A Patient with Fever and Headache

You are asked to see a 64-year-old woman in the Yale Emergency Department in January because of fever and headache. She claimed to feel well until 3 days prior to admission when she began to develop fever. Two days before admission she developed a headache that began to increase in intensity, and the fever continued so she came to the Emergency Department. She denied any trauma, cough, visual or hearing problems. She was never hospitalized for any medical illness.

PE reveals a thin woman in moderate distress wanting all lights off in the room. T 101.6, P112, R 26, BP 140/84. SKIN - no rash or petechiae. LN - none palpable. HEENT – nuchal rigidity was noted; sinuses nontender; oropharynx red but without exudate; conj normal; Fundi reveal sharp discs without retinal exudates; TMs are red without effusion. CHEST - clear. COR - RRR with 1/6 SEM at base. ABD - soft, nontender without organomegaly. G/R - normal; heme negative. NEURO - somnolent but oriented; motor, sensory, cerebellar and CN exams are normal; Kernig's and Brudzinski signs were negative.

Fifteen minutes after the initial evaluation, the patient develops a grand mal seizure.

LABS

Na 124, K 3.9, Cl 100, HCO3 21, Cr 1.1, glu 108
Hb 14.3, Hct 44.8, WBC 11.1 (75 seg, 3 bands, 22 lymphs), plts 370K
UA: normal
EKG: S tach 110/nl intervals without ischemic changes. CXR: clear
Head CT scan: no masses or bleed
LP: opening pressure 260 mm, glucose 38 mg %, protein 140 mg%, 3 RBC, WBC 1230 (52 segs, 40 lymphs, 8 monos); Gm stain - no organisms seen

QUESTIONS:

1. What other pertinent history would you obtain in this patient?

2. How does one test for Kernig's and Brudzinski's sign, and what diagnostic value do they provide?

3. What are the advantages and disadvantages with obtaining a head CT scan before lumbar puncture in this patient? Would you have ordered one?

4. What categories of infectious agents would you be most concerned about?

5. Are there non-infectious diseases that can produce a similar CSF profile?

6. What specific diagnostic studies would you consider at this time?

7. What empiric therapy would you select for this patient in the Emergency Department?

8. 24 hours later, the blood and CSF cultures grow out Gram positive cocci in pairs and chains. The patient's husband asks you what the patient's chances are of surviving without any neurological problems. How do you respond?

A Patient with New Onset Azotemia

You are called by the surgical intern to see a 68 yr old man in the surgical ICU because of new onset azotemia. He has a history of smoking, hypertension, osteoarthritis, and peripheral vascular disease, and was admitted 3 days earlier for unstable angina. His pain was refractory to maximal medical therapy, so he underwent cardiac cath and subsequently 3 vessel coronary bypass grafting 48 hours prior to your call from the intern. His post-operative course was complicated by a subendocardial infarction but was otherwise unremarkable until yesterday when his urine output began to diminish (total of 150 cc over 24 hrs), and his serum creatinine was noted to be 3.5 mg/dl (previous creatinine was 1.2 on admission). The patient is intubated and can give no history. Medications include lasix, lisinopril, intravenous nitroglycerin, ibuprofen, and perioperative cefazolin.

PE reveals an intubated alert man in no acute distress. T 97.3, P 96, R 12, BP 110/86. SKIN - no rash or lesions noted; normal turgor. LN - none palp. HEENT - conjunctivae are benign; Fundi reveal grade 2 hypertensive changes; oropharynx is intubated and poorly visualized. CHEST - clear on the ventilator; sternotomy incision looks normal; COR - RRR with distant heart sounds; no murmurs or rubs. ABD - soft nontender, without organomegaly; no flank tenderness; bowel sounds are diminished. G/R - Foley catheter in place; rectal normal; heme negative. NEURO - nonfocal. EXT - saphenous vein harvest site benign; no edema.

LABS

Na 133, K 4.5, Cl 100, HCO3 20, Cr 3.5, glu 132
Hb 13.6, Hct 40.2, WBC 8.6, plts 400K
UA: clear/1.015/no protein, glucose or ketones/sediment reveals occasional hyaline casts, moderate pigmented granular casts and many renal epithelial cells. There are few RBC and rare WBC.
EKG: NSR 90/nl axis and intervals; inverted T waves are noted in the anterior leads.
CXR - normal heart size; no CHF or infiltrates noted.

