



Abdominal Pain in the Elderly: Clues to Catastrophic Diagnoses

Atypical presentations are frequent in the elderly, a group of patients who comprise an increasing proportion of emergency department patients. Geriatric patients may have a catastrophic cause of what appears to be mild abdominal pain. Developing an approach to abdominal pain in the elderly that considers the potentially catastrophic causes is an important priority for emergency physicians. This course will help you sort out the dangerous from the benign causes of abdominal pain in the elderly.

- Recognize the unique characteristics of abdominal pain that change with advancing age.
- Review the differential diagnosis of abdominal pain in the elderly.
- Identify pitfalls in diagnosis and management of abdominal pain in the elderly.

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FACULTY

Robert A Bitterman, MD, JD,
FACEP

Clinical Assistant Professor,
Emergency Medicine, University of
North Carolina Medical School,
Chapel Hill; Director, Risk
Management and Managed Care,
Department of Emergency Medicine,
Carolinas Medical Center, Charlotte,
North Carolina; Editorial Board
Member, *Emergency Department
Legal Letter*; Chairman,
ACEP/EMTALA Task Force

1999 ACEP SCIENTIFIC ASSEMBLY

ACUTE ABDOMINAL PAIN IN THE ELDERLY

- I. INTRODUCTION**
- II. THE PROBLEMS**
- III. THE "ANSWERS"**

Faculty:

Robert A. Bitterman, MD, JD, FACEP

Director of Risk Management & Managed Care
Department of Emergency Medicine
Carolinas Medical Center
Charlotte, NC

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American College of Emergency Physicians
Robert A. Bitterman, MD, JD, FACEP

Key Principles

1. **Always consider and rule-out the worst possible disease based on the patient's age, sex, and presenting complaint.**
2. ***"The eye does not see and the hand does not feel what the mind does not think of."***
A corollary to #1, (loosely paraphrased **from** Confucius), before you make a diagnosis you must **think** of it! Build mental checklists of possible diagnoses based on rule #1, and rule each out in your own mind (and in the chart) before disposition of patients.
3. **Appreciate the value of time: reexamine, reexamine, reexamine!** Catastrophic conditions may present with maximal **Sx** immediately, others take time to reveal their true nature. It is not always easy to determine at what stage the patient is at in the disease process. Use the passage of time as an ally. Reevaluate patients frequently.
4. **"When in doubt, don't let them out."** Don't discharge patients when you are uncomfortable with your diagnosis. Keep them around awhile (use rule #3), obtain consultation, be more liberal with diagnostic tests, etc.. It is perfectly appropriate to discharge patients without a diagnosis, just be comfortable in your own mind that nothing serious is present.
5. **Arrange early follow-up** examinations with attending physicians or via the ED. This should be the extension of rules #3 & #4. Patients who go home and get better won't show up anyway, so be liberal in arranging outpatient reevaluations.
6. **Trust your gut feeling.** Ancillary studies **may** be helpful, but your clinical expertise is more accurate. Don't let anyone talk you out of your diagnosis or concern because the lab tests are 'normal'. The assertion that "He can't have appendicitis. the WBC is normal." is myth, rubbish, and negligence!

Acute Abdominal Pain in the Elderly

A. Scope of the Problem - The 5 "Ds":

1. Definition: ED Patients age ≥ 65 who present with abdominal pain:
2. Demographics:
 - a. Aging population - increased encounters; 20% of ED visits
 - b. 50-60% admitted
 - c. 30-45% require an operation
 - d. diagnosis evident in $\geq 75\%$
 - e. difficult, time consuming evaluations in ED
3. Demise
 - a. diagnostic challenge
 - b. delay in diagnosis increases complication rate
 - c. mortality doubles if admission diagnosis is wrong
 - d. mortality 9 times greater than younger patients
 - e. "basically, only bad things cause abdominal pain in the elderly"
4. Deficient Protoplasm
 - a. abdominal muscle atrophy
 - b. omental inertia
 - c. poor visceral pain response; lack of somatic pain response
 - d. poor white cell response to inflammation, infection
 - e. frequency and consequences of co-morbid conditions
5. Diagnostic Considerations
 - a. must be aggressive and comprehensive in evaluating the elderly
 - b. more liberal use of labs, xrays, EKGs, and ancillary studies
 - c. early consultations
 - d. frequent reexamination, observation, or admission
 - e. cost considerations
 - f. medical-legal considerations

B. Indications for Abdominal X-Rays

1. Prior abdominal surgery
2. History of foreign body ingestion
3. Abdominal distension
4. Abnormal bowel sounds
5. Peritoneal signs
6. Worry factor

C. Cost Effective Evaluation

D. Case Studies

*****Please note:*** *At the back of the handout are detailed ‘Answers’ to the cases. The main goal of this course is to help you develop an effective approach to evaluating elderly patients with abdominal pain. If you participate in the case discussions I believe you will learn more from the course, and have more fun.*

Case #1.

