.

• Students will be presented with a brief overview of and become familiar with Acute Aortic Aneurysm, Aortic Dissection, Bowel Perforation, Acute Mesenteric Ischemia, Peritonitis, Pancreatitis, Sickle Cell Crisis, Appendicitis, Intestinal Obstruction, Strangulated Hernia, Acute Cholangitis and Ectopic Pregnancies.

• Students will be able to recognize the acute abdomen and interpret its significance.
The general rule can be laid down that the majority of severe abdominal pains that ensue in patients who have been previously fairly well, and that last as long as six hours, are caused by conditions of surgical import. “
What is an Acute Abdomen?

• A sudden, severe abdominal pain of unknown etiology that is less than 24 hours in duration.

• The Acute Abdomen is often a surgical emergency
Criteria

• Pain that has been consistent in nature for **greater than 6 hours** duration

• Any of the following in the upper, middle, or lower abdomen
  – Guarding, Rigidity, **Swelling** or **Fever** of unknown origin
  – **Pain** that is out of proportion for the exam
It wouldn’t be an EMS lecture if I didn’t mention

- **Airway**
- **Breathing**
- **Circulation**
  - Could shock cause diffuse abdominal pain?
Two greatest tools in the EMS providers Toolbox

• Quality History

• And

• Quality Physical Exam
Copes Early Diagnosis

• “The first principle is that the necessity of making a serious and thorough attempt at diagnosis, usually predominantly by means of history and physical examination”
History Questions

• **O** – What were you doing when this started?
• **P** – Does anything make your pain better or worse?
• **Q** – Describe the quality of this pain
• **R** – Does it radiate anywhere?
• **S** – 1-10 score of patient perceived pain
• **T** - Is this pain new or chronic?
History Continued

• Ask open ended questions – allow the patient to tell you what they are experiencing in their own words

• Has anything like this ever happened before?
Family History

• Acquiring a strong family history from the patient or their family members can prove highly useful.

• If the patient’s father died of a ruptured aortic aneurysm at a young age that’s something we absolutely want to know.
Past Medical History

• Asking the patient’s past medical history can be an excellent window into the patient’s current presenting condition.

• This includes current medications and therapies, past surgeries and hospitalizations, etc.
Social History

- Social history including
  - Alcohol use
  - Drug use
  - Caffeine and dietary supplements
  - Diet and nutritional intake
  - Recent travel
  - Additional questions as necessary
Questions to ask

• Don’t be afraid to ask “What do you think is going on?”

• Patients often have a wealth of knowledge regarding familial conditions, past medical history, and risk factors that they are reluctant to share. Asking this question directly involves the patient in their care and can prove high yield.
Physical Exam

- Identify the location of the pain
- Begin assessing the patient at the furthest site working your way inward
- Inspection
- Palpation
- Percussion
- Auscultation
Physical Exam Red Flags

• Severe Pain (Out of proportion to the exam)
• Signs of shock – hypotension, tachycardia, altered mental status
• Signs of peritoneal irritation
• Significant abdominal distention or swelling
RUQ Differentials

- Acute cholecystitis
- Acute pancreatitis
- Renal and ureteric colic
- Acute retrocecal appendicitis
- Rt. Pleural effusion consolidation
RLQ Differentials

- Acute Appendicitis
- Renal and Ureteric Colic
- Ectopic Pregnancy
- Ovarian Torsion
- Diverticulitis
- Pelvic inflammatory disease
- Psoas abscess
- Intussusception – Telescoping of the bowel

- In female patients, sex specific causes must be considered
LUQ Differentials

- Acute pancreatitis
- Subphrenic abscess
- Splenic abscess
- Renal and ureteric colic
- Left Pleural Effusion or abscess
- Myocardial Infarction – Uncommon presentation but certainly possible
- Ruptured aneurysm
LLQ Differential

- Renal ureteric colic
- Ectopic pregnancy
- Ovarian Torsion
- Pelvic Inflammatory Disease
- Diverticulitis
- Ruptured aneurysm
- Intussusception
Epigastrium

- Biliary causes – Cholecystitis, Cholelithiasis, Cholangitis
- Cardiac cause – MI, Pericarditis
- Gastric causes – esophagitis, peptic ulcer
- Acute appendicitis
- Colonic causes
- Pancreatitis
- Vascular Causes – AAA, mesenteric ischemia
Diffuse or Nonspecifically localized