QUESTIONS:

1. What broad categories of diagnostic possibilities need to be considered in a patient with acute kidney injury?

2. What unique aspects of this individual patient place him at risk for prerenal, post renal and intrinsic renal etiologies for his acute kidney injury?

3. How does the urinalysis help in your differential diagnosis? What other diagnostic information would you request at this point?

4. Does this patient need a renal biopsy? Explain why or why not?

5. What complications can ensue in a patient with acute kidney injury? What would be general indications for dialysis in this setting?

A Patient with An Acid-Base Disturbance

A 61-year-old man is brought to the Yale Emergency Department after being found on the floor of his apartment by a friend. The patient, who can give only minimal history, claims to have had abdominal pain and a cough for a few days, but cannot be more specific. His medical records state that he has a long history of alcohol use with many E.D. visits during alcoholic binges, but no admissions for any acute or chronic medical complications. He is on no medications, and lives alone.

PE reveals a thin man in moderate distress. T 103, P 100, R 32, BP 98/64. SKIN - no rash or lesions. LN - none palp. HEENT - no evidence of trauma; eyes and fundi are normal; oropharynx is benign. CHEST - clear other than diminished breath sounds at the right base with overlying bronchophony. HEART - RRR with a 1/6 systolic ejection murmur at the base without radiation; no friction rub. ABD - soft, with some mid epigastric tenderness but no organomegaly. G/R - normal; stool heme negative. NEURO - nonfocal.

LABS
Na 136, K 3.2, Cl 90, HCO3 16, Cr 1.2, glu 65
Hb 12.2, Hct 25.3 (43 seg, 34 bands, 12 lymphs, 11 monos)
UA: clear/1.025/ 1+ protein, no ketones/ no cells or casts
EKG: NSR 100/normal axis, intervals and no ischemic changes
CXR: nl heart size; opacification of right lower lobe
ABG (RA): pH 7.40/ pCO2 22/pO2 85
ETOH level = 0 amylase 350/lipase 4.0

QUESTIONS:

1. Does this patient have an acidosis? Is it respiratory or metabolic?

2. How do you calculate the anion gap? Is it abnormal in this patient?

3. What would be the differential diagnosis for a metabolic acidosis with an increased anion gap? Which would you consider in this patient?

4. Does the patient have an alkalosis? Is it respiratory, metabolic or both?

5. In 24 hours the patient's blood and sputum cultures are growing *Klebsiella pneumoniae*. How would you explain the entire acid-base disturbance and why is the pH normal?

A Patient with Dysuria, Nausea and Abdominal Pain

You are asked to see a 32-year-old female with IDDM who presents to the Emergency Department complaining of abdominal pain and dysuria. The patient had been feeling well until two days prior to admission when she began to notice dysuria and urinary frequency. On the morning of admission she began to have nausea and abdominal pain, and because she was unable to eat she stopped taking her insulin. The abdominal pain became worse so she came to the hospital. The pain is in the epigastric region without radiation. She denies bloody diarrhea, fever, chills, sweats. She had not vomited yet but felt severe nausea. She states that she was too busy to check her finger sticks but that she had been strict with her diet. She is married, has one child; denies alcohol or tobacco use. She has no allergies. Meds: NPH insulin 20 u q a.m., 10u q p.m.

Physical exam - uncomfortable but in NAD. RR 26 labored. Supine: BP = 108/62, HR 116; upright BP 86/50 HR 138; Temp 99.8. SKIN: normal. HEENT - conjunctivae pink, anicteric, oropharynx/sinuses/TMs are clear; fundi benign. HEART – RRR without murmurs or rub. CHEST - clear. ABD - normoactive bowel sounds, mild midepigastric tenderness and flank tenderness, no organomegaly or masses. Rectal - no masses, nontender, hemoccult negative. Extremities : normal without edema.

