CASE 3

A 42-year-old man presents to his doctor for a checkup after several years without medical care. His medical history is significant for extensive smoking, alcohol, and intravenous drug abuse. On review of systems, the patient reports bleeding gums and increased bruising. Physical examination reveals an overweight white male who appears older than his stated age, mild gynecomastia, palmar erythema, and pitting edema of the lower extremities. Abdominal examination reveals shifting dullness. Relevant laboratory findings are as follows:

- WBC count: 3200/mm³
- Hematocrit: 28%
- Platelets: 90,000/mm³
- Blood urea nitrogen (BUN): 36 mg/dL
- Creatinine (Cr): 1.5 mg/dL
- Albumin: 3.3 g/dL
- Partial thromboplastin time (PTT): 40 seconds
- Prothrombin time (PT): 14 seconds
- Alanine aminotransferase (ALT): 60 U/L
- Aspartate aminotransferase (AST): 100 U/L

**What is the most likely diagnosis?**
Alcoholic cirrhosis of the liver. The ascites, palmar erythema, and gynecomastia all suggest liver failure. The moderately elevated transaminase levels suggest a chronic process (too many hepatocytes have already died to cause the dramatic rise seen in an acute process). Further indicators of chronicity include decreased albumin, elevated PT and PTT, thrombocytopenia, and decreased hematocrit. An AST level higher than ALT level suggests an alcoholic, rather than viral, etiology (mnemonic: ToASTed).

**What are the causes of this patient’s gynecomastia and bleeding gums?**
The liver normally degrades estrogen. In liver failure, circulating serum levels of estrogen are higher, explaining the gynecomastia and palmar erythema. Bleeding gums are likely due to thrombocytopenia secondary to splenic sequestration and decreased platelet proliferation factor secreted by the damaged liver.

**How does ascites form?**
Ascites (an abnormal accumulation of serous fluid in the abdominal cavity) is caused by increased intrahepatic sinusoidal pressure secondary to intrahepatic obstruction within the cirrhotic liver, decreased degradation of aldosterone by the liver leading to sodium and water retention, and decreased plasma osmotic pressure due to decreased hepatic production of albumin. Physical signs of ascites include shifting dullness, bulging flanks, and a fluid wave.

**What do the laboratory findings reveal about renal function?**
Elevated BUN and Cr levels (BUN: Cr ratio > 20) suggest prerenal failure. The kidneys are not perfused appropriately because of decreased intravascular volume (due to ascites). Prolonged intravascular volume depletion in the setting of end-stage liver disease can cause intense renal vasoconstriction and renal failure unresponsive to volume loading; known as hepatorenal syndrome.
CASE 2

A 50-year-old HIV-positive man presents to his primary care physician with a 1-day history of nausea and vomiting. He also has severe epigastric pain radiating to the back. Review of the patient's medical history reveals that he is taking the reverse transcriptase inhibitor didanosine. Laboratory testing reveals an amylase level five times higher than normal and a lipase level six times higher than normal.

What is the most likely diagnosis?
Acute pancreatitis.

What are the common causes of this condition?
Acute pancreatitis occurs when pancreatic enzymes (trypsinogen, chymotrypsinogen, and phospholipase A) are activated in pancreatic tissue rather than in the lumen of the intestine, resulting in the autodigestion of pancreatic tissue. The most common causes are Gallstones (leading to common bile duct obstruction) and EtOH. Other causes include Trauma, Steroids, Mumps, Autoimmune diseases, Scorpion stings, Hyperlipidemia, and certain Drugs, including antiretrovirals (mnemonic: GET SMASHeD).

What are the top three conditions to consider in the differential diagnosis?
- **Cholelithiasis** refers to the presence of gallstones in the gallbladder that can obstruct the cystic duct. This obstruction can lead to biliary colic (short-term waxing-and-waning pain associated with the ingestion of fatty food) or cholecystitis (more prolonged, constant pain due to inflammation of the gallbladder).
- **Intestinal obstruction** often presents with abdominal pain, nausea, and vomiting but also with changes in bowel habits.
- **Acute coronary syndrome** should be considered in patients 50 years of age or older with abdominal pain and associated risk factors.

