

SELECTED PRESENTATIONS FROM SCIENTIFIC ASSEMBLY 2001

Course Title: Abdominal Pain: Case Presentations
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Course #/Date: MO-72, October 15, 5:00 pm – 6:00 pm, Room 324

Course Objectives assigned:

Upon completion of this course, the participant will be able to:

- List “can’t-miss” diagnoses for abdominal pain.
- Discuss how to manage patients when the diagnostic work-up does not reveal a cause.
- Develop a comprehensive differential diagnosis for abdominal pain complaints.
- Describe optimal diagnostic approaches.
- List management recommendations.

Case Studies in Abdominal Pain

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Course Rationale and Description: According to the National Ambulatory Care Survey, emergency physicians see more patients with Abdominal Pain than any other chief complaint. 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 participants develop a differential that includes the possible life-threatening etiologies. The material gives participants 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 presents in “text book” fashion

because all are actual cases from the last few 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 those 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: A 36-year-old female presents to the ED with a 2-day history of right lower quadrant pain. The pain began suddenly, is now crampy, located mostly in the RLQ, and is increasing in severity to 9/10 now. The pain is constant and associated with tactile fevers, anorexia, and nausea and is made worse with movement. PMH: C5-C6 cervical fusion, G3P1 (SAB 2). ROS: positive for mild dysuria and diarrhea 2 days ago. LNMP 1 week ago.

Physical Exam: HR 129, BP 145/90, RR 18, T 36.2 °C, and O₂ Sat 100% on RA. HEENT, Chest, Pulm: normal. Abd: RLQ tenderness and rebound. Back: mild right CVA tenderness.

Are any critical elements of the physical exam missing?

Differential Diagnosis:

- Appendicitis
- Ectopic pregnancy
- Hemorrhagic ovarian cyst
- Nephrolithiasis
- Pregnancy
- Threatened abortion
- Tubo-ovarian abscess

Additional information:

Pregnancy test: negative

Pelvic: R adnexal tenderness, no CMT, no masses, scant white d/c

Hematocrit: 38.2

WBC:13.8

UA: negative

Next course of action? Are more tests needed before surgical consult is called?



Pelvic US : Uterus and ovaries appear normal. A 1 cm non-compressible blind-ending loop of bowel and free fluid found in the pelvis. Impression by resident and attending: acute appendicitis

The patient is taken to the operating room by the general surgery service with the presumptive diagnosis of appendicitis.

Appendicitis

Pathophysiology:

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

Epidemiology:

- Lifetime prevalence 7%
- 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.

Etiology:

- May be due to 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 and immunocompromised don't follow this typical presentation and display fever, rebound, and guarding <50% of the time.
- Women of childbearing age are clearly more difficult to diagnose, and up to 1/3 of them are initially misdiagnosed with PID being the most common misdiagnosis. (Rothrock)
- 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% depending on threshold value, specificity much lower; not useful in the majority of patients with an intermediate pretest probability (Snyder).
 - 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, not recommended (Hallan 1997).

Radiology:

- Plain radiographs
 - 1) Not recommended in the routine evaluation of suspected appendicitis. (Rao 1999)
 - 2) Only use to diagnose other causes of abdominal pain causing perforation or obstruction.
 - 3) Although more common in appendicitis, fecaliths can be found in approximately 3% of normal appendices. (Teicher)
- 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) Especially helpful in
 - a. Pregnant patients (42 patient study by Lim found it 100% sensitive and 96% specific in 15 cases with 3 non-dx).
 - b. Children (may compare with CT, Lowe)
 - 5) Very operator dependent – limits utility in most centers, general accuracy probably much lower than that found in the literature
- Helical CT scan
 - 1) With optimal conditions very sensitive (96%-100%).
 - a. Need to use thin cuts (5mm cuts lead to an accuracy of 99% versus 89% for 10mm cuts, Weltman 2000).
 - b. Rectal Contrast : highest sensitivity and specificity if done without IV contrast (Rao 1999, Funaki 1998).
 - c. Recent study compares different CT sequences in 100 ED patients.(Wise)
 - i. No significant difference between standard abdominal/pelvic helical CT with IV contrast and focused study w or w/o rectal contrast
 - ii. All patients had P.O. contrast
 - iii. Limited sample size
 - iv. 18 pts refused study due to rectal contrast
 - v. Discomfort with rectal contrast (6.7) versus (5.3) with IV contrast on 10 point