- Herpes Zoster
- Muscle Strain
- Bowel Obstruction
- Mesenteric ischemia
- Peritonitis
- Narcotic withdrawal
- Porphyria
- Heavy Metal poisoning
Prehospital Goal

• Our goal is not to create an exact diagnosis in the field

• But rather to determine that an acute abdomen exists and that an emergency surgically correctable condition exists
Prehospital Providers

• Communication, Communication, Communication

• “It can be confidently asserted that a large number of acute abdominal conditions can be diagnosed by considering carefully the history of their onset. That is only possible, however, when each symptom is carefully appraised in relation to other symptoms, so that its significance is properly understood. This is of the greatest use when the chronological appearance of symptoms, from the time of the last period of well-being is meticulously recorded.”
Patient Presentation Number 1

- 67 Year old African American Male Presents to EMS providers. Family members activated the 911 system stating the patient was experiencing abdominal pain.

- Upon arrival – Paramedics found the patient residing in unsanitary conditions covered in his own feces and urine.

- Patient is noted to have an altered mental status but is able to localize the pain by pointing to his upper and lower abdomen.
Past Medical History

- Recent admission to the hospital for C. Difficile Colitis
- Hx of Aspiration pneumonia
- Type 2 diabetes – Recent hemoglobin A1C – 8.2
- Recent embolic CVA with left hemiplegia resulting in decreased ambulation
- Pacemaker Placement
- Mitral Valve Replacement with mechanical Prosthesis
- Hypertension
- Chronic Atrial Fibrillation
Physical Exam Findings

- **Vital Signs**: Temp of 98.06, pulse of 71, respirations 20, blood pressure is 170/66.
- **General Appearance**: The patient is in mild distress, lethargic. Patient is able to point to localize his pain to the upper and lower abdominal quadrants.
- **HEENT**: Oropharynx is unremarkable. Pupils are equal, round and reactive to light.
- **Neck**: Supple without lymphadenopathy or JVD.
- **Chest**: Well-healed surgical scars.
- **Heart**: Irregularly irregular with metallic clicks due to valve prosthesis. No gross murmurs or friction rubs.
- **Lungs**: Diminished breath sounds at the bases but otherwise clear to auscultation without wheezing, rhonchi or crackles.
- **Abdomen**: Diffusely tender with moderate distention. Pain out of proportion to the physical exam.
- **Extremities**: No Edema Noted.
Differential Diagnosis

- Small Bowel Obstruction
- Mesenteric Ischemia (Acute, Chronic, or non-occlusive)
- Toxic Megacolon secondary to C. Difficile Colitis (1)
- Gastroenteritis
- C. Difficile Colitis
- Volvulus
- Pancreatitis
- Sepsis
- Acute Myocardial Infarction
- Dehydration
- Urinary Tract Infection
- Electrolyte Imbalance
- Infection
- Intussusception (Rare in adults but there have been reported cases in the literature. (2)
Anatomy
Imaging – X-Ray
CT Angiography
CT Angiography (Cont)
Diagnosis - Mesenteric Ischemia

- Atrial Fibrillation
- Valvular Heart Disease
- History of Arterial Emboli
- Newly formed clot in the Superior Mesenteric Artery as demonstrated on CT

- All indicative of Acute Mesenteric Ischemia – A surgical emergency
Types of Mesenteric Ischemia

• Non-Occlusive Mesenteric Ischemia
  – Related to the homeostatic mechanism that maintains cardiac and cerebral blood flow at the expense of the splanchnic and peripheral circulation

• Chronic Mesenteric Ischemia
  – Characterized by post prandial abdominal pain secondary to atherosclerotic disease of two or more mesenteric vessels

• Acute Mesenteric ischemia
  – Venous
  – Arterial
Treatment

- Superior Mesenteric Artery Embolectomy
- Direct Visualization of viable and necrotic tissue through emergent laparotomy
- Surgical excision of the necrotic bowel
- No anastomoses initially occurred to evaluate for viable tissue via Fluorescence Angiography
Take Home Points