In this patient, the significantly elevated amylase and lipase levels are sensitive and specific for acute pancreatitis.

Why is this condition more common in patients with HIV infection?
Patients with HIV and/or AIDS are susceptible to infection with organisms such as cytomegalovirus, *Mycobacterium avium* complex, and *Cryptosporidium*, all of which can cause pancreatitis. Antiretroviral agents such as didanosine, pentamidine, and trimethoprim/sulfamethoxazole can also cause acute pancreatitis.

What is the appropriate treatment for this condition?
Most cases (85%-90%) are self-limited and resolve within 4-7 days of the start of treatment. Typical treatment for acute pancreatitis includes avoiding oral intake, aggressive intravenous fluid resuscitation, pain control, and possibly nasogastric tube placement to decrease gastric secretions in the stomach. Antibiotics are not recommended in uncomplicated pancreatitis but may be of use in severe, necrotizing pancreatitis.
CASE 8

A 64-year-old woman presents to her physician complaining of gas, constipation, and left lower abdominal discomfort. The pain increases after meals but persists throughout the day. The patient has a history of chronic constipation, but the current symptoms are worse than normal. She denies bloody stools currently but did have a massive gastrointestinal (GI) bleed last year. During that hospitalization she received a barium enema (Figure 7-6). Her only medication is one baby aspirin per day. On physical examination, she is febrile to 38.6°C (101.5°F) with a blood pressure of 110/70 mm Hg, heart rate of 105/min, and respiratory rate of 18/min. Relevant laboratory findings are as follows:

- WBC count: 13,400/mm³
- Hemoglobin: 13 g/dL
- Hematocrit: 38%
- Platelets: 250,000/mm³
- Chloride: 100 mEq/L
- Potassium: 4.3 mEq/L
- Bicarbonate: 24 mEq/L
- Sodium: 136 mEq/L
- Creatinine: 1.2 mg/dL
- Stool guaiac test: Negative


What is the most likely diagnosis?
Diverticulitis (inflammation of outpouchings involving all layers of the colonic wall). The patient has known diverticula in her distal colon as seen in her roentgenogram. The previous GI bleed was likely secondary to a diverticular bleed.

Which of the clinical signs and symptoms help confirm the diagnosis?
Constipation, flatus, left-sided abdominal pain, tenderness, fever, tachycardia, and elevated WBC count are characteristic of diverticulitis.

What tests can help confirm the diagnosis?
X-ray of the abdomen is needed to rule out free air (a surgical emergency in which upright x-ray of the abdomen shows an area of lucency immediately under the diaphragm caused by diverticular rupture). If there is no surgical emergency, a CT of the abdomen may be ordered. Radiographic findings include bowel wall thickening, fistulas, and/or abscesses. Colonoscopy is contraindicated in acute cases as it may cause perforation but should be completed on follow-up to evaluate for malignancy.

What are the risk factors for this condition, and what steps can prevent recurrence?
Advanced age, chronic constipation, previous diverticulosis, and aspirin use all heighten the risk for diverticular disease. A high-fiber diet and good hydration reduce the risk of developing diverticula and subsequent diverticulitis.

What is the appropriate treatment for this condition?
Treatment includes broad-spectrum antibiotics, such as metronidazole and ciprofloxacin, a clear liquid diet for 1 week, and adequate analgesia. A follow-up colonoscopy should be performed after the acute symptoms resolve.
The emergency department triage nurse calls the on-call intern to ask how she should triage a 42-year-old woman with fever, mental status changes, and a history of hereditary spherocytosis. The patient was brought in by her husband after he found her disoriented and sick in bed. She is unable to provide a good history. Vital signs are notable for a temperature of 38.9°C (102°F), heart rate of 125/min, blood pressure of 80/50 mm Hg, and respiratory rate of 24/min. She is overweight, diaphoretic, slightly yellow, and oriented only to person. Physical examination reveals tenderness and guarding in the right upper quadrant (RUQ).

Where should this patient be placed on the triage list?
This patient requires immediate attention. Even without laboratory data, her vital signs (fever, tachycardia, hypotension, and tachypnea) and toxic appearance raise suspicion of infection.

What is the most likely diagnosis?
Cholangitis is an infection of the bile ducts secondary to ductal obstruction (Figure 7-7). Most commonly, the common bile duct is obstructed by a gallstone. Other causes include stricture, biliary cancer, and infection (e.g., Clonorchis).

How does the physical examination help confirm the diagnosis?
The patient displays Charcot triad (RUQ pain, jaundice, and fever) and Reynolds pentad (Charcot triad plus hypotension and mental status changes), which are classic for cholangitis.

What risk factors in this patient’s history predispose her to this condition?
The patient likely has underlying cholelithiasis (gallstones). In addition to the 4 F’s (Fat, Fertile, Forty, and Female), the patient also has hereditary spherocytosis (HS). Patients with HS are predisposed to develop pigment gallstones due to chronic hemolysis. Pigment gallstones are radiopaque because they are composed of calcium bilirubinate. The high iron content from the hemolyzed red blood cells may also help these stones to be visualized on x-ray.

What laboratory values are expected?
- WBC count will be elevated as a cellular response to infection.
- Hyperbilirubinemia (indirect and direct) will be present. Indirect bilirubin is elevated because of red cell lysis in the setting of hereditary spherocytosis; direct bilirubin is elevated because of inappropriate excretion in the setting of obstruction.
- Alkaline phosphatase, secreted by the mucosal cells of the biliary tree, not specific to biliary obstruction, will be elevated.
- γ-Glutamyl transpeptidase, secreted by the mucosal cells of the biliary tree, will be elevated, specifically as a marker of biliary obstruction.
- Positive blood cultures are consistent with the patient’s systemic signs of infection.

What is the appropriate treatment for this condition?
This patient is displaying severe symptoms, so every effort should be made to relieve the obstruction and decompress the biliary tree. Endoscopic retrograde cholangiopancreatography (ERCP) is the tool of choice, as it is both diagnostic and therapeutic.
A 65-year-old immigrant woman from Japan presents with fatigue, weight loss, early satiety, and a gnawing stomach pain. She has been seen by multiple physicians, all of whom diagnosed her with peptic ulcer disease and treated her with antacids. However, the pain has not improved for 8 months. She has lost 16 kg (35 lb) and now complains of painful intercourse (dyspareunia) and painful defecation (dyschezia).

**What is the most likely diagnosis?**
Gastric cancer. Because of symptoms similar to peptic ulcer disease and gastritis, gastric cancer is frequently misdiagnosed. Hence, patients are typically diagnosed at a late stage and prognosis is therefore poor (5% survival at 5 years).

**What risk factors are associated with this condition?**
- Infection with *Helicobacter pylori*.
- Chronic gastritis.
- Smoking.
- Diets high in nitrosamines (ie, smoked, cured, or pickled foods) commonly found in East Asia, the Andes, Scandinavia, and eastern Europe.
- Pernicious anemia and type A blood (associated with gastritis).
- Family history.
- Previous gastric surgery.

**What will the biopsy findings reveal?**
Adenocarcinoma is the most common type of gastric cancer, and its hallmark is *signet-ring cells* on histopathology (Figure 7-14). Other signs include *limitis plastica*, or "leather-bottle stomach," which is a diffusely infiltrative cancer and portends a worse prognosis. It is also important to rule out *gastric lymphoma*, which is frequently associated with *H pylori* and may regress without surgery if the bacteria can be eradicated.

**How does this condition spread?**
Gastric cancer metