



## **Abdominal Pain: Case Presentations**

Most abdominal pain in the emergency department is not dangerous or life threatening; however, life-threatening abdominal pain often mimics that with benign causes. The lecturer will use a case presentation format to examine abdominal pain and help you develop a broad differential diagnosis. You will have a better understanding of recommendations for the diagnosis, workup, treatment, and disposition of abdominal pain.

- Develop a differential diagnosis of abdominal pain, including nonabdominal causes.
- Describe a diagnostic approach to the evaluation of abdominal pain, and discuss current recommendations for the management of abdominal pain.

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## **FACULTY**

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## Case Studies in Abdominal Pain

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**Course Rationale and Description:** Most abdominal pain in the ED is not life-threatening. However, life-threatening abdominal pain often mimics benign causes and vice-versa. This course uses a case presentation format to examine abdominal pain and helps you develop a differential which includes the possible life-threatening etiologies. You will have a better understanding of recommendations for the diagnosis, evaluation, treatment, and disposition of patients with the chief complaint of abdominal pain.

The cases in this syllabus are followed by detailed case discussions. None of the cases present in “text book” fashion because they are all real cases over the last several years; this provides for the greatest applicability to the real ED experience.

### Suggestions for a safe evaluation of abdominal pain

- After the first several minutes with a patient consider a differential diagnosis of all the dangerous pathologies possible that fit the age, sex, and presenting signs and symptoms of the patient.
- If you are unable to rule out the dangerous pathologies on the differential either consult or admit. Do not send the patient home.
- Repeat the vital signs and exam after each new therapy, during periods of observation, and before discharge is considered,
- Only half of ED patients with abdominal pain are discharged with a specific diagnosis and in half of them the diagnosis is incorrect.
- The very old, the very young, and the very sick almost never present with typical signs and symptoms: a thorough work up and admission is warranted in most cases.
- Women of childbearing age are pregnant until proven otherwise
- All patients with abdominal pain need follow up. If quick follow up cannot be obtained through a personal physician, have the patient return to the ED to be re-examined

Case 1: An 84 year old female presents with 2 day history of nausea, vomiting and abdominal pain. The pain is constant in both lower quadrants. She denies anorexia, hematemesis, diarrhea, constipation or urinary tract symptoms. She has no significant PMH, medications, or allergies

Physical exam: Pleasant white female who looks much younger than stated age in "moderate" distress. Vitals: HR 97, BP **94/60**, RR 18, T 37.6 °C, O<sub>2</sub> Sat 95% on RA. HEENT: normal. Cardiac: normal. Pulmonary: normal. **Abdomen**\*:soft, bilateral lower abdominal tenderness with rebound and guarding. Rectal: **heme** negative brown stool. Pelvic: normal. Back: no CVA tenderness. Urine dipstick: ++ Leukocytes, + **heme**.

#### Differential Diagnosis

- 🙌🙌🙌
- Appendicitis
- Diverticulitis
- Mesenteric ischemia
- UTI
- **Volvulus**

What is your next step?  
What tests do you want?

Labs: WBC: 9.0, rest all normal UA: WBC 6, RBC 7, Epi: mod  
Abdominal Series: normal

What next?

The surgical consult recommended discharging the patient over the phone and treating her for a UTI, given the abnormal urine, and normal WBC and temperature. After agreeing to see the patient in person, the consult ordered a CT scan which suggested perforated appendicitis.

Surgical pathology showed acute suppurative appendicitis with rupture

#### Appendicitis

Pathophysiology:

- Ischemic necrosis of appendix and infection of devitalized tissue with bacteria

Epidemiology:

- Lifetime prevalence 7%

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\* Bowel sounds will not be found in this syllabus because they have never been proven to be helpful in diagnosis.

- Up to 25% of ED patients < 60 years of age with abdominal pain will ultimately prove to have appendicitis versus 5-7% of geriatric patients with abdominal pain.
- 22-40% of elderly ED patients with abdominal pain require surgical treatment.
- Mortality is 7% for ED patients >80 years with abdominal pain.

Etiology:

- Luminal obstruction with fecal matter with resulting distention and increased pressure on tissues

Signs/Symptoms:

- Sensitivity and Specificity of various signs and symptoms has been well studied. No single finding has proven sensitive or specific enough to be useful in isolation. Diagnosis based on history and physical exam remains an "art". (Wagner 1996)
- The elderly don't follow this typical presentation and display fever, rebound, and guarding <50% of the time.
- 20-30% of patients with appendicitis have symptoms and/or a UA indicative of infection.

Table below lists sensitivity and specificity of various signs and symptoms from meta-analysis by Wagner on all age patients.

Sign or symptom	Sensitivity(%)	Specificity(%)
RLQ pain	81	53
Rigidity	27	83
Migration of pain	64	82
Psoas sign	16	95
Fever	67	79
Rebound	63	69
Guarding	74	57
No history of similar pain	81	41
Rectal tenderness	41	77
Anorexia	68	36
Nausea	58	37
Vomiting	51	45

Laboratory:

- WBC
  - 1) Sensitivity approximately 80%, specificity much lower
  - 2) More likely to be normal early in the course of disease, in immunocompromised, or at the extremes of age when diagnosis is difficult
  - 3) Addition of neutrophilia increases sensitivity but decreases specificity
- C-reactive protein -doesn't add much diagnostic power over WBC. role in diagnosis is unclear in 1998 (Hallan 1997).

Radiology:

- Ultrasound (Meta-analysis by Orr 1995)

- 1) Helpful if positive, but cannot exclude diagnosis
- 2) Accuracy in expert hands 83%-96%
- 3) Can diagnose other important diseases in differential diagnosis – especially female pelvic disorders
- 4) Very operator dependent – limits utility in most centers, general accuracy probably much lower than that found in the literature
- **CT scan (the NEW and IMPROVED method to diagnose appendicitis?)**
  - 1) In expert hands probably very sensitive (96%-100%).
  - 2) New studies done on select ED populations which exclude low risk patients, may falsely elevate sensitivity (Rao 1997).
  - 3) Useful in diagnosing other abdominal pathology in differential: AAA, diverticulitis, nephrolithiasis, cholelithiasis, colon CA, mesenteric adenitis.
  - 4) Probably better at diagnosing appendicitis than ultrasound in most centers
  - 5) **Cannot use standard CT done in the community to exclude the diagnosis in 1999!** (It has only been proven to be sensitive on *admitted* patients and a has not been applied to the ED population as whole.)

Treatment:

- Surgical removal
- Very ill patients with rupture and abscess may have **percutaneous** drainage

*Teaching points*

- 1) *Imaging tests are most helpful in patients who do not have clear cut appendicitis (the very old, very young, those with comorbid diseases); If positive can have more timely operation.*
- 2) *Don't be dissuaded from proper diagnostic evaluation by the seeming presence of urinary tract infection in elderly persons.*

**Case 2:** A 29 year old female presents with an acute onset of severe right lower quadrant pain 3 ½ hours prior to arrival. The pain awoke her from sleep and is accompanied by vomiting and chills. She denies fever, vaginal discharge, vaginal bleeding, or dysuria. She had a similar pain **1day** ago and was evaluated at another ED and given Bactrim for a presumptive UTI. She has no PMH or PSH and takes no medications except Bactrim. LMP: 6 days ago.