LABS
Na 136, K 5.4, Cl 111, HCO3 8, glu 640, Cr 1.3
Hb 14.0, Hct 42.1, WBC 12.1, plts 420 K
LFTs = wnl, Phosphate = 6.0, Ca++ = 8.9, Amylase = 300, Alb = 3.9
UA - 1.022/+ ketones/ 5 WBC/2 RBC per HPF
CXR - clear
EKG - NSR; normal intervals, negative ST/T wave changes
ABG (room air): 7.08/pCO2 20/pO2 107

QUESTIONS:

1. What is the most likely diagnosis? What urgent treatment is required?

2. You send serum ketones and the result is 1:16 dilution. Hours later the patient looks better clinically but her ketone level is 1:64. How do you explain this? What's the best way to follow this patient's acid/base status?

3. What hormonal mileu is ketogenic? Why do you think this patient developed ketoacidosis? What are some precipitating causes of DKA?

4. Is there any role for intravenous bicarbonate therapy in this patient?

5. Are you concerned about the patient's elevated serum K+ and phosphate? Explain.

6. The patient's glucose is lowered to 200 and she is on a full liquid diet. Her IV insulin is discontinued and she is placed on 10 units SQ NPH bid with sliding scale coverage of regular insulin qid for finger stick values of 200 or more. Later that evening you see her and she is breathing deeply and rapidly. Her fingerstick is 410. Her bicarbonate is 12. What happened?

A Patient with Abdominal Pain and Vomiting

A 39-year-old woman is admitted to you because of severe abdominal pain and vomiting. She states that her illness began about 3 days ago with midepigastric pain and nausea, and progressed to severe abdominal pain, nausea and vomiting. She describes her pain as crampy, without any radiation, and continuous throughout the day so that she cannot eat. She denies back pain, flank pain, diarrhea, dysuria, hematuria, cough or any similar episode of pain before. She denies eating any unusual foods, and her medications include NSAIDs for headaches, and oral contraceptives; she recently took a course of metronidazole for Trichomonas vaginitis. She is employed as a corporate vice-president, and lives with her daughter and husband. She does not smoke cigarettes and drinks alcohol only on social occasions. Her parents both died of cancer and she had a sister who committed suicide.

PE reveals a thin woman lying on her side in a fetal position. T 99, P 130, R 20, BP 100/82. SKIN - warm, dry without lesions. LN - none. HEENT - normal with dry mucosa. CHEST - clear. HEART - RRR 2/6 SEM; no rub or gallop. ABD - scaphoid with diffuse tenderness to light palpation especially in midepigastrium; voluntary guarding in all quadrants; no rebound; no organomegaly or palpable masses; BS absent. PELVIC - normal with normal rectum. Stool trace heme positive. NEURO - nonfocal.

LABS
Na 142, K 3.1, Cl 100, HCO3 36, Cr 1.2, glu 60
Hb 13.3, Hct 39.7, WBC 14.8 (88 segs, 10 bands, 2 lymphs)
UA – normal; ABG (RA) 7.50/38/64
AST 102; ALT 75; Alk Phos 126; Amylase 806; Lipase 5.3
EKG – Sinus tach 130/flattened T waves in V2-V6
CXR - atelectasis at both bases; small left pleural effusion

QUESTIONS:

1. What is the differential diagnosis of this patient's abdominal pain? Which is most likely?

2. What are the major causes of acute pancreatitis?

3. What is its presumed pathogenesis?

4. Are imaging studies helpful at this point?

5. The patient undergoes abdominal ultrasound which reveals no gallstones. How would you manage this patient the day of admission?

6. Five days later the patient is febrile with continued abdominal pain and elevated amylase. What would your concerns be, and what would you do?

7. The next day the patient has continued severe pain and fever despite your therapy, and she develops dyspnea, and hypotension. The serum amylase increases to 1200, platelet count drops to 60K and CXR reveals bilateral interstitial infiltrates. What potential complications can account for her clinical course? Are there features at presentation that could have predicted this subsequent clinical course?

8. Although the patient describes herself as only a "social drinker", her husband phones to tell you that he is concerned because she has been drinking several vodka drinks each night and asks if her drinking is related to her illness. How do you respond?

A Patient with Back Pain

A 45 year old woman was admitted from the Emergency Department because of back pain. She has a history of breast cancer that was first diagnosed 4 years ago. Her primary tumor was 2.3 cm in size and she had only one axillary lymph node that was positive for malignancy. She elected to have a mastectomy, and she received adjuvant chemotherapy for 6 months. Her tumor was negative for hormone receptors.