- scale
- vi. Suggests standard CT with IV and PO contrast as initial approach with rectal contrast reserved for questionable cases
 - 2) Useful in diagnosing other abdominal pathology in differential: AAA, diverticulitis, nephrolithiasis, cholelithiasis, colon CA, and mesenteric adenitis.
 - 3) Probably preferable to ultrasound for diagnosing appendicitis in most centers.
 - 4) Focus CT with rc can also safely be used in pregnant patients using 300mrads (Castro).
 - 5) In year 2001 experienced radiologists in the community can use helical CT to rule out appendicitis if a normal filled appendix is visualized. (Funaki, 97% sens)
 - MRI – only a research tool at this point, but shows promise (Hörmann).

Treatment:

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

The final pathology report described a normal appendix that was an average of 2mm in diameter.

Post op diagnosis was listed as ruptured ovarian cyst.

The same week that this young woman presented, two other young women presented with RLQ pain and a question of appendicitis. The first was almost taken to the OR, but on attending surgery request underwent helical CT, which showed a normal appendix and thickening of the terminal ileum consistent with inflammatory bowel disease. The second underwent helical CT that was normal except that the appendix was not visualized (but there was no stranding in the RLQ). Due to persistent pain and a “high white count” the patient underwent appendectomy after 12 hours of observation. Although the operation report listed “acute appendicitis” as the final diagnosis, the pathologist reported an entirely normal appendix without any signs of inflammation.

Teaching points:

- 1) *WBC is not only insensitive for appendicitis, but due to its low specificity, often misleading particularly in women with RLQ pain.*
- 2) *If the appendix is not visualized consider repeating the CT with*

rectal contrast.

- 3) *Understand how to interpret the findings of imaging tests and what to query the radiologist about.*

Case 2: A 84-year-old female presents with a one-week history of abdominal pain and distention. She was seen by her PMD for the same 2 days ago with a reportedly benign exam and was diagnosed with constipation, and given instructions to take milk of magnesia. She returned to her PMD today with increased pain and distention and was sent to the ED for further evaluation. The patient is unable to describe the pain but localized it to the lower abdomen. She has been eating normally without nausea and has had no BM for 1 week. Her daughter requests that she be given pain medicine immediately for the pain. PMH: Hypothyroidism, Hip fracture, DVT, and Alzheimer's. Meds: Synthroid, KCl, Indapamide, Aricept, ASA.

Physical Exam: Thin black female in mild to moderate pain. Vitals include HR 120, BP 84/55, RR 20, T 36.7 °C, O₂ Sat 96% on RA. HEENT: nl, Chest: Tachy RRR, Lungs clear, Abdomen: distended with diffuse tenderness and rebound. Neuro: baseline dementia, otherwise normal. Stool: heme negative

Differential Diagnosis:

- AAA
- Cholecystitis
- Mesenteric ischemia
- Pancreatitis
- Perforated viscus
- Small bowel obstruction
- Volvulus

What elements of the physical are missing? What tests will help you? Can this patient be given pain medicine?

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 (Attard, LoVecchio, Mahadevan, Pace, Vermeulen, 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.
- Study to prove no adverse effects from pain medicine would require 1,500 patients and has yet to be done. (Lee)
- In many cases, it is reasonable to negotiate with the surgical consult that 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 consult exam.

Case 2: Additional information

EKG: Sinus tachycardia, no old EKG

UA: RBC 4, WBC 13

Lytes: normal except Cr 2.2

CBC: Hct 40.5 WBC 25 Platelets 310

Another case of urosepsis and constipation in the elderly?