Physical Exam: Young female crying in pain. Vitals: HR 105, BP 120/81 RR 28, T 37. °C, and O<sub>2</sub> Sat 99% on RA. HEENT, Cardiac, Pulmonary, Skin, and Extremities: normal. Abdomen: very tender diffusely with rebound and guarding in the RLQ. Pelvic exam: cervical os closed, no CMT, bilateral adnexal and uterine tenderness, no abnormal masses. Rectal: tender with palpation R>L, **heme** negative brown stool.

Differential Diaanosis:

Appendicitis

Cecal volvulus

Diverticulitis with perforation (in a 29 year old?)

Ectopic pregnancy (ruptured)

Nephrolithiasis  
Ovarian Torsion  
Ovarian cyst rupture  
Tubo-ovarian abscess with rupture  
Torsion of a uterine fibroid

What tests do you want?  
Can the patient be given pain medicine?

Urine pregnancy: negative  
Urine dipstick: negative  
Bedside hemoglobin: 14

A surgical consult is called 30 minutes **after** the initial patient evaluation, She requests that no opiates be given to the patient before her exam. Fifteen minutes later the consult arrives and 5 minutes later the patient receives fentanyl. The consult recommends an abdominal series and a GYN consult.

Labs: UA 3 WBC, 2 RBC. WBC 15.2, Hct 42.8. Rest normal.  
Abdominal series: normal, no free air.

Next diagnostic test?

Pelvic ultrasound: 8 x 7 cm cystic mass with multiple septations anterior to uterus. Left ovary normal, right not visualized.  
The GYN service recommends laparoscopy for presumptive tubo-ovarian abscess. At surgery a twisted 10 x 10 cm hemorrhagic right ovary and 4 cm right fallopian tube are found 2 full revolutions from their natural position.

### Ovarian Torsion

Pathophysiology:

- Rotation of the adnexa around its vascular pedicle causing ischemic necrosis of the ovary and tube with resultant infertility if not treated.

Epidemiology:

- 15% of cases occur during infancy and childhood due to the relatively mobility of the adnexa during that time.
- Approximately 20% of cases occur during pregnancy due to increased vascularity and displacement of the adnexa by the growing uterus.
- Occurs 1.5 times as often on the right side (probably a work-up bias)

Etiology:

- Most often occurs in the setting of large ovarian cysts, but can occur in normal ovaries in up to 20% of cases.

Signs/Symptoms:

- Acute, severe pain localized to the RLQ or LLQ
- Nausea and vomiting at the time the pain starts (versus appendicitis when they come later).



- More than 50% have a history of similar episodes that resolved spontaneously.
- Impressive adnexal tenderness, less CMT than with PID
- A palpable adnexal mass less than 50% of the time.

Diagnosis:

- Mainly a clinical diagnosis -a high index of suspicion must be maintained in the appropriate clinical scenario.
- Laboratory: fever and leukocytosis rare, occurring less than 20% of the time in one study (Meyer et al).
- Radiology:
  - 1) Standard pelvic ultrasound can reveal the presence of a large cyst, but cannot reliably diagnose the torsion.
  - 2) Color Doppler Sonography can confirm flow to the ovary which correlates with ability to salvage fertility 94% of the time (Shalev).
  - 3) New technique: A 1997 Korean study by Eun Ju Lee uses Color Doppler Sonography to detect a "twisted vascular pedicle" which was 87% sensitive at diagnosing torsion preoperatively. Additionally this technique predicted ovarian necrosis in all 12 patients in whom surgery ultimately confirmed the diagnosis.

Treatment:

- Emergency laparoscopy.
- Traditionally salpingo-oophorectomy was performed without untwisting due to the theoretical fear of pulmonary embolism from a thrombosed vein and the inability to determine viability of the ovary.
- Recent studies in the last 5 years confirm the safety of laparoscopic detorsion with preservation of fertility in a majority of cases who had blood flow on color doppler sonography preoperatively (Lee, Bayer, Mayer).
- Contralateral oophoropexy recommended in cases of torsion of a normal adnexa when the torsed ovary is resected (Steyaert).

Use of pain medicine for patients with abdominal pain

- The common practice of withholding pain medicine from patients with abdominal pain for fear of altering the exam and clouding the diagnosis is not supported in the literature.
- All available studies (LoVecchio, Pace, Zoltie) on this topic show that pain medicine indeed relieves suffering versus placebo without altering diagnostic abilities of clinicians.
- Many studies show that the use of pain medicine even aids the clinician in making the correct diagnosis.
- In many cases it is reasonable to negotiate with the surgical consult who may not be familiar with or agree with the literature support for analgesics in abdominal pain. For example: if the consult will be delayed more than 15 or 20 minutes then a short acting narcotic, such as fentanyl will be given prior to their exam.

Teaching Points

- 1) *Consider the diagnosis of ovarian torsion in all females at or below child bearing age that present with localizing lower abdominal pain,*
- 2) *The use of analgesia in patients with abdominal pain does not hinder diagnosis and is the humane choice for our patients.*

Case 3: A 6 month old male presents with intermittent screaming for 1 to 2 days. His parents say that he has been drawing up his legs, holding his abdomen, and screaming several times an hour. He has vomited food 2 times and has not had a bowel movement today. He has no past medical history, takes no medications, and has no allergies. His parents are concerned that he has had a "reaction" to his routine 6 month immunizations given 1 week ago.

Physical Exam: HR 132, BP 89/60, RR 21, T 37.3, and O<sub>2</sub> Sat 95% on RA. The patient is quietly resting in his parents lap. HEENT: dry mucous membranes, otherwise negative. Chest and Pulmonary: normal. Abdomen: soft, non-tender. Rectal: normal tone, no stool. Extremities: normal.

Differential Diagnosis:

- Appendicitis
- Child abuse
- **Corneal** abrasion
- Hair tourniquet
- Incarcerated Hernia
- Intussusception
- Malrotation with volvulus
- Meckel's diverticulitis
- Sickle cell disease
- Testicular Torsion

Additional Information:

**Vomitus:** mostly food, nonbilious

No history of constipation in the past, no toxic ingestions, decreased urine output in last day

Eyes: no cornea abrasion with fluorescein dye

Genital Exam: normal male, nontender

Skin: normal

Extremities: normal, no hair tourniquets

Repeat rectal: **heme** positive brown stool

Labs: Hb 12, Hct 34, WBC 11, Na 132, Cl 101, Bicarb 24, K 3.4, Cr 0.9, Bun 20, Glu 80.

Abdominal Series: nonspecific bowel gas pattern

Next step?

Water soluble enema showed an intussusception that was easily reduced during study.