A 70y/o previously healthy male presents with 3 days of increasing colicky lower abdominal pain. He notes increased urinary frequency and mild dysuria, but no problems initiating his urinary stream. He is nauseated, vomited once, and complains of constipation. He recorded a fever to 102F but complains of no other associated symptoms. He has no past history of intra-abdominal disease.

He is awake and alert, but appears uncomfortable. Vital signs are normal except for a temperature of 101F. His abdomen is mildly distended with marked suprapubic tenderness and guarding; the tenderness may be slightly greater on the left than the right. No mass is palpable. Bowel sounds are normal. Rectal exam reveals no lesion; stool is brown, heme positive.

What is your differential diagnosis?

How do you plan to work-up this gentleman?

Case #2. An 86y/o woman with a history of HTN and an “indigestion problem” presented with vague abdominal pain, vomiting, and bloating. She had stable vital signs, mild epigastric tenderness which improved with a “GI cocktail”, and mild hypokalemia. She was discharged with a diagnosis of “indigestion”.

She returned 6 hours later still complaining of epigastric abdominal pain, vomiting, and inability to belch. She had one loose stool at home. Vital signs were T = 99, BP = 120/80, P = 115, R = 22. She had mild, vague, diffuse abdominal tenderness, greater in the epigastrium, and hyperactive bowel sounds. Rectal examination was negative. Her CBC was normal and electrolytes also normal except for a K⁺ of 3.0 and glucose of 295. Abdominal X-rays were non diagnostic. She was discharged with a diagnosis of “probable gastroenteritis”, and prescribed ibuprofen and Donnato[®].

What concerns you about this case so far?

What is your differential diagnosis?

The patient returned by EMS 6 hours later apneic and pulseless. She could not be resuscitated. Autopsy showed?

case #3. A 67y/o female presents with three days of diffuse abdominal pain and swelling. She vomited dark material twice today, but noted no blood. She’s been troubled with constipation over the last few weeks; multiple home and prescribed remedies have failed.

She is alert, slightly pale and diaphoretic, and vomits foul smelling coffee-ground material as you enter the room. She appears dehydrated. Vital signs are T = 99, P = 110, BP = 90/65, R = 22. Her abdomen is moderately distended, tympanitic, and diffusely, though mildly, tender. No hernias are found. Rectal exam reveals no mass and the stool is heme positive.

What is wrong with this woman?

How would you treat her now, and what is the diagnostic modality of choice?

What else can present like this in the elderly, especially those institutionalized?

Case #4. A 72 y/o woman complained of constipation and watery bowel movements alternating over the previous several months. She had been taking Lomotil and Kaopectate for these symptoms without results. She presents now because of increasing abdominal distention and pain in the lower abdomen. She has had no vomiting, no bloody stools, and no history of gastrointestinal diseases.

On exam she is awake, alert and in NAD. Her abdomen is soft, moderately distended and tympanitic, but non-tender throughout. Bowel sounds were normal. Rectal examination reveals a huge mass 3 cm above the anal verge having a consistency of peanut butter. Labs were normal and an x-ray was obtained.

What most “cost-effective” diagnostic or therapeutic procedure does this patient need now?

Case #5. A 68 year-old white male had presented earlier during the day with a complaint of lower back pain. At that time, the patient explained that he had probably worsened his chronically bad back by working in his garden the day before. The patient otherwise claimed to have a history of arterial hypertension, controlled by Hydrodiuril 50 mg p.o.. The emergency physician briefly examined the patient and made a diagnosis of “lumbosacral radiculopathy.” The patient was then sent home on acetaminophen with codeine and Robaxin ®. No x-rays were taken, and no other work-up was done at that time,

On this return visit the patient was brought in by his brother, who was helping him to walk. The patient claimed to have taken his medicine as prescribed and said that he had been lying flat, but that the pain had become excruciating. He denied other symptoms, except for dizziness.