Is there a role for plain abdominal radiographs in this patient?

KUB shown below:



Case 2: ED course

The patient becomes more tachypnic and her oxygen saturation falls to the low 80's.

What is the next step?

Our patient was intubated, given antibiotics, and taken to the operating room. She became hypotensive and required dopamine intraoperatively. In surgery, 63 cm of necrotic sigmoid colon was resected leaving the patient with a colostomy and a rectal Hartmann

pouch.

Sigmoid Volvulus:

Pathophysiology:

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

Epidemiology:

- Causes 5-6% of all large bowel obstructions (3rd 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 diagnoses made on plane films (at least 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.

Remarkably our patient was extubated and weaned off of dopamine the day after surgery. She was discharged to home 6 days after surgery and continues to be a devoted patient of her primary care physician.

Teaching points

- 1) *Beware of the diagnosis of constipation in elderly patients with abdominal pain.*
- 2) *Sigmoid volvulus may present with out significant symptoms of obstruction.*
- 3) *Add volvulus to your list of reasons to obtain abdominal radiographs in the patients with abdominal pain.*

Case 3: 69 year old male is brought to the ED by paramedics for acute LLQ pain and hematuria. The pain is 7/10, colicky, sharp, and worse when standing. He also complains of mild SOB and sweating off and on today but denies cough, CP, fever, nausea, vomiting or diarrhea. PMH is significant for CAD, CHF, CVA's, HTN, NIDDM, and an appendectomy. His medications include glyburide, HCTZ, Lopressor, and K+.

Physical exam: WNWD male "relaxed, pale, and diaphoretic". HR 94, BP 127/84, RR 26, T 37.1 °C. RESP: mild right basilar crackles, CV: irregular without murmurs, GI: obese and soft with moderate LLQ tenderness, EXT: no edema and normal pedal pulses. BACK: no CVA tenderness. Rectal: 2+ prostate, heme negative brown stool.

Differential Diagnosis

- AAA
- Aortic dissection
- Diabetic ketoacidosis
- Cardiac ischemia
- Mesenteric Ischemia
- Nephrolithiasis
- Pancreatitis

Additional information:

Genital exam: normal

EKG: Atrial fibrillation without signs of ischemia

UA: WBC 3, RBC 1

Chest X-ray: Cardiomegally, mild CHF

Bedside glucose: 190

Next diagnostic test of choice? Doesn't Nephrolithiasis cause more than 1 RBC on urinalysis?

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 the three vascular abdominal emergencies in the elderly: **a leaking AAA, mesenteric ischemia, and myocardial infarction.**

In this case the treating physician suspected nephrolithiasis and ordered a KUB and then an IVP. What is the role of abdominal x-rays in the work up of abdominal pain? Is a KUB a good screening x-ray or should an "abdominal series" be ordered?

Abdominal Radiographs in Patients with Abdominal Pain

- An "abdominal series" should at least include upright chest in addition to supine abdomen to look for free air under the diaphragm.
- Suspected pathology indications:
 - 1) Perforation
 - 2) Obstruction
 - 3) Volvulus
- A KUB is not a good screening x-ray even for nephrolithiasis. Even though textbooks state that 90% of kidney stones are visible on radiograph (outside of the patient), less than 10% can be seen on prediagnosis x-ray (with in the patient).



The KUB interpreted by the radiologist while the IVP was being done showed a large calcified AAA.

Next move?

Stat Surgical Consult.

Hospital course. Over the phone the surgical consult suggested that

an abdominal CT scan be performed to delineate whether or not the aneurysm was ruptured (because repair of symptomatic, but not ruptured AAA has a much lower mortality if performed electively rather than emergently). Twenty minutes later a CT scan confirmed a ruptured AAA. The patient became hypotensive with a SBP in the 60's and 70's. He received 4 liters of saline and 4 units of O negative blood in an effort to "stabilize" him so he could be taken to surgery. Although his blood pressure transiently increase, he arrested as he was being wheeled into the OR and could not be resuscitated.