Intussusception:

Pathophysiology:

- Intestine telescopes into itself
- Most common site is **ileo-colic**
- Blood supply in mesentery also involved leading to venous congestion, arterial compromise, and ultimately gangrene

Epidemiology:

- Ages 3 month to 5 years, peak 6-11 months

Etiology:

- Usually idiopathic in young children (less than 5% have lead point)
- Older children usually have pathologic lead point

Signs/Symptoms:

- Classic triad found in only **20-40%** of cases
  - 1) Colicky abdominal pain (**50-90%**)
  - 2) Vomiting (63-90%)
  - 3) **Heme** positive stool ("current jelly" stool very rare)
- Occasionally a mass may be felt in RUQ or RLQ
- Can present with lethargy or altered mental status
- An episode of pain should be observed in ED

Laboratory:

- Lab tests are not useful to make the diagnosis but can rule out metabolic etiologies.

Radiology:

- Abdominal Series – suggestive signs are helpful, but not sensitive enough to rule out the diagnosis (Smith 1992)
  - 1) Visible abdominal mass
  - 2) Abnormal distribution of gas and fecal contents
  - 3) Air fluid levels and dilated loops of small bowel
  - 4) Interrupted air column in large bowel (Lazar 1995)
  - 5) Specific, but not sensitive indicators: "Target sign" and "Meniscus sign"
- Ultrasound -
  - 1) Most sensitive (**98%-100%**) in expert hands but very operator dependent
  - 2) Standard of care in the Far East (Bhisitkul 1992)
  - 3) Identifies pathologic lead point if present which are missed by x-ray study
  - 4) Doppler ultrasound may differentiate which cases cannot be reduced with enema.
- Fluoroscopic study using air, water soluble contrast, or barium- currently the gold standard for diagnosis in the United States.

Treatment:

- Hydration, pain medication
- Surgery: indicated for patients with peritonitis, perforation, shock, or unsuccessful reduction with enema

- Enema reduction: Air or saline enema reduction consistently proven to be safer and deliver less radiation to the patient than barium. (Guo 1985, Wang 1995, Rohrschneider 1995, **Daneman** 1995, Campbell 1989, Gu 1993).
  - 1) Barium noxious if spilled into peritoneum through undiagnosed perforation.
  - 2) Ultrasound guided air or saline reduction eliminates radiation dose
  - 3) Air enema's for reduction first described method of treatment by Samuel Mitchell in the 1836.
- After successful reduction short admission for observation indicated
- Recurrence rate **0.5-15%**, most in first 24 hours
- Possible association with Rotavirus Vaccination (**RotaShield**)
  - 1) Based on passive reporting to the Vaccine Adverse Events Reporting System(VAERS) and a post-licensure study of adverse events Kaiser study (OR 1.9 CI:0.5-7.7).
  - 2) Increased risk occurs within 3 weeks of vaccination.
  - 3) Occurs in younger age group than previously described
  - 4) CDC Case-control study underway: results?
  - 5) In July, 1999 CDC and AAP recommended that **RotaShield** vaccination be postponed until November 1999.
  - 6) All cases which occur after **RotaShield** should be reported to VAERS (800-822-7967, [WWW.fda.gov/cber/vaers/report.htm](http://WWW.fda.gov/cber/vaers/report.htm))

*Teaching Points:*

- 1) *Abdominal exam and stool **often** normal in intussusception.*
- 2) ***History** most important factor in making diagnosis.*
- 3) *In cases of low suspicion, observe patient in the department for episode of pain before deciding to discharge.*

Case 4: A 45, **G4P4** year old female presents with a 6 day history of **crampy** LLQ pain radiating to the back. She admits to night sweats, intermittent fevers, and decreased urine output, but denies dysuria or any GI symptoms. 5 weeks earlier she had a NSVD of a term infant followed by immediate bilateral tubal ligation. She has no significant past medical history, takes no medications, and has no allergies.

Physical Exam: Well nourished white female in no obvious distress. Vitals include HR 112, BP 130/90, RR 18, T 37.3°C, and O<sub>2</sub> Sat 98% on RA. Abdominal exam: soft with healing umbilical scar and LLQ tenderness, guarding and rebound. No CVA tenderness. Rectal: **heme** neg brown stool.

Should pelvic exam be performed soon after delivery? How soon is OK?

Differential Diagnosis:

- Diverticulitis
- Nephrolithiasis
- Ovarian Torsion

- Pyelonephritis
- Post-operative abscess
- Tubo-ovarian abscess

Additional information:

ED course: Patient continued to complain of pain and requests analgesia.

Urine pregnancy test: negative

Pelvic: moderate left adnexal tenderness and mild uterine tenderness no masses or CMT.

UA: 2 WBC, 1 RBC, trace ketones

WBC: 11.9

Rest of labs normal

Next diagnostic test?

Suspecting adnexal pathology, the treating physician ordered an US which showed a thickened loop of bowel and a complex 6.5 cm cystic mass in the LLQ. CT of the abdomen further elucidated the mass involving the sigmoid colon.

Diagnosis: Diverticulitis?

**Diverticulitis: (in a young woman? Yes!)**

Pathophysiology:

- Food and bacteria become trapped in **colonic** diverticula and create a localized infection that can lead to abscess and perforation.
- Most often involves the sigmoid colon.

Epidemiology:

- Formerly thought to occur only in people over age 40, the advent of CT has allowed us to diagnosis more young patients with this disease (Spivak 1997, Mader 1994).
- At least 2% of those younger 30 year old and younger have diverticuli.
- 30% of people over age 60 have diverticula.

Etiology:

- Weakening of bowel wall at points of perforation of vessels due to increased intraluminal pressure from straining and hard stools

Signs/Symptoms:

- LLQ pain, occasionally LUQ or RLQ in location.
- Pain worse with bowel movements,
- Localized tenderness and guarding,
- Frequently febrile.

Diagnosis:

- Labs often not helpful, may have increased WBC.
- Abdominal Series: usually not helpful unless perforation or obstruction suspected.
- CT scan of the abdomen usually makes the diagnosis; can be false negative with concomitant bowel obstruction due to obscuring air filled loops of bowel.

- Barium enema and colonoscopy relatively contraindicated in acute setting due to risk of perforation,

Treatment

- Very mild cases: high fiber diet and stool softening agents +/- p.o. antibiotics
- Moderate cases (fever, vomiting, severe pain): IV fluids, IV antibiotics, admission
- Severe cases (signs of sepsis, bowel obstruction, or perforation): surgical resection or percutaneous drainage
- All patients who are discharged from the ED need to have follow up barium enema or colonoscopy to confirm the diagnosis and rule out malignancy which occasionally is mistakenly diagnosed as diverticulitis.

Hospital course:

The patient was placed on intravenous antibiotic therapy and taken to the operating room by the general surgery service. The sigmoid colonic abscess was resected with primary anastomosis. Final pathology showed no evidence of diverticular disease, but abscess secondary to a colonic perforation.

*Teaching points:*

- 1) *Although uncommon, diverticulitis can occur in younger patients.*
- 2) *Vasectomy is a safer choice for surgical **sterilization**. (humor)*

Case 5: A 90 year old female presents with a one day history of diffuse abdominal pain, nausea, and vomiting. She denies diarrhea, and blood in her vomit or stool. She admits to dysuria and decreased oral intake for 2 days. Her last bowel movement was 1 day ago and was normal. Her PMH is significant for an MI and angioplasty 7 years ago, **atrial** fibrillation, hypertension, breast cancer, gallstones, and CHF. Past Surgical history includes radical mastectomy for breast cancer and abdominal hysterectomy. Medications include procainamide, lasix, vasotec, pepcid, digoxin, and nitrofur.