Exam reveals a pale apprehensive man who is also slightly diaphoretic. He can not lie still on the examining stretcher. Vital Signs BP-88/168, P-110, R-26, T-98.6. Abdominal examination reveals a pulsatile mass approximately 6 cm in size in the mid epigastric area. It is movable and moderately tender. Rectal examination is negative. Flanks show no evidence of tenderness.

What would you do for this man at this time?

Case #6. A 75 y/o male with a history of atrial fibrillation controlled with Digoxin, and insulin-dependent diabetes complains of 12 hours of severe, diffuse abdominal pain. The pain awoke him from sleep and was accompanied by an urge to defecate. He denies chest pain.

On exam he appears very uncomfortable. P-80 and irregular, BP-110/50, R-20. Chest clear. His abdomen is soft, non-distended, and diffusely mildly tender. There is no guarding, rebound, or masses palpable. His bowel sounds are decreased but present. There is no hernias noted. Rectal examination reveals stool moderately positive for blood.

What is your differential diagnosis and how would you go about working up this gentleman?

Case #7. An 83y/o female presents with 24 hours of increasing abdominal pain, fever, and chills. She vomited once, but did not have urinary or other GI symptoms. She has a known, previously silent gallstone, but no other medical history. She had a hysterectomy for abnormal uterine bleeding 5 years ago.

On examination she appears ill and maybe jaundiced. VS are T = 103F, P = 110, BP 138/90, R = 26. Her mental status is fine. Neck supple. Chest clear. Heart normal. The abdomen is soft, diffusely tender, but more so in the RLQ. No guarding or rebound is present. Bowel sounds, pelvic exam, and rectal exam are normal.

What is your differential diagnosis?

What diagnostic studies will you order?

A later examination reveals

General References

1. Bugliosi TF, Meloy TD, Vukov LF: Acute abdominal pain in the elderly. *Ann Emerg Med* 1990;19:1383-1386.
 2. Balsano N & Cayten SG: Emergency Care of the Elderly: Surgical Emergencies of the Abdomen, *Emerg Med Clin N Amer* 8:399; 1990
 3. Kauvar DR: The geriatric acute abdomen. *Clin Geriatr Med* 1993;9:547-558.
 4. Fenyo G: Acute abdominal disease in the elderly. Experience from two series in Stockholm. *Am J Surg* 1982;143:751-754.
 5. ACEP Clinical Policy for the Initial Approach to Patients Presenting with a Chief Complaint of Nontraumatic Acute Abdominal Pain, *Ann Emerg Med* 23:906, 1994 (available directly from ACEP's services department at 1-800-798-1 822)
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 8. Sanson TG & O'Keefe KP. Evaluation of abdominal pain in the elderly. In Gastrointestinal Emergencies, *Emerg Med Clin N Amer* 1996;3:615-628.
 9. Siewert B et al. Impact of CT on diagnosis and management of acute abdomen in patients initially treated without surgery. *AJR* 1997;168:173
 10. Marco CA et al. Abdominal pain in geriatric emergency patients: variables associated with adverse outcomes. *Acad Emerg Med* 1998 Dec 5;1163-8.
 11. Strange GR & Chen EH. Use of emergency departments by elder patients: a five-year follow-up study. *Acad Emerg Med* 1998 Dec 5;1157-62.
 12. Walker JS & Dire DJ. Vascular abdominal emergencies. *Emerg Med Clin N Amer* 1996;14(3):571.
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ABDOMINAL PAIN IN THE ELDERLY CASE STUDIES - THE "ANSWERS"

CASE #1. ACUTE DIVERTICULITIS

1. Pathophysiology - Acute diverticulitis is the most frequent complication of diverticulosis and rarely occurs under the age of 40. Perforation of a diverticulum leads to inflammation. In uncomplicated diverticulitis, the inflammation is confined to the colonic wall by the serosa. If there is perforation of the serosa, inflammation may lead to a pericolic abscess or spread to produce frank peritonitis.
2. CMF: The most common symptom is persistent abdominal pain that early on is vague and generalized but later becomes well localized to the LLQ. Fever, malaise, and constipation are common. Urinary symptoms may be present secondary to inflammation near the bladder or ureter. A mass in the LLQ may or may not be palpable, and stool for occult blood is positive in over 50 percent of cases, but gross bleeding is unusually. Symptoms can progress to generalized peritonitis.