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: cannot rule out AAA base on exam (Lederle).

Laboratory:

- Not helpful in excluding diagnosis
- Hematuria is common and does not help differentiate AAA from nephrolithiasis (7/15 microscopic and 6/15 gross hematuria in study by Pomper 1995 where as Bove found that 33% of patients with CT documented nephrolithiasis had a urinalysis with fewer than 5 RBC and 11% had no RBC).

Radiology:

- Plain film radiographs
 - 1) Suggests AAA 60% of the time
 - 2) Best view is lateral lumbar spine file
 - 3) Should never be used to rule out AAA
- Ultrasound:
 - 1) Can diagnose the presence or absence of an AAA
 - 2) Will not differentiate whether or not AAA is leaking or ruptured
 - 3) Allows for continued careful monitoring of patient

4) Operator dependent, however a recent study has shown ED physicians to be very (100%) accurate for detecting AAA with only 2/68 scans being indeterminate.(Kuhn)

- CT Scan of abdomen
 - 1) Diagnoses the AAA if it is leaking or ruptured
 - 2) Patient must leave the department
 - 3) Less operator dependent
 - 4) Excellent at diagnosing other pathology
 - 5) Scans for nephrolithiasis will diagnose AAA (Nachmann)
- 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: controversial, some data suggests “hypotensive hemostasis” and withholding fluids and blood until SBP drops below 50mmHg. (Bickell)
 - 3) Mortality 100% without surgery; 50% with surgery overall: mortality greater when rupture occurs into abdominal cavity (Satta 1998)
 - 4) Even symptomatic, but radiographically “unruptured” AAA should be operated on emergently and do not have a higher mortality when performed emergently than electively.(0/9 versus 5/18 in one series, Adam)
 - 5) One recent study found that emergency surgery in patients over 80 years of age only prolonged life by an average of 1 week. (Robinson 1997)
 - 6) **Cutting Edge:** Emergently Placed Endovascular Grafts
 - a) Landmark Study: Ohki and Veith
 - b) Used a transbrachial balloon to achieve hemostasis in patients with 25 patients with ruptured AAA
 - c) 20 patients were stented with a “one-size-fits-all” graft; 5 needed open laparotomy
 - d) 23/25 survived to hospital discharge
 - e) Amazing results in study that included unstable patients
 - f) Currently limited to major vascular surgery center: should be available more broadly in 2 years
- For asymptomatic 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%

Teaching Points:

- 1) *Always consider the diagnosis of AAA first in vasculopathies with signs and symptoms of nephrolithiasis.*
- 2) *Utilized helical CT to diagnose nephrolithiasis rather than IVP when available.*
- 3) *For patients with suspected AAA rupture or leaking: Call a surgeon and ready the OR immediately; don't delay the call for diagnostic studies.*

Case 4: An 86 year old female brought in by RA for a sudden onset of abdominal pain and bradycardia. In the RA the patient had a pulse of 40 that became normal after 0.5 mg atropine. PMH is significant for appendectomy and breast cancer. Social: she lives alone, is independent in all of her basic and instrumental activities of daily living, and exercises regularly (skiing and ice skating). Medications: vitamins

Physical Exam: Alert, thin, and pale. HR 83, BP 186/94, T 36.0, RR 20, O₂ Sat 97%. HEENT: normal. Chest: RRR without RGM. Pulmonary: normal. Abdomen: tender throughout lower abdomen. Back: no CVA tenderness. Rectal: normal, heme negative. Extremities and pulses: normal. Skin: rash (old per patient)

Differential Diagnosis:

- AAA
- Biliary tract obstruction
- Bowel obstruction
- Cardiac ischemia
- Mesenteric ischemia
- Nephrolithiasis
- Pancreatitis
- Perforated diverticula
- Perforated duodenal/peptic ulcer

What tests would you order?