Physical Exam: Thin elderly female lying quietly on gurney. Vitals: HR 100, BP 120/94, RR 20, T 36.2 °C, and O<sub>2</sub> Sat 94% on RA. HEENT and extremity exam are normal. Chest: decreased BS on right side. Cor: Irregularly Irregular. Abdomen: soft, non-distended with diffuse tenderness and guarding, no rebound or rigidity. Rectal: **heme** negative brown stool. No CVA tenderness.

Differential Diagnosis:



- Aortic dissection
- **Biliary** tract obstruction
- Bowel obstruction
- Cardiac ischemia
- Digoxin toxicity
- Mesenteric ischemia

- **Urosepsis/pyelonephritis**
- Pancreatitis
- Peptic ulcer disease with perforation
- Pneumonia

Additional information:

Equal pulses and BP bilaterally

EKG: **atrial** fibrillation with gradually down-sloping ST segments inferio-laterally

Abdominal series: no signs of perforation or obstruction, normal mediastinum

Repeat temp: 37.9

Dig level: 2.0

After a period hemodynamic stability, CT was obtained which showed a small right pleural effusion and was otherwise normal. The cross-covering physician instructed us to discharge the patient and have the family call the PMD later.

Should an elderly patient with significant abdominal tenderness and no etiology for abdominal pain be discharged from the ED?

Labs: Normal except Cr 1.7, Glucose 167, WBC 18.6 diff 95% **PMN's**, **Troponin <0.5.**, Labs obtained after decision to admit: SGOT 178, **T.Bili 4.0** (indirect 2.4). amylase 641, lipase 192

Diagnosis: Cholecystitis, Cholangitis, Pancreatitis.

#### Cholecvstitis:

Pathophysiology:

- Outflow obstruction to bile causes increased intraluminal pressure, decreased gallbladder wall perfusion, necrosis, and infection of the organ

Epidemiology:

- Up to 20% of total US population have cholelithiasis
- More common in the elderly (50% prevalence)
- Approximately 25% of elderly presenting to the ED with an acute abdomen ultimately prove to have cholecystitis (**Fenjo**) making it the number one cause of acute abdominal pain in older patients,
- **22-40%** of elderly ED patients with abdominal pain require surgical treatment,
- Mortality is 7% for ED patients **>80** years with abdominal pain.
- Individuals with cholelithiasis have a 6% chance of developing cholecystitis per year.

Etiology:

- Obstruction most often due to cholesterol or bilirubin stones,
- 10% of cholecystitis due to sludge or acalculous.

Signs/Symptoms:

- Classically RUQ colicky pain that becomes constant as infection or continuous obstruction progresses.
- Frequent nausea, occasional vomiting.

- Fever usually absent (Singer 1996).
- Murphy's sign (patients stops inspiring during palpation of the RUQ 2ndary to pain) is approximately 97% sensitive and 50% specific for acute cholecystitis.
- Elderly often present atypically and may not even have pain.

Laboratory:

- WBC – elevated in only about 60% of patients with cholecystitis (Gruber 1996, Singer 1996).
- **LFTs** – elevated with complete biliary obstruction over time, not helpful in the diagnosis of cholecystitis.

Radiology:

- Ultrasound
  - 1) Most often available.
  - 2) **88-94%** sensitive (Shea 1994).
  - 3) Quick.
- Nuclear medicine scans (**HIDA** scans)
  - 1) 97% sensitive (Shea 1994)
  - 2) Not available at all times.
  - 3) Takes several hours.
  - 4) Requires fasting state
- **CT Scan**
  - 1) Not studied well for detection of cholecystitis.
  - 2) May be insensitive for biliary tract abnormalities, especially if the study is being performed for other indications.

Treatment:

- Supportive: IV fluids, pain medicine
- Antibiotics
- Surgical removal

*Teaching Points:*

- 1) *Elderly patients with abdominal pain should not be discharged from the ED based on the results of 1 normal test.*
- 2) *CT scans of the abdomen may not always reveal gallstones, if clinical suspicion points to stones follow up CT with US.*
- 3) *Elective cholecystectomy is indicated in elderly patients after symptomatic cholelithiasis.*

Case 6: 78 year old male is brought to the ED by paramedics after a 3 hour history off epigastric pain, RLQ pain and nausea. The epigastric pain radiates to the back but has subsided now. The patient also complains of nausea and admits to falling 1 week ago. PMH is significant for CAD, CHF, CVA's, HTN, and prostate CA. Patient had a BP of 90/60 and HR of 60 in the field, described as pale and diaphoretic.

Physical exam: WNWD male in “mild” pain. HR 61, BP 161/95, RR 17, T 36.4 °C. Exam is recorded as normal except for abdominal exam: positive bowel sounds, tender in epigastrium with a questionable palpable aorta.

### Differential Diagnosis

- 🙌🙌🙌
- Aortic dissection
- Biliary Tract Disease
- Cardiac ischemia
- Mesenteric Arterial Embolus
- Nephrolithiasis
- Pancreatitis
- Peptic ulcer with perforation
- Vertebral fracture

Additional information:

EKG: NSR, no signs of ischemia

Next diagnostic test of choice?

In the ED we always need to rule out life threatening causes. Given the non-specific nature of this patient's pain and risk factors one must consider highly lethal conditions a leaking AAA and Mesenteric Ischemia.

Stat bedside Ultrasound:

- Can diagnose the presence or absence of a AAA.
- Will not differentiate whether or not AAA is leaking.
- Allows for continued careful monitoring of patient
- Operator dependent.

CT Scan of abdomen

- Diagnoses presence and if AAA is leaking
- Patient must leave the department.
- Less operator dependent.
- Excellent at diagnosing other pathology.

Stat Bedside Ultrasound: 7.5 cm AAA

Next move?