3. DX: The diagnosis is clinical. X-rays generally only show a non-specific ileus and/or mild distension, but should be done to exclude obstruction or perforation. Avoid contrast studies in the acute stage to prevent perforation. CT scan is probably the modality of choice to delineate the extent of the inflammatory process or to rule out other diagnoses.
 4. TRX: Patients generally require hospitalization with bowel rest, intravenous fluids, analgesics, intravenous antibiotics, and frequent reexamination. Initiate antibiotic treatments with either cefoxitin 2 GIVPB q 8 hrs or an aminoglycoside plus a specific anaerobic agent (e.g., gentamycin plus metronidazole).
 5. References:
 - a. Ferzoco LB, Raptopoulos V, Silen W. Current Concepts: Acute Diverticulitis. *NEJM* 1998;338:1521
 - b. Floch MH, Update on Diverticulitis, *J Critical Illness* 8:43,1993
 - c. Cho KC, et al: Sigmoid diverticulitis: Diagnostic role of CT-comparison with barium enema studies. *Radiology* 176:111, 1990.
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CASE #2. PERFORATED PEPTIC ULCER

Key points in recognition and management

1. Remember, they are called 'vital' signs for a reason.
2. Abdominal wall rigidity, elicited on physical exam, is affected by awareness. Patients can be distracted and the intensity of rigidity lessened and still have acute peritonitis. An increasing and difficult to diagnose problem in the elderly.
3. Get adequate x-rays: if the patient can't sit up, get a lateral decubitus - left side down. Be firm that the x-ray technicians obtain the proper films.
4. A useful technique to dx free air under the diaphragm is to place an NGT into the stomach and instill 300-400cc of air, then repeat upright films.
5. Though perforations are sterile early on, infection quickly ensues and should be treated with antibiotics which cover enteric gm negative bacilli and anaerobes. Begin Abx in the ED! Cefoxitin 2Gm, or equivalent, is a good choice. Clindamycin + gentamycin is also reasonable coverage.
6. Avoid 3rd generation cephalosporins in patients with liver disease to prevent inducing coagulopathies.
7. References:
 - a. Cina SJ et al, From Emergency Room to Morgue: Deaths Due to Undiagnosed Perforated Peptic Ulcers, *Am J Forensic Med Pathol* 15:21,1994
 - b. Clinch D, Banerjee AK, Ostick G: Absence of abdominal pain in elderly patients with peptic ulcer. Age and Ageing 1984;13:120-123.
 - c. Levrat M, Pasquier J, Lambert R, et al: Peptic ulcer in patients over 60. *Am J Dig Dis* 1966; 11:279-285.

CASE #3. LARGE BOWEL OBSTRUCTION (LBO)

Sigmoid Colon Carcinoma with “Apple Core” large bowel obstruction

1. Cancer is the most common cause of LBO.
2. Diverticulitis is the second most common cause of LBO
3. Volvulus is the 3rd most common cause of LBO.

Colonic Volvulus

1. Accounts for 10 - 13 percent of all large bowel obstructions.
2. Volvulus results from the rotation of a segment bowel about its mesenteric axis sufficient to produce obstruction of the lumen. Sigmoid volvulus (60%) is more common than cecal volvulus (40%). The two types of volvulus are very different:
3. Sigmoid Volvulus: Occurs almost exclusively in two groups: patients of any age with severe psychiatric or neurologic disease, or elderly patients with debilitating diseases who are chronically inactive. The common denominator is severe chronic constipation
 - a. CMF: Early symptoms are intermittent cramping, lower abdominal pain, and progressive abdominal distention. Because of the underlying disease state, most patients present late in the course of the disease with diffuse abdominal tenderness, marked distension, and tympany.
 - b. DX: Diagnosis should be considered in any institutionalized patient with an acute abdomen. In approximately 80 percent of the cases, the diagnosis can be confirmed by plain films of the abdomen, which show a tremendously dilated single loop of colon in the left half of the abdomen positioned as a “bent innertube” picture. Barium enema can be diagnostic, showing a twisted “bird’s beak” or “ace of spades” deformity.
 - c. TX: Surgical consultation: non-strangulated volvulus may be decompressed/detorsed using a rectal tube via the sigmoidoscope; operative repair is essential when strangulation is suspected.
4. Cecal Volvulus: Occurs in all ages, but most common in 25 to 35 year olds. Constipation is not a factor, and there is no association with psychiatric or neurologic disease as in sigmoid volvulus. Etiology is probably congenital hypofixation of the right colon to the posterior abdominal wall. Predisposing factors include previous abdominal surgery (disturbed the fixation of the cecum to the posterior wall) and pregnancy.
 - a. CMF/DX/TX: Symptoms of acute small bowel obstruction diagnosed by x-ray revealing one very large dilated segment of colon (characteristic “coffee bean” deformity) anywhere in the abdomen because of the mobile cecum.
 - b. Treatment is surgical; nonoperative decompression generally unsuccessful.