Labs: WBC: 8.1 ,Hematocrit:41, T.Bili:0.7, Glu: 149, Electrolytes: normal.

EKG: RBBB with LVH. Unchanged from prior EKG.

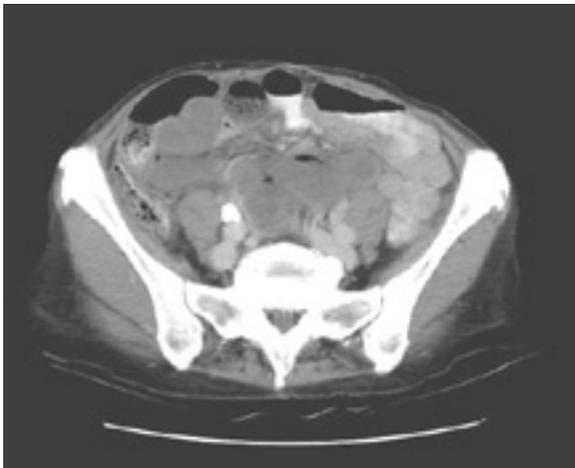
Abdominal series: negative except some increased air in the stomach

UA: RBC: 1 WBC: 4

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

The treating physicians were worried about the 3 vascular abdominal emergencies in the elderly and took steps to rule them out. Additionally, 22-40% of elderly ED patients with abdominal pain require surgical treatment and 7% of those >80 years will die.

Given the unchanged EKG and stable vital signs a stat abdominal CT was ordered along with immediate surgical consult for possible mesenteric ischemia. Final radiologist reading of a triple contrast CT was: Intrahepatic biliary dilatation and small amount of perihepatic fluid consistent with acute hepatic process and large amount of colonic stool consistent with fecal impaction.



Diagnosis?

Can this patient be discharged with the diagnosis of constipation and/or “an acute hepatic process”?

Thankfully the initial reading of the CT by the radiology resident was: distended small bowel with a thickened wall, some free fluid, and mild biliary dilatation.

Although the CT scan was consistent with mesenteric ischemia, the patient’s pain improved intermittently after fentanyl and the surgical service declined to operate immediately on the patient. The new shift of emergency physicians ordered a mesenteric angiogram, which was done approximately 2 hours after being ordered. Initial reading of the angiogram was consistent with mesenteric ischemia.

Acute Arterial Occlusive Mesenteric Ischemia

Pathophysiology:

- Thrombosis or emboli occlude arterial blood supply to intestines
- Emboli almost always involve 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
- Thrombus develops via atherogenic process
- 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; Leo found phosphate only 26% sensitive.
- 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
 - 1) Often normal or non-specific
 - 2) Most common finding: bowel wall thickening (non-specific)
 - 3) Specific findings include pneumatosis intestinalis, portal venous gas, abnormal bowel enhancement, and mesenteric vessel occlusion
 - 4) 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 in treatment.
- Most patients require fluid resuscitation secondary to third space fluid loss.
- Surgical resection of ischemic bowel and/or embolectomy of involved vessel have been the standard of care.
- Newer therapies involve intra-arterial infusions of papaverine or thrombolitics coupled with laparoscopy in patients without peritonitis. (Regan 1996)

Hospital course:

The patient was taken to the operating room with a pre-op diagnosis of mesenteric ischemia. In the OR, surgeons found that in the middle portion of the jejunum, the small bowel was twisted to the point that it became strangulated. Final reading of the angiogram showed: Non-opacification of the distal jejunal branches, ileal branches and ileocolic branch of the superior mesenteric artery. No definite evidence of embolism is identified. Moderately dilated bowel in the region of hypovascularity. These findings are suggestive of a mid gut volvulus.