Stat Surgical Consult

### Abdominal Aortic Aneurysm

Pathophysiology:

- Localized dilatation of aorta involving all layers of vessel wall



Epidemiology:

- 2-4% prevalence over age 50
- 10% prevalence over age 80
- **five** times more common in males

Etiology:

- Cause currently unknown
- Associated with long history of hypertension and atherosclerosis

Signs/Symptoms:

- Without rupture or leakage most are asymptotic
- With rupture
  - 1) Abdominal or back pain
  - 2) Hypotension
  - 3) Exam may be misleading: often without significant tenderness, may not palpate a pulsatile mass

Laboratory:

- Not helpful

Radiology:

- Plain film radiographs
  - 1) Suggests **AAA** 60% of the time
  - 2) Best view is lateral lumbar spine film
  - 3) Should never be used to rule out **AAA**
- Ultrasound:
  - 1) Can diagnoses the presence or absence of a **AAA**
  - 2) Will not differentiate whether or not **AAA** is leaking or ruptured
  - 3) Allows for continued careful monitoring of patient
  - 4) Operator dependent
- CT Scan of abdomen
  - 1) Diagnosis presence and if **AAA** is leaking or ruptured
  - 2) Patient must leave the department
  - 3) Less operator dependent
  - 4) Excellent at diagnosing other pathology
- Angiography
  - 1) Less sensitive than other modalities and more **invasive**
  - 2) Main role is preoperative evaluation of elective AAA repair
  - 3) No role in emergency evaluation of suspected leaking **AAA**

Treatment:

- For leaking AAA
  - 1) Immediate surgical consult
  - 2) Fluid/blood transfusion to maintain adequate end organ perfusion
  - 3) Mortality 100% without surgery; 50% with surgery overall: mortality greater when rupture occurs into abdominal cavity (Satta 1998)
  - 4) One recent study found that emergency surgery in patient over 80 years of age only prolonged life by an average of 1 week. (Robinson 1997)
  - 5) New treatments involve endovascular graphs placed via femoral artery under fluoroscopic guidance. (Blum 1996)
- For asymptotic non-ruptured AAA

- 1) Refer for elective surgical or transfemoral repair
- 2) Treatment of even small aneurysms shown to improve survival in almost all patients: even octogenarians
- 3) Elective repair mortality: 1-5%

Hospital course: The surgical consult arrived approximately 45 minutes into the patient's ED course at which time patient complained of increased abdominal and back pain. He was given pain medicine but continued to have pain and became hemodynamically unstable. All resuscitative efforts, including blood transfusion and emergency department thoracotomy failed to save the patient and he officially expired less than 2 hours after arrival.

*Teaching Points:*

- 1) *If a diagnosis seems likely based on field information; prepare ahead of time by **notifying** technicians and consults.*
- 2) *For hypotensive patient with suspected rupture: Call surgeon immediately, don't delay for diagnostic studies.*
- 3) *There will be cases that can't be saved in the time they present to the ED; recognize this for the sake of your sanity.*

Case 7: A 36 year old female presents with an acute onset diffuse lower abdominal pain. The pain is constant, dull, and radiates to the xyphoid. She states that she is 4 weeks pregnant after being treated with gonadotropin injections for infertility secondary to prenatal DES exposure. An ultrasound performed 1 week before by her **OB/GYN** reportedly showed an intrauterine pregnancy. She denies nausea, vomiting, diarrhea, vaginal bleeding or GU complaints.

Physical Exam: HR 85, BP 106/184, RR 18, T 37.2 °C, and O<sub>2</sub> Sat 100% on RA. Abdomen: soft, diffusely tender with moderate diffuse guarding, no rebound. Pelvic: scant white discharge, moderate cervical motion tenderness and left adnexal tenderness. Uterine size seems about 4 cm and no adnexal masses are palpated.

Differential Diagnosis:

- Appendicitis
- Ectopic pregnancy
- Hemorrhagic ovarian cyst
- Ovarian torsion
- Pelvic inflammatory disease
- Threatened abortion
- Tubo-ovarian abscess

Additional information:

Patient is very dizzy when she attempts to get up from gurney and her pulse goes up to 129.

Pregnancy test: positive

Bedside hemoglobin: 10.5

Quantitative  $\beta$ -HCG: 2557 eight days before admission, 6732 in ED

Serum Progesterone: 25 ng/ml

Does this patient need further evaluation or can her symptoms be attributed to a ruptured corpus luteal cyst or a threatened abortion?

#### Additional Evaluation

Bedside Ultrasound

Ob/Gyn consult

IV fluids

Type and cross for possible blood transfusion

Rh status

**Transvaginal Ultrasound:** hypoechoic 5.5 mm by 5.1 mm structure within the uterus, bilaterally enlarged cystic ovaries measuring 4-5 cm each. Free fluid was seen adjacent to the left ovary in addition to a 1.1 cm echogenic ring with a hypoechoic center and a second smaller ring with a linear lucency within the first ring.

Does the patient have an intrauterine pregnancy or an ectopic pregnancy or both?

If she remains hemodynamically stable and has an ectopic pregnancy should she be treated with methotrexate to preserve possible fertility?

#### Ectopic Pregnancy

Pathophysiology:

- Erosion of growing gestation into fallopian tubes leading to tubal distention and hemorrhage

Epidemiology:

- 1.6% of all pregnancies
- Risk factors include: PID, infertility, present IUD, tubal surgery, prior ectopic, DES exposure, and smoking.
- Almost half of all cases occur in women without risk factors (Stovall 1990)
- Most common cause of non-traumatic maternal death in 1<sup>st</sup> trimester
- Heterotopic pregnancies which traditionally occur in only 1/30,000 to 1/3,000 pregnancies are more common in patients being treated for infertility.

Etiology:

- Ovum implantation in extrauterine location

Signs/Symptoms:

- Abdominal pain (90-100% of cases)
- Vaginal bleeding (50-80% of cases)
- Tachycardia and hypotension secondary to rupture and hemorrhage (<5%)

- Abdominal tenderness (50%)
- Cervical motion tenderness (50%)
- Adnexal mass (25-30%)
- Warning: exam has never been proven to be a useful test in ruling out ectopic pregnancy

#### Laboratory:

- Urine qualitative  $\beta$ hCG
  - 1) Most commonly used to diagnose pregnancy
  - 2) Correlates with a serum  $\beta$ hCG of 10-50 mIU/ml
  - 3) Diagnoses 90% of pregnancies within 3 weeks of ovulation
  - 4) 95-100% sensitive when compared with serum test
  - 5) False negative test due to  $\beta$ hCG <50 mIU/ml or dilute urine
  - 6) Would miss only 1/2000 ectopic pregnancies, most too small to be dangerous
- Serum  $\beta$ hCG
  - 1) Minimal difference in sensitivity compared to urine
  - 2) Helpful in highly suspicious cases with negative urine test
  - 3) Quantitative levels helpful in interpreting ultrasound and following patient progress
  - 4) Normally doubles in 48 hours for IUPs when  $\beta$ hCG is <10,000 mIU/ml
- Signs of intrauterine pregnancy should be seen transabdominally when quantitative  $\beta$ hCG is above 6,500 mIU/ml
- Signs of intrauterine pregnancy should be seen transvaginally when quantitative  $\beta$ hCG is above 1,500 mIU/ml

Sonographic sign	Gestation (from LMP)	$\beta$ hCG (mIU/ml)
Gestational sac (transvaginal)	4 ½ to 5 weeks	>1,000-1,500
Gestational sac (transabdominal)	6 weeks	>6,500
Yolk sac	5-6 weeks	>7,200
Fetal pole/fetal heart tones	5 ½ to 7 weeks	>10,800

- Serum Progesterone
  - 1) Very low values (<5 ng/ml) predictive of abnormal pregnancy in 97-100% of patients
  - 2) High values (>25 ng/ml) predictive of normal pregnancy in 97% of patients
  - 3) Intermediate values not helpful in evaluation
  - 4) Limited utility in 1999 (may be useful in cases when combination of  $\beta$ hCG and ultrasound are non-diagnostic)

#### Radiology:

- Ultrasound
  - 1) Diagnostic in 80-90% of cases at 6-7 weeks
  - 2) Can diagnose ectopic earlier, but may be non-diagnostic
  - 3) Does not exclude diagnosis as 20% of ectopics have non-diagnostic scan

- 4) All pregnant women with pelvic complaints and no fetal heart tones that are not clearly having a spontaneous abortion deserve a prompt ultrasound to evaluate for ectopic pregnancy
- 5) Patients with non-diagnostic scans (IO-20% of patients) need further evaluation with serial  $\beta$ hCG and/or serial pelvic ultrasound
- 6) Endometrial stripe thickness
  - a) A 1999 study by Dart et al found endometrial stripe thickness predictive of ectopic pregnancy when the quantitative  $\beta$ hCG is  $<1,000\text{mIU/mL}$ .
  - b) A thickness  $< 8\text{mm}$  (or radiologists read of "thin") was 93% sensitive in identifying ectopic pregnancies in this group.
  - c) The "thin" sign had a specificity and PPV of only 27%, NPV:92%.
  - d) Future research using clearly defined and possibly larger cutoffs for size may prove to have even greater sensitivity.

Treatment:

- Laparoscopic surgery by **OB/GYN**
- **Chemotherapeutic** agents (e.g. methotrexate) which retard the growth of the ectopic gestation and hopefully maintain tubal patency. Criteria for use of Methotrexate includes: stable patients, empty uterus, and ectopic gestation  $<3.5\text{ cm}$  as measured by ultrasound.

Hospital course:

This patient clearly had an abnormal pregnancy as her quantitative  $\beta$ hCG did not double as expect; it would have been over 9,000 at the time of evaluation and she should have had more concrete signs of an **IUP** on ultrasound given a value over 6,000. The 1.1cm mass adjacent to the right ovary was almost certainly an ectopic pregnancy. Methotrexate is contraindicated in this case as the patient may still have an intrauterine pregnancy as well.

The patient underwent laparoscopic surgery where a 2cm ectopic pregnancy was discovered in the **fimbriae** of the left adnexa. It was removed without excising the tube. The patient had a NSVD of a term infant 8 months later.

Diagnosis: Heterotopic pregnancy

*Teaching Points*

- 1) *All 1<sup>st</sup> trimester pregnant women with abdominal pain and no fetal heart tones have an ectopic pregnancy until proven otherwise*
- 2) *History and physical exam are insensitive and unreliable in diagnosing or excluding ectopic pregnancy.*
- 3) *History of an ultrasound documenting IUP is insufficient to exclude the diagnosis of an ectopic unless the specifics of the study can be documented.*

Case 8: An 89 year old male presents with a 2 day history of diffuse lower abdominal pain. The pain is severe, colicky, and associated with back pain. The patient denies nausea, vomiting, or genitourinary tract complaints. The caretaker states that the patient has had daily loose brown bowel movements and his usual

appetite. The patient lives with a full time caretaker and needs assistance with all his instrumental activities of daily living. He feeds himself and ambulates with a walker.

PMH includes hypertension, CHF, CVA with residual right hemiparesis, renal insufficiency, Parkinson's, upper GI bleed secondary to esophagitis, BPH, recurrent UTIs, and a left inguinal hernia. He has had no prior abdominal surgeries.

Medications include Sinemet, Lasix, K-Dur, vasotec, prilosec, and norvasc.

Physical Exam: Thin elderly male in no acute distress the majority of the time but occasionally moans in pain for several seconds. Vitals include HR 114, BP 188/110, RR 24, T 37.4 °C, O<sub>2</sub> Sat 94% on RA. Abdomen: soft, moderate distention, mild suprapubic tenderness, no rebound or guarding. Rectal: heme negative brown stool.

Differential Diagnosis:

- AA4
- Cholelithiasis
- Colon Carcinoma with obstruction
- Diverticulitis
- Fecal impaction
- Incarcerated Inguinal Hernia with Small Bowel Obstruction
- Mesenteric Ischemia
- Nephrolithiasis
- Urinary tract infection
- Urinary tract obstruction
- Volvulus

What elements of the physical are missing? What tests will help you?

Additional information

Genital Exam: very large, easily reducible, non-tender, left inguinal hernia (unchanged per patient)

EKG: NSR, unchanged from prior study

UA: 20 WBC 10 RBC rest normal

All other labs normal

The patient has a UTI, is further work up needed?

Abdominal series: severely dilated single loop of colon in left abdomen

Sigmoid Volvulus:

Pathophysiology:

- Rotation of bowel segment around its mesenteric axis leading to luminal obstruction, vascular insufficiency, and eventual bowel necrosis.



Epidemiology:

- Causes 56% of all large bowel obstructions (3<sup>rd</sup> leading cause after cancer and diverticulitis).
- Occurs most often in inactive elderly with debilitating diseases.
- Also occurs in patients with severe psychiatric or neurologic diseases.

Etiology:

- Often due to severe, chronic constipation.

Signs/Symptoms:

- Early symptoms – intermittent cramping, lower abdominal pain, and distention.
- Later symptoms-nausea, vomiting, dehydration, obstipation (vomiting and obstipation often not present as in this case).
- May have a history of similar episodes that resolved spontaneously.
- Physical exam – moderate abdominal tenderness, but may not be impressive.
- Fever, marked tenderness, and peritonitis are late findings and suggest bowel ischemia.
- Mortality 20% overall, 53% when bowel is gangrenous.

Diagnosis:

- One of the few diagnosis made on plane films: Diagnostic 80% of the time
  - 1) Severely dilated single loop of colon in left abdomen
  - 2) Both ends in pelvis and bowel pointing superiorly (“bent innertube sign”)
- Water soluble or barium enema confirms the diagnosis
  - 1) “Bird’s beak” deformity at the point of twists
  - 2) Cut-off of contrast flow into proximal colon

Treatment:

- Surgery for gangrenous bowel or failed reduction,
- For stable patients the volvulus can usually be reduced with sigmoidoscopy and rectal tube insertion. (Successful 85%-95% of the time).
- The rectal tube stents the bowel and prevents reoccurrence of the volvulus over the short term.
- Recurrence rate is 90% if reduction is not followed by colopexy.

*Teaching points*

*1) Sigmoid volvulus often presents without any GI symptoms.*

*Elderly persons **may** lack physical exam findings with serious intra-abdominal pathology.*

Case 9: A 19 year old female presents with a 2 day history of right upper quadrant pain. She is 30 weeks pregnant and has had persistent nausea throughout her pregnancy which is somewhat worse over the last 2 days. She has no diarrhea or vomiting. Other than 2 therapeutic abortions and a fractured jaw in the past she has no significant past medical history and this pregnancy has been uncomplicated. Medications include prenatal vitamins and iron, she is allergic to penicillin



Physical exam: Tearful white female in no obvious physical distress. Vitals: HR 90, BP 140/90, RR 22, T 37.8, and O<sub>2</sub> Sat 99%. HEENT, Chest, Pulmonary exams: normal. Back no CVA tenderness. Abdomen: fundal height 20 cm, FHT's 150, moderate diffuse abdominal tenderness, without rebound or guarding. Rectal: heme negative brown stool.