• Mesenteric Ischemia must be ruled out in the patient presenting with an acute abdomen
• Acute Mesenteric Ischemia is a surgical emergency
  - Acute mesenteric ischemia must be considered in patients with a past medical history positive for
    - Atrial Fibrillation
    - Valvular Heart Disease
    - History of Arterial Emboli
Patient Presentation 2

- EMS is called to an apartment complex for a 17 year old African American Female who recently immigrated to the United States. Patient complaining of gradual, vague, and generalized abdominal pain.
History

- O – The patient participated in a track meet earlier in the day when it started.
- P – Nothing makes the pain better or worse
- Q – The pain is described as gradual, vague, and generalized.
- R – The pain is localized to the upper or central abdomen.
- S – Pain is rated a 7/10
- T – The pain has been constant for 7 hours now.
PMH

• Patient states she was told she had a blood disorder when she was a kid but was unaware of exactly what it is.
• Other than that the patient has no significant PMH or family history that she is aware of.
Physical Exam

- Vital Signs: Temp of 98.2, pulse of 90, respirations 20, blood pressure is 140/66.
- Abdominal tenderness noted upon palpation in the upper and central abdomen. Most notably in the LUQ.
- Patient was noted to vomit twice while on the way to the hospital.
- Patient is noted to be sweating freely and complains of a severe headache.
Imaging in the ED
Diagnosis

• This patient has splenic infarcts secondary to sickle cell anemia. The patient was most likely in a dehydrated state causing sickling of the red blood cells and subsequent splenic infarct as noted in the CT image above.

• Imaging is required to determine if splenic or hepatic infarcts are causing the abdominal pain
Patient Presentation 3

- A 57 year old male patient activates the EMS System stating diffuse abdominal pain. Upon arrival and exam peritonitis is noted. Patient stated the pain woke him up from his sleep.
Symptoms noted consistent with Peritonitis

- The symptoms vary greatly depending on the extent of involvement, the etiology, and the acuteness of onset.
- They can include:
  - Pain – Most constant symptom
  - Vomiting
  - Muscular Rigidity
  - Anxious facial expression
  - Alteration of temperature
  - Abd. Distention
  - Intestinal paresis
History

• O – The pain started suddenly after a meal. The patient went to sleep and was awoken by the pain.
• P – The food seemed to provoke the pain
• Q – The pain is described as a diffuse gnawing pain
• R – Pain was noted to be diffuse across the abdomen with greater pain noted in the LUQ
• S – Patient states the pain is a 7/10
• T – This is a new pain that he has not experienced before. He states he has a history of gastric ulcer but the pain has not felt like this before.
Physical Exam

- **Vital Signs**: Temp of 98.6, pulse of 84, respirations 20, blood pressure is 104/62.
- **General Appearance**: The patient is in mild distress, lethargic. Patient points to his whole abdomen when asked where the pain is.
- **HEENT**: Oropharynx is unremarkable. Pupils are equal, round and reactive to light.
- **Neck**: Supple without lymphadenopathy or JVD.
- **Chest**: Equal chest rise and fall.
- **Heart**: Regular rate and rhythm - No gross murmurs or friction rubs.
- **Lungs**: Clear to auscultation in all fields without wheezing, rhonchi or crackles.
- **Abdomen**: Diffusely tender with moderate distention. **Muscular Rigidity noted**
- **Extremities**: No Edema Noted
Differential Diagnosis

- Gastric Ulcer
- Gastric Perforation
- Peritoneal irritation secondary to infection
- Pleuropneumonia
- Colic
- Intestinal Obstruction
- Internal Hemorrhage
Imaging
Diagnosis

• In this patient – the physical exam findings consistent with peritonitis – specifically abdominal muscular rigidity in a patient with known gastric ulcers leads clinicians to be highly suspicious of a perforated gastric ulcer.

• This was confirmed with an x-ray showing free air in the abdomen defining this as a surgical emergency.
Patient Presentation 4

- 65 year old male patient activates the EMS system with chief complaint of dizziness and abdominal pain.
History

• O – Patient was out walking his dog when the pain began. Denies any trauma or irregular inciting event. Felt as though he needed to sit down right away.
• P – Nothing makes it better or worse
• Q – Patient describes it as ripping and tearing sensation
• R – Pain radiates into the patients back
• S – Pain radiated a 9/10
• T – This pain is new to the patient who has not experienced anything like this before.
Past Medical History

• Chronic Hypertension
• Chronic Kidney disease
• Tobacco and alcohol Abuse
• Type 2 Diabetes
• PVD
• Atherosclerosis
Physical Exam

• **Vital Signs:** Temp of 98.6, pulse of 118, respirations 18, blood pressure is 82/52.