5. References:

- a. Deans GT, Krukowski ZH, Irwin ST: Malignant obstruction of the left colon. *Br J Surg* 81(9):1270, 1994.
 - b. Jones IT, Fazio VW: Colonic volvulus. Etiology and management. *Dig Dis* 7(4):203-9, 1989.
 - c. Ponc RJ, Saunders MD, Kimmey MB: Neostigmine for the treatment of acute colonic pseudo-obstruction. *NEJM* 1999;341:137-141.
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CASE #4. FECAL IMPACTION

1. Consider spurious diarrhea in the elderly, ie, you must do a rectal exam to rule a lesion, mass, or impaction in patients with diarrhea.
 2. "Deliver the impaction" in the ED before you discharge the patient.
 - a. digitally break up the impaction
 - b. mineral oil enema
 - c. digitally break up more of the impaction
 - d. repeat mineral oil enema, or use tap-water enema
 - e. repeat above as necessary to evacuate the rectum
 3. Discharge the patient with stool softeners and/or laxatives as needed, depending on the cause of the impaction.
 4. Remember to determine the etiology of the impaction: fecal impaction is a physical finding, not a diagnosis.
 5. References:
 - a. Shafik A: Constipation: pathogenesis & management. *Drugs* 1993;45:528.
 - b. Romero Y et al: Constipation and Fecal Incontinence in the Elderly. *Mayo Clin Proc* 1996;71:81-92.
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CASE #5. RUPTURED ABDOMINAL AORTIC ANEURYSM

1. Dx. not always easy. Twenty percent still admitted under a different dx, especially renal colic.
2. Classic triad of acute abdominal/back pain, palpable pulsatile mass, and decreased BP occurs in < 50% of cases.
3. Anyone with a known AAA who presents with abdominal pain or back pain has a **leaking** AAA until proven otherwise!

4. Dx modality of choice to prove presence or absence of AAA is ultrasound (hopefully right in your ED)
 5. Dx modality of choice to prove presence or absence of leaking AAA is CT scanning, But remember, bad things happen in Xray!
 6. References:
 - a. Ernst CE. Review Article: Abdominal Aortic Aneurysm. *NEJM* 1993;328: 1167
 - b. Johansen K, Kohler TR, Nicholls SC, et al: Ruptured abdominal aortic aneurysm: The Harborview experience. *J Vasc Surg* 1991;13:240-247.
 - c. Marston WA, Ahlquist R, Johnson, Jr. G, et al: Misdiagnosis of ruptured abdominal aortic aneurysms. *JVasc Surg* 1992; 16: 17-22.
 - d. Porcellini M et al. Intra-abdominal acute diseases simulating rupture of abdominal aortic aneurysms. *J of Cardiovasc Surg* 1997;38:653
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CASE #6. ISCHEMIC COLITIS\COLONIC INFARCTION

Due to inferior mesenteric artery occlusion from an embolus caused by atrial fibrillation

1. Key to dx of ischemic bowel is pain out of proportion to physical finding. Pain is visceral in origin and thus poorly localized and not as severe as somatic pain from peritonitis, which will be a late finding here.
 2. A helpful clue is an abnormally high WBC such as 25,000.
 3. Consider the dx of enterohemorrhagic colitis from E.coli 0157:H7 which causes severe bloody diarrhea. It arises from inadequately cooked beef, particularly hamburger, and outbreaks have occurred commonly in nursing home populations. M & M is quit high. (See Rosen text, chapter 78 page 1549)
 4. References:
 - a. Bower TC: Ischemic colitis. *Surg Clin North Am* 73:1037-53, 1993.
 - b. Ottinger LW: Mesenteric ischemia. *N Engl J Med* 307:535-7, 1982.
 - c. Cohen MB, Giannella RA: Hemorrhagic colitis associated with *Escherichia coli* 0157:H7. *Adv Intern Med* 37:173-195, 1992.
 - d. Castellone JA & Powers RD: Ischemic Bowel Syndromes: A comprehensive, State-of-the-art approach to emergency diagnosis and management. *EM Repts*. 1997;18:189-200.
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CASE #7. R/O

CHOLELITHIASIS

- 1 Early pain is visceral in origin, and may present anywhere in the abdomen or chest
Later pain is somatic in origin and generally well localizes in the RUQ over the anatomic location of the GB.