Differential Diagnosis:

- Acute fatty liver of pregnancy
- Appendicitis
- Cholecystitis or biliary colic
- Placental abruption
- Preeclampsia and HELLP syndrome
- Preterm labor

Additional information:

UA: moderate ketones, otherwise negative  
WBC: 15, rest of labs including LFT's normal

What do you make of her WBC count and fundal height?

Why is the patient tearful?

White count even less useful in gravid patients as they have physiologic leukocytosis and WBC of up to 16,000 per cc is considered normal.

The patient's fundal height is very small for gestational age.

Upon further questioning the patient begins sobbing and reveals that her boyfriend, who is in the waiting room, has been physically and sexually abusing her and threatened her life when she tried to leave him. She told him that she had abdominal pain to stop him from sexually assaulting her.

Partner Violence in Pregnancy

- Prevalence rates of abuse in pregnant patients generally exceed that in the general population and range from 8% to 17%.
- Pregnant adolescents are at even greater risk and found to have a prevalence in one study of 20.7%. (Parker)
- Another study shows that women may be at even greater risk for partner violence during the postpartum period with partner violence rates increasing from 19% during pregnancy to 25% during the postpartum period. (Gailen)
- Battering during pregnancy correlates with delayed prenatal care, low birth weight, anemia, infections, and increased bleeding. (McFarlane)
- After birth exposure to parental partner violence can have lasting and damaging effects on the children.

- 1) The majority of children of battered mothers witness the violence. This group comprises an estimated 3.3 million children between the ages of 3 and 17 yearly in the United States.
- 2) Witnessing parental domestic violence has been found to cause posttraumatic Stress Disorder in children similar to the amount of the disorder children exhibit when they are direct victims of child abuse or sexual abuse. (Kilpatrick)
- 3) Children of battered women may sustain developmental delays growing up in an environment marked by violence and unpredictable explosions.
- 4) Additionally witnessing parental domestic violence is the greatest risk factor for becoming a perpetrator or victim of partner violence as an adult. (Hotelling)
- 5) As the philosopher Jean Paul Sartre put it so eloquently "One is never finished with the family. It's like the Smallpox – it catches you in childhood and marks you for life."

Case 10: A 34 year old male presented with a 4-5 day history of constant epigastric pain which was non-radiating and slight right sided chest pain. He admitted to accompanying nausea and vomiting and a 1 day history of fever. The patient suspects he has PUD and has been taking Maalox without relief. PMH: Familial Mediterranean Fever and anal fissures. Medications: Cholchicine.

Physical Exam: WNWDDWM in mild distress. Vitals: HR 100, BP 130/76, RR 20, T 38.7, and O<sub>2</sub> Sat 93%. HEENT: normal. Cardiac: normal. Pulmonary: normal. Abdomen: soft, mild epigastric and RUQ tenderness, no rebound, guarding, or rigidity. The patient refuses rectal examination,

#### Differential Diagnosis:

- Cardiac ischemia
- Cholecystitis
- FMF crisis
- Hepatitis/hepatic inflammation
- Peptic ulcer disease

#### Additional information:

History-patient states that is abdominal pain is different from his prior abdominal crisis with FMF.

Cardiac risk factors: positive family history only

EKG: NSR

Travel history: Ixtapa, Mexico 3 months prior, travels to France frequently for business

No IVDA, no HIV risks

Labs: LFTs: ALT 75(<50), AST 57(<40) T.Bili 1.8(<1.2), WBC 18, UA RBC 6, WBC 9, ketones 3+, protein 3+, rest normal.

Abdominal series: normal (was this test necessary?)

ED course:

Is a rectal examination necessary in the evaluation of abdominal pain? Is there another way to obtain this information provided by rectal exam?

Although he refused a rectal examination by the doctor, he agreed to provide a stool sample in the ED for occult blood testing. This was negative. Although palpation of the rectum has never been shown prospectively to aid in diagnosis of abdominal pain, stool blood testing is important in any patient suspected of having PUD or GI bleeding and must be performed before discharging such a patient.

What additional test would help you make the diagnosis?  
To evaluate the biliary tract an abdominal US was ordered

RUQ ultrasound normal per radiology resident.

The patient was discharged with *abdominal pain of unknown etiology* and given a prescription for omeprazole for possible PUD and told to take clear liquids only and *Follow-up in 24 hours*.

After the patient was discharged the attending radiologist called the ED to say that the US was not normal, but suggestive of an intrahepatic abscess.

The patient followed up the next day with his PMD as he was instructed. The PMD ordered an abdominal CT which elucidated the 4 cm x 5cm hepatic abscess.

### Hepatic Abscess

Pathophysiology:

- Focal infection of bacteria (Pyogenic) or *Entamoeba histolytica* in one or more cystic structures in the liver parenchyma.

Epidemiology:

- Pyogenic: 8-16 cases/ 100,000 hospital admissions in the U.S.
- **Amebic**
  - 1) The organism infects 10% of the world's population and 1-2% of the U.S. population.
  - 2) 8.5% of those infected will develop a liver abscess.

Etiology:

- Pyogenic
  - 1) Most often secondary to ascending cholangitis in the U.S.
  - 2) 10% are secondary to appendicitis.
  - 3) 10% are cryptogenic (no cause found).

- 4) Approximately half are polymicrobial with escherichia coli the most common isolate.

- Amebic

- 1) Fecal-oral transmission of Entamoeba histolytica.

Signs/Symptoms:

- RUQ and/or epigastric pain in almost all cases
- Nausea and vomiting common.
- Diarrhea common only in amebic disease (up to 1/3 of adult cases).
- Solitary pyogenic abscess may have an indolent course with only weight loss and vague abdominal pain; multiple abscesses tend to have a more severe course with frank sepsis common.
- Fever (more common in amebic and up to 60% of pyogenic).

Laboratory:

- Pyogenic: increased WBC in 70-80%, Alk Phos in 90%, and bili in 50%.
- Amebic
  - 1) 90%-100% of patients have a positive solid-phase radioimmunoassay to Entamoeba histolytica.
  - 2) Alk phos and ALT, AST elevated in 50-75% of cases; bili rarely elevated.

Radiology:

- Plain films
  - 1) Chest x-ray may show a right pleural effusion or an elevated right hemidiaphragm.
- CT
  - 1) 100% sensitive in one study
  - 2) Findings similar for pyogenic and amebic abscess
  - 3) Lesions are well defined with low attenuation and peripheral enhancement,
  - 4) Contrast must be used to show many lesions.
- Ultrasound
  - 1) 94% sensitive in one study.
  - 2) Amebic abscesses more likely to be round or oval and hypoechoic than pyogenic abscesses, but there is considerable overlap, making diagnosis by US alone impossible in most cases.