• **General Appearance:** The patient is in significant distress. Patient is able to point to localize his pain to the mid abdominal line stating that it radiates into his back. Pain is described as a tearing sensation. Patient color appears ashen.

• **HEENT:** Oropharynx is unremarkable. Pupils are equal, round and reactive to light.

• **Neck:** Supple without lymphadenopathy or JVD.

• **Heart:** Sinus Tachycardia. No gross murmurs or friction rubs.

• **Lungs:** Breath sounds clear and equal in all quadrants

• **Abdomen:** Midline pulsating mass approximately 2 cm superior to the umbilicus extending 5 cm distally.

• **Extremities:** No Edema Noted
Diagnosis

• Dissecting/Potential Ruptured Aortic Aneurysm

• Emergency requiring rapid transport and surgical intervention.
Patient Case Presentation 5

• Johnny is an 8 year old boy whose mother activated the EMS system stating her son was experiencing extreme abdominal pain, anorexia, nausea, and rebound tenderness.
History

• O – The patient describes no abnormal inciting event.
• P – Nothing makes the pain better or worse
• Q – The pain is described as a dull gnawing pain
• R – The pain initially started in the peri-umbilical region but has since radiated to the RLQ.
• S – 6/10
• T – The pain has been ongoing for 2 days in duration.
Past Medical and Surgical Hx

- Patient has no past medical or surgical history of significance

- Why do we ask about prior abdominal surgeries in the patient experiencing acute abdominal pain?
Physical Exam

- **Vital Signs**: Temp of 101.2, pulse of 104, respirations 18, blood pressure is 112/76.
- **General Appearance**: The patient is in mild distress with movement. Patient is able to point to localize his pain to the right lower quadrant. He notes the pain was initially periumbilical but has since migrated to the RLQ.
- **HEENT**: Oropharynx is unremarkable. Pupils are equal, round and reactive to light.
- **Neck**: Supple without lymphadenopathy or JVD.
- **Heart**: Sinus Tachycardia. No gross murmurs or friction rubs.
- **Lungs**: Breath sounds clear and equal in all quadrants
- **Abdomen**: Voluntary Guarding noted when palpation performed near the right lower quadrant. Positive McBurney’s point. Obturator test positive.
- **Extremities**: No Edema Noted
Diagnosis

• Appendicitis

• This is surgically correctable condition
Patient Case Presentation 6

- 21 year old female patients activates the local EMS System with the chief complaint of RLQ abdominal pain.
History

- **O** – The patient was going about her day when the pain grew worse. She states she has been experiencing pain, amenorrhea, and vaginal bleeding for the last two weeks.
- **P** – Nothing makes the pain better or worse
- **Q** – The pain is described as sharp and stabbing
- **R** – The pain is located in the RLQ with no radiation
- **S** – The pain is rated at a 6/10
- **T** – This is the first time the patient has felt this pain. It has remained constant since it started.
Past Medical and Surgery Hx

• The patient denies any relevant past medical history outside of asthma as a child

• Minor surgical histories include implantation of an IUD as her only form of contraceptive.
Physical Exam

- **Vital Signs:** Temp of 98.2, pulse of 114, respirations 20, blood pressure is 82/66.
- **General Appearance:** The patient is in mild distress with movement. Patient is able to point to localize his pain to the right lower quadrant. She appears ashen in color.
- **HEENT:** Oropharynx is unremarkable. Pupils are equal, round and reactive to light.
- **Neck:** Supple without lymphadenopathy or JVD.
- **Heart:** Sinus Tachycardia. No gross murmurs or friction rubs.
- **Lungs:** Breath sounds clear and equal in all quadrants
- **Abdomen:** Voluntary Guarding noted when palpation performed near the right lower quadrant.
- **Extremities:** No Edema Noted
Imaging in the ED
Diagnosis