She was in her usual state of health until about 2 months ago, when she began to notice interscapular back pain. She initially attributed it to a "pulled muscle" because she was weight lifting and exercising at a local health club. However, over the last 3 days the pain has increased in intensity particularly when she lies down, and she has noted weakness in her legs, so she came to the YNHH Emergency Department. She denied any fever, night sweats, weight loss, or headache.

Physical exam reveals a thin woman in NAD. VITAL SIGNS: T 98.8, P100, R 14, BP 135/76, O2 sat 98% on RA. SKIN: warm dry, normal turgor. LN: no palpable cervical, supraclavicular, axillary or inguinal adenopathy. HEENT: conjunctivae normal, oropharynx benign, TMs normal, sinuses nontender, fundi benign. CHEST: clear. HEART: JVP normal. RRR without murmur or rub. ABD: nontender without hepatosplenomegaly. BS normal. EXT: no joint abnormalities or edema. NEURO: alert, oriented. CN II-XII intact. Motor: 4/5 muscle strength in LE bilaterally. Sens: intact pain, vibration, position sense. Reflexes: 3+ patellar and ankle jerks. Babinski signs is positive on the right and equivocal on the left.

LABS: Na 136, K 3.9, Cl100, HCO3 26, Cr 1.1, glu 125
Hb 13.9, Hct 40, WBC 8.9 (normal differential), plts 350K
UA: normal
EKG: NSR 90, normal axis and intervals
CXR: normal heart size; lungs clear

QUESTIONS:

1. What is your differential diagnosis of this patient's back pain syndrome and what would be your greatest concern?

2. What clinical features would you be most concerned about in evaluating a patient for the possibility of spinal cord compression?

3. What would you do to establish a diagnosis? How urgent is it to make a diagnosis?

4. The patient undergoes an emergency MRI that reveals tumor mass invading T6 vertebral body and compressing the anteriolateral portion of the thecal sac and spinal cord. There is evidence for additional tumor lesions at T4, T5, and T7 but there is no visible cord or thecal sac compression there. What would be the major therapeutic options available?

5. Three months later, the patient's ability to walk improves but she begins to notice problems with more diffuse muscle weakness, constipation, polyuria, and increased thirst. What concerns would you have now?

6. Diagnostic evaluation reveals an MRI that remains improved compared to her MRI before beginning radiotherapy. The patient has mild orthostatic changes in blood pressure, urinalysis reveals a specific gravity of 1.004, EKG reveals a short QT interval, and serum calcium is 16. What are the possible explanations and what is the initial approach to therapy*?*

Pneumonia in an HIV Infected Patient

A 37-year-old man with a long history of injection drug use with a history of HIV infection for 6 years is admitted because of fever, cough and an abnormal CXR. He has been followed as an outpatient on a regimen of a combination pill of two nucleoside reverse transcriptase inhibitors (tenofovir300/emtricitabine200= Truvada one tab QD) and a non-nucleoside reverse transcriptase inhibitor (efavirenz= Sustiva) at bedtime with a stable but detectable HIV viral load (25,000 copies) and a CD4 count of 190 three months ago. He states that he rarely takes his pills every day. He has continued to actively use drugs, but has had no active clinical problems until about 3 weeks ago when he began to have a dry cough. This continued for about 2 weeks and only occasionally was associated with clear sputum production, without any change in sputum color or hemoptysis. He then began to note the onset of some dyspnea on exertion which now has progressed to SOB at rest. Over the past 3 days he has noted the onset of fever to 102 that has persisted despite Tylenol, so he came to the ER.

Past medical history is notable for an episode of S. aureus TV endocarditis three years ago that was successfully treated with antibiotics. He admits to having multiple sexual partners, and was incarcerated last year for selling cocaine. Physical exam reveals a thin man in mild respiratory distress. T 103, P 120, R 32, BP 120/76. SKIN - diffusely dry with a fine scale over the posterior arms and legs; there are old and recent injection marks on all extremities. LN - diffusely enlarged to about 1-2 cm in the neck, axillae and groin. HEENT - conjunctivae and fundi are benign; TMs are normal; oropharynx reveals mild thrush. CHEST - faint rales at the bases but otherwise clear. HEART - RRR with a 1/6 holosystolic murmur at the apex that is non-radiating. ABD - symmetrical, non-tender without hepatosplenomegaly. GU - normal. NEURO - nonfocal.