True diagnosis: intestinal ischemia secondary to small bowel volvulus

Small bowel volvulus in adults

Pathophysiology:

- Fluid filled small bowel twisted upon itself caused a closed loop and vascular compromise

Epidemiology:

- 5-10 times more common in third world than western world (Gurleyik)
- Responsible for 3%-6% of small bowel obstructions
- More common in pregnancy (volvulus responsible for ¼ SBO with SB volvulus first followed by cecal and sigmoid).
- 10 fold increase in Afghanistan during Ramadam

Etiology:

- Cause currently not completely understood
- High bulk diet eaten rapidly on an empty stomach
- May be secondary to abnormal mechanics (i.e. secondary to adhesions, Meckel's diverticula, internal hernias, Ascariasis, or

pregnancy).

Signs/Symptoms:

- Severe, central pain
- Signs of obstruction

Laboratory:

- Not helpful in making the diagnosis

Radiology: (Chou)

- Plain film radiographs: non-specific, may show only a gasless abdomen or signs of mild obstruction
- Barium swallow may show "corkscrew pattern"
- CT or MRI may show "whirl" sign
- Angiography shows spiraling of the branches of the twisted SMA causing a "barber pole" appearance

Treatment:

- Immediate surgery with derotation and fixation or resection for ischemic bowel

Prognosis

- Mortality 10%-35%, much higher when bowel becomes ischemic

Teaching points:

- 1) *Suspect mesenteric ischemia in all elderly with severe abdominal pain without significant tenderness.*
- 2) *Don't be dissuaded from a proper diagnostic evaluation by radiographic diagnoses that don't fit the severity of the patient and when faced with 2 interpretations always consider the most dangerous one first.*
- 3) *The only methods to "rule out" mesenteric ischemia are angiography and surgery, but CT often will provide alternative important diagnoses.*

Case 5: A 52-year-old male presents with a 2-day history of left upper abdomen and flank pain. The pain is burning, constant, and worse with palpation. He denies fever, vomiting, diarrhea, or any GU symptoms. PMH is significant for brachial plexopathy, appendectomy, and orthopedic procedures. No meds or allergies.

Physical exam: Well-nourished male who is well appearing. HR 72, BP 127/84, RR 12, T 37.1 °C. RESP, CV: normal. GI: soft with epigastric and LUQ tenderness EXT: no edema and normal pedal pulses. BACK: no CVA tenderness. Rectal: refuses. Genital: normal.

Any other elements of the history or physical exam required?

Additional information:

The pain is not exacerbated with activity, and he has completed his usual aerobic exercise daily without difficulty. Palpation of the left abdomen and flank exacerbate his pain.

EKG: normal sinus rhythm without signs of ischemia.

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

A glove and hemacult card is provided to the patient, and he willingly obtains a sample.

Stool hemacult: negative

ED Course: the patient is given pain medicine, return precautions, and discharged with abdominal pain of unknown etiology and told to follow up with his PMD the next day. The following day the patient's pain persists, and he visits his PMD as directed who discovers a vesicular rash in the right flank area in a dermatomal pattern and diagnoses Herpes Zoster.

Teaching Points:

- 1) Abdominal pain of unknown etiology is a perfectly acceptable diagnosis, and is preferred to labeling the patient with a diagnosis that is likely to be incorrect.*
- 2) Close follow up is almost always indicated in the management of patients who are discharged with abdominal pain.*
- 3) The digital rectal exam may be replace by self-obtained stool sample in the majority of patients with abdominal pain.*

Case 6: A 28-year-old female presents to the ED at 1:00 am complaining of a 5 hour history of epigastric and RUQ pain. The pain is made worse lying supine and with deep inspiration, but is unchanged by food. She has nausea, but no vomiting or diarrhea. The patient had a D & C 8 days ago for a probable molar pregnancy, but denies any pain after the procedure. She continues to have a bloody vaginal discharge. PMH: Negative except above, no Meds or Allergies. ROS: recorded as negative except for nausea

Physical Exam: HR 91, BP 107/71, RR 20, T 97.3 °F, and O₂ Sat 98% on RA. Well appearing in no distress. HEENT, Chest, Pulm: normal. Abdomen: RUQ tenderness and positive Murphy's sign. Back: no CVA tenderness.