• **Ectopic Pregnancy** – A surgical emergency

• Pain, amenorrhea, and vaginal bleeding is the most common clinical triad for ectopic pregnancy. Unfortunately this triad is only present in roughly 50% of patients.
Patient Case Presentation 7

• A 45 year old female patient activates EMS with chief complaint of fever, RUQ pain, jaundice, itching, and malaise.
History

• O – These symptoms started a few days prior after ingesting a fatty meal
• P – Nothing makes the symptoms better or worse
• Q – The pain is dull and achy in the RUQ.
• R – RUQ with systemic symptoms as listed above
• S – The pain is rated a 5/10
• T – The patient has experienced pain list this before after eating fatty meals but it has subsided.
Past Medical and Surgical Hx

- The patient has a PMH positive for hypertension, obesity, hyperlipidemia, and tobacco abuse.

- The patient has no past surgical history.
Physical Exam

- **Vital Signs:** Temp of 102.6, pulse of 114, respirations 20, blood pressure is 112/66.
- **General Appearance:** The patient is in mild distress. Patient is able to point to localize his pain to the right upper quadrant. She appears jaundiced in color.
- **HEENT:** Oropharynx is unremarkable. Pupils are equal, round and reactive to light. Scleral icterus is noted.
- **Neck:** Supple without lymphadenopathy or JVD.
- **Heart:** Sinus Tachycardia. No gross murmurs or friction rubs.
- **Lungs:** Breath sounds clear and equal in all quadrants
- **Abdomen:** Voluntary Guarding noted when palpation performed near the right upper quadrant.
- **Extremities:** No Edema Noted.
What are our main findings here?

• Charcot’s triad
• Jaundice – secondary to the decreased blood flow through the common bile duct
• Fever – Secondary to the bacterial infection proximal to the obstruction
• Abdominal Pain (RUQ)
Diagnosis

• Acute Cholangitis

• Acute Cholangitis is suspected of progressing to a more threatening condition when Reynolds Pentad is noted.
  – Jaundice
  – Fever
  – Abdominal Pain
  – Hypotension
  – Altered Mental Status
Cholangitis
Patient Presentation 8

42 year old male patient activates EMS with the chief complaint of “Abdominal swelling and constipation.”
History

• O – The constipation started 6 days prior. The patient stated he had some mild periumbilical pain at the time which has persisted.
• P – Nothing makes the pain better or worse. The symptoms have not been relieved by laxatives
• Q – The pain was described as dull and achy
• R - located in the periumbilical region but is has since migrated to the RLQ.
• S – The pain is a 5/10 but the inability to pass fecal material has caused significant distention and distress to the patient
• T – The pain has continued for the full 6 days growing worse with each meal.
Past Medical and Surgical

• The patient has a past medical history positive for hypertension and diabetes

• No past surgical history has been recorded.
Physical Exam

- **Vital Signs:** Temp of 101.6, pulse of 98, respirations 20, blood pressure is 132/86.
- **General Appearance:** The patient is in mild distress. Patient is able to point to localize his pain to the right lower quadrant. His abdomen is clearly distended upon visualization.
- **HEENT:** Oropharynx is unremarkable. Pupils are equal, round and reactive to light.
- **Neck:** Supple without lymphadenopathy or JVD.
- **Heart:** Normal Sinus rhythm. No gross murmurs or friction rubs.
- **Lungs:** Breath sounds clear and equal in all quadrants.
- **Abdomen:** Voluntary Guarding noted when palpation performed near the right lower quadrant. Abdomen is grossly distended throughout. Auscultation reveals high pitched sounds only in the RLQ.
- **Extremities:** No Edema Noted.
Diagnosis

• Appendicitis with secondary small bowel obstruction

• It is not uncommon to see an abscessed appendix serve as a source of bowel obstruction
Take Home Points

• **Acute Abdomen** – sudden, severe, abdominal pain of unclear etiology less than 24 hours in duration
• Pain that has been consistent in nature for **greater than 6 hours** duration

• Any of the following in the upper, middle, or lower abdomen
  – Guarding, Rigidity, Swelling or Fever of unknown origin
  – Pain that is out of proportion for the exam
  – Often times requires rapid transport with surgical consultation
  – Do not forget female specific conditions