Treatment

- Pyogenic
  - 1) IV broad spectrum antibiotics (to cover enteric and anaerobic organisms) and metronidazole pending organism identification.
  - 2) IV fluids and pain medicine if needed.
  - 3) Definitive treatment involves percutaneous US or CT guided drainage with antibiotics continued for several weeks until radiological cure is demonstrated.
  - 4) Prior to the 1970's mortality was approximately 50%.
  - 5) With improved diagnosis and treatment the mortality is now 2-5%
- Amebic
  - 1) Most abscesses can be cured with intravenous metronidazole.

- 2) Approximately 15% of them are refractory and need percutaneous drainage.
- 3) Additionally up to 20% become bacterially suprainfected necessitating percutaneous drainage.

### Familial Mediterranean Fever

#### Pathophysiology

- A dramatic accumulation of neutrophils at symptomatic serosal sites.
- Abdominal pain is caused by a sterile peritonitis.

#### Epidemiology

- Most common in Sephardic Jews (1/250-1/1000), also found in Armenians, Turks, Arabs, and Ashkenazi Jews.
- Autosomal recessive pattern of inheritance.

#### Etiology

- Thought to be secondary a mutation in a gene which acts as an upregulator of an anti-inflammatory molecule or a downregulator of a pro-inflammatory.

#### Signs/Symptoms

- Acute episodes of fever (in 96%) accompanied by: Abdominal pain, chest pain, or joint pain
- Abdominal pain
  - 1) Occurs in almost all patients at some point and in 50% it is the first manifestation of the disease.
  - 2) Pain can be diffuse or localized.
  - 3) Large range of clinical presentations: from mild pain to a surgical abdomen with rebound and rigidity.
  - 4) Patients often go undiagnosed for years and have a history of multiple laparotomies, laparoscopies, and psychiatric evaluations.
- Attacks come without an identifiable cause and last 12-72 hours.
- The most dangerous complication is amyloidosis with end organ renal failure.

#### Laboratory

- During attacks
  - 1) Increased ESR, WBC, and fibrinogen.
  - 2) Microscopic hematuria/proteinuria.

#### Radiology

- No radiographic tests help make the diagnosis, but they may rule out others.

#### Treatment

- The use of daily prophylactic colchicine can prevent attacks and all but eliminate the risk of amyloidosis.

### Abdominal Radiographs in Patients with Abdominal Pain

- Series should include upright chest in addition to supine abdomen
- Suspected pathology indications:
  - 1) Perforation
  - 2) Obstruction



### 3) Volvulus

#### Teaching Points:

- 1) *Peptic ulcer disease is an unlikely cause of abdominal pain with fever.*
- 2) *Abdominal pain of unknown etiology is a perfectly acceptable diagnosis and much preferable to labeling a patient with a incorrect diagnosis that might discourage them from seeking further care.*
- 3) *Well appearing patients with abdominal pain may be discharged if adequate follow up can be assured.*

Case 11: A 77 year old female presented with a sudden onset of abdominal pain which awoke her from sleep. This sharp pain is located in the RLQ, radiates to the back and down the leg, and "feels like labor pain". It's accompanied by nausea and vomiting without diarrhea or dysuria. PMH is significant for high cholesterol and she last saw a doctor 2 years ago.

Physical Exam: Thin female obvious severe pain. HR 76, BP 240/150, T:36.3 , RR 20, O<sub>2</sub> Sat 99%. HEENT: normal. Chest: Irregularly irregular no RGM. Pulmonary: normal. Abdomen: soft, slight RLQ tenderness, "pain out of proportion to exam", no rebound, guarding, or rigidity Back: no CVA tenderness. Rectal: no stool. Extremities and pulses: normal.

#### Differential Diagnosis:

- ☺☺☺
- Biliary tract obstruction
- Bowel obstruction
- Mesenteric ischemia
- Ovarian torsion
- Perforated diverticuli
- Nephrolithiasis

What tests would you order?

Labs: WBC: 7.5 ,Hematocrit:40, T.Bili:0.8, Glu: 210, Electrolytes: normal.  
EKG: Atrial fibrillation (no history of afib, old EKG unavailable)  
Pelvic exam: normal  
Abdominal series: negative

What is the next step in the management of this patient?

The treating physicians called an immediate surgical consult with a presumptive diagnosis of superior mesenteric artery embolus. Surgical consults requested an immediate abdominal CT which showed right sided hydroureter and a UVJ stone. UA showed 94 RBC and physician review of the EKG diagnosed sinus arrhythmia not atrial fibrillation. After appropriate pain medication the patients

blood pressure declined to **170/100** and she was discharged with the usual instructions for nephrolithiasis.

Although common, Nephrolithiasis is seldom life threatening. The treating physicians were correct in maintaining a high degree of suspicion for mesenteric arterial embolism and taking appropriate diagnostic and therapeutic steps,

### Mesenteric Arterial Embolism

#### Pathophysiology:

- Thrombotic emboli occlude arterial blood supply to intestines
- Almost always involves the superior mesenteric artery

#### Epidemiology:

- Occurs almost exclusively in patients with atherosclerotic disease

#### Etiology:

- Emboli most often from clot in the left atrium or ventricle, occasionally from aortic thrombus
- Cardiac and/or vascular pathology common: CAD, valvular disease, **atrial** fibrillation, post MI mural thrombi, aortic instrumentation

#### Signs/Symptoms:

- Sudden onset of severe periumbilical pain
- May have nausea, vomiting, and diarrhea
- Hallmark: pain out of proportion to physical exam
- 75% of patient have **heme negative** stool
- If ischemia progresses untreated the patient will develop tenderness, peritoneal signs, and shock

#### Laboratory:

- No test sensitive enough to rule out diagnosis reliably
- Lactate, WBC, and phosphate studies: only elevated consistently when bowel is already necrotic
- Labs may be entirely normal early on in course of disease

#### Radiology:

- Plain films
  - 1) Usually normal or nonspecific
  - 2) Late findings include intramural air (pneumatosis intestinalis), thickened bowel wall with “thumbprinting”, and portal venous gas
- **CT Scan**
  - 5) Often normal or non-specific
  - 6) Specific findings include pneumatosis intestinalis, portal venous gas, and mesenteric vessel occlusion
  - 7) Sensitivity **64%-82%** (Taourel 1996) – but can diagnose other important pathologies in the differential.
- Doppler ultrasound and MRI not well studied, may be helpful in the future
- Angiography
  - 1) Gold standard



- 2) Only for stable patients without peritoneal signs; patients with an acute surgical abdomen should go directly to surgery

#### Treatment

- Aggressive diagnostic approach warranted as mortality is significantly increased by small delays treatment.
- Most patients require fluid resuscitation secondary to third space fluid loss.
- Surgical resection of ischemic bowel and/or embolectomy of involved vessel has been the standard of care.
- Newer therapies involve intra-arterial infusions of papaverine or thrombolitics coupled with laparoscopy in patients without peritonitis. (Regan 1996)

#### Teaching points:

- 1) *Suspect mesenteric ischemia in all elderly with severe abdominal pain without significant tenderness.*
- 2) *The only methods to "rule out" mesenteric ischemia are angiography and surgery, but CT often will provide alternative important diagnosis.*
- 3) *Interpret the EKG prior to relying on the computer generated reading.*

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