LABS

Na 136, K 3.7, Cl 100, HCO3 29, Cr 1.1, glu 132
Hb 12.8, Hct 36.9, WBC 6.4 (normal differential)
UA: remarkable for 1 + protein and 2-5 RBC per HPF; otherwise normal
EKG: NSR with normal axis, internals and ST segments
CXR: increased interstitial markings in the perihilar area and upper lobes bilaterally
ABG (room air): pH 7.49/pCO2 32/pO2 68

QUESTIONS:

1. What risk factors does this patient have for HIV infection?

2. What is the differential diagnosis for his clinical presentation? Which would be the most likely and why?

3. What other historical information would you seek from this patient that is relevant to the differential diagnosis of his current condition?

4. What diagnostic steps would you pursue in this patient at this time?

5. Would you empirically treat this patient on admission? What would you choose and why?

6. What preventive measures can we take in this patient to prevent pneumonia in the future?

7. The fact that the patient has not had medical follow-up since his diagnosis of HIV infection is consistent with his propensity for high risk behavior. What are the implications of this behavior for his future medical care?

8. A young woman approaches you and indicates that she has been living with the patient for the past month. She asks about the patient's condition and seems to be unaware of his HIV infection. How should you respond? What are your obligations to the patient and to the young woman?

A Patient with an Acute Gastrointestinal Bleed

A 52-year-old man is admitted through the Yale Emergency Department because of vomiting blood. He has a long history of alcohol use and has been hospitalized for withdrawal complications, pancreatitis, and traumatic injuries over the past ten years. He had been relatively stable however until about 2 days prior to admission when he noted some occasional vague abdominal pain. He claims the pain was intermittent and nonradiating, but on the day of admission he began to feel nauseated and vomited a small cup full of blood, so he came to the hospital. He denies syncope, chest pain, cough, dyspnea, fever, recent trauma or diarrhea. He has no travel or unusual exposures. He has continued to drink (about 2-3 six packs of beer per day). He is a smoker, and he is on no medications but occasionally takes Advil or aspirin for hangover headaches. He is divorced, lives alone, and has been intermittently unemployed.

PE reveals a thin elderly man in mild distress. T 98.8, R 16, P 110, BP 108/76. SKIN - no rash or lesions. LN - none palp. HEENT - crusted blood on face and in oropharynx but without visible trauma or mucosal abnormalities; TMs are normal. CHEST - clear. HEART - RRR with 1/6 systolic ejection murmur at base without radiation. ABD - soft nontender without hepatosplenomegaly; no ascites is appreciable. G/R - nl testes and genitalia; stool dark and heme positive. NEURO - alert, oriented, non-focal exam; no asterixis.

LABS Na 135, K 3.7, Cl 99, HCO3 26, Cr 1.2, glu 138
Hb 12.2, Hct 36.4, WBC 4.5 (72 segs, 22 lymphs, 6 monos), platelets 350K
UA: clear/1.020/no protein, glucose, ketones or cells
EKG: Sinus tach 110/nl axis, intervals, and no ischemic changes
CXR: clear lung fields; normal heart size

QUESTIONS:

1. Would you characterize this patient's bleed as being from the upper GI tract, lower GI tract or both? What clinical clues would you use to make this distinction?

2. What would be your differential diagnosis of this patient's GI bleed and what risk factors does he possess for any of your diagnostic possibilities?

3. What information would you use to assess the degree of this patient's blood loss?

4. The patient's Attending calls a gastroenterology consult who recommends emergency upper endoscopy. Do you agree? What impact would endoscopy make at this time?

5. The patient undergoes endoscopy which reveals a gastric ulcer with a "visible vessel" and bleeding esophageal varices. What would your therapeutic approach be acutely? What would you do to prevent this from occurring again?

6. Before discharge the patient expresses the desire for treatment for his alcohol addiction but does not know where to go. What are the options for substance use treatment? What could you do that might increase the chances of his actually getting into a treatment program?