Are any critical elements of the physical exam missing?

Differential Diagnosis:

- Appendicitis
- Biliary colic
- Ectopic pregnancy
- Hemorrhagic ovarian cyst
- Nephrolithiasis
- Pulmonary embolism
- Threatened abortion
- Tubo-ovarian abscess

Additional information:

Pregnancy test: Not done. *Would you expect it to be positive?*

Pelvic and Rectal: Not done

Hematocrit: 33.4, WBC 14.9

UA: not done

The treating doctor suspected biliary tract disease and ordered more labs and a RUQ ultrasound to "rule out gallstones". She was given 25 mg of Demerol and 25 mg of Phenergan IVP.

RUQ Ultrasound: Normal



The radiology tech decided to scan the entire abdomen and discovered a live 9-week gestation in the right adnexa.

What is the diagnosis and next move with this patient?

Stat Gyn consult, T & C 2 U PRBC.

Repeat Hematocrit: 24.7
Serum β hCG: 88,038 mIU/ml

The patient was taken to the operating room and underwent right salpingectomy.

Ectopic Pregnancy

Pathophysiology:

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

Epidemiology:

- 2% of all pregnancies
- Risk factors include: PID, infertility, present IUD, tubal surgery, prior ectopic, advanced age, and smoking.
- Almost half of all cases occur in women without risk factors (Stovall 1990)
- Most common cause of pregnancy related maternal death in 1st 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 extra uterine 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%)
- May **not** have missed a period!
- Warning: exam has never been proven to be a useful test in ruling out ectopic pregnancy

Laboratory:

- Urine qualitative β hCG
 - 1) Most commonly used to diagnose pregnancy
 - 2) Correlates with a serum β hCG of 10-50mIU/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 β hCG <50mIU/ml or dilute urine
 - 6) Would miss only 1/2000 ectopic pregnancies, most too small to be dangerous
- Serum β 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 β hCG is <10,000 mIU/ml
- Signs of intrauterine pregnancy should be seen transabdominally when quantitative β hCG is above 6,500mIU/ml
 - Signs of intrauterine pregnancy should be seen transvaginally when quantitative β hCG is above 1,500mIU/ml
 - A low β hCG (<1,000) should not dissuade the use of a diagnostic pelvic US in patients with symptoms as 1/3rd of patients with ectopic pregnancies and low β hCG can be diagnosed at that visit (Dart 1997).

Sonographic sign	Gestation (from LMP)	β 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 (>25ng/ml) predictive of normal pregnancy in 97% of patients
 - 3) Intermediate values not helpful in evaluation
 - 4) Recent study found a value < 22 ng/ml to be 100% sensitive (CI down to 98%) and 25% specific. It's unclear how, if at all, this will be used by ED physicians. (Buckley)

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 who are not clearly having a spontaneous abortion deserve a prompt ultrasound to evaluate for ectopic pregnancy
 - 5) Patients with non-diagnostic scans (10-20% of patients) need further evaluation with serial β 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 β hCG is $<1,000$ mIU/mL.

- b) A thickness < 8 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
- Methotrexate Injections: retards the growth of the ectopic gestation and hopefully maintains tubal patency.
 - Criteria for use includes: stable patients, empty uterus, and ectopic gestation <3.5 cm as measured by ultrasound.
 - Single Dose of MTX or Multidose (up to 4) of MTX and Leucovorin.
- If patient is stable and ectopic appears to be resolving, serial exams and observation may be elected.

Teaching Points

- 1) *Specialists make mistakes too. Don't assume that they've ruled out the dangerous diagnosis.*
- 2) *Don't be reassured by a recent D & C. It should raise a RED FLAG for ectopic pregnancy.*
- 3) *Remember to thank those that save you from bad mistakes if you want them to do it in the future.*

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