2. Risk factors: fat, fair, fertile, female, > 40 age, family history, hemolytic anemia such as sickle cell, birth control pills\estrogens, American Indian descent (SO-90%)
3. Dx modality of choice to determine presence or absence of stones is ultrasound, but if clinical suspicion of cholecystitis is high and US is negative proceed to HIDA radionucleotide scanning.
4. Most gallstones are cholesterol stones and are not radiopaque (70-80%). Calcium bilirubinate stones are radiopaque (20-30%).
5. "The innocent gallstone is not a myth." Incidentally found GB stones are probably best left alone.

ACUTE ASCENDING CHOLANGITIS

1. Pathophysiology: obstruction, elevated intraluminal pressure, infection. E. coli, Klebsiella, Pseudomonas are usual organisms (unless AIDS patient, then consider cytomegalovirus or cryptosporidium). More common after biliary instrumentation, also consider drug induced cholangitis.
2. SX: "Charcot's Triad," fever and chills, jaundice, and RUQ pain.
3. DX: Clinical diagnosis, elevated WBC, bilirubin, alkaline phosphatase, and transaminases are present in almost all cases; blood culture is positive in greater than 40 percent. US/CT may demonstrate bile duct dilatation.
4. TRX: IV antibiotics, +/- urgent decompression of the bile duct

ACUTE APPENDICITIS

1. Contrary to dogma, the use of pain relieving medications in patients with acute abdominal pain may be beneficial in making a dx, and are safe.
 - a. Pace S & Burke TF. Intravenous morphine for early pain relief in patients with acute abdominal pain. Acad Emer Med 1996;3:1086;
 - b. Yealy DM & O'Toole KS. Commentary: Challenging Dogma - Analgesia in Abdominal Pain. Acad Emer Med 1996;3:1081;
 - c. Attard AR et al. Safety of early pain relief for acute abdominal pain. British Medical J 1992;305:544-556;
 - d. Cone's Early Diagnosis of the Acute Abdomen, 19th Edition, p. 5-6. 1996;
 - e. Lukens TW, Emerman C, Effron D. The natural history and clinical findings in undifferentiated abdominal pain. Ann Emerg Med 1993;22:690-696.
 - f. Zoltrie N & Crust MP. Analgesia in the acute abdomen. Ann R Coll Surg Engl 1986;68:209

2. Tell patients and their families that you have considered acute appendicitis in your ddx, why you don't think the problem is appendicitis at this time, and what to look for that should prompt return for further examination.
3. Proper documentation should preempt any and all allegations of medical malpractice for "missed appendicitis."

References Case #7:

1. Dawes LG & Nahrwold DL, Acute Cholecystitis: Update on Diagnosis and Treatment, **J Critical Illness** 7:1409,1992
 2. Horattas MC, Guyton DP, Wu D: A reappraisal of appendicitis in the elderly. **Am J Surg** 1990;160:291-293.
 3. Freund HR, Rubinstein E: Appendicitis in the aged is it really different? **Am Surg** 1984;50:573-576.
 4. Gruber PJ, Silverman RA, Gottesfeld S, Flaster E. Presence of Fever and Leukocytosis in Acute Cholecystitis. **Ann Emerg Med** 1996;28:273.
 5. Singer AJ, McCracken G, Henry MC, Thode HC, Cabahug CJ. Correlation among clinical, laboratory, and hepatobiliary scanning findings in patients with suspected acute cholecystitis. **Ann Emerg Med** 1996;28:267.
 6. Parker LJ, Vukov LF, Wollan PC. ED evaluation of geriatric patients with acute cholecystitis. **Acad Emerg Med** 1997;4:51-55.
 7. Paajanen H et al. Emergency appendectomies in patients over 80 years old. **Am Surg** 1994;60:950.
 8. Saini S. Imaging of the hepatobiliary tract. **NEJM** 1997;336: 1889
 9. Rao PM et al. Effect of computed tomography of the appendix on the treatment of patients and use of hospital resources. **NEJM** 1998;338:141
 10. Lane MJ et al. Unenhanced helical CT for suspected acute appendicitis. **AJR** 1997;168:405
 11. Barie PS & Fischer E. Acute acalculous cholecystitis. **J Am Coll Surg** 1995; 180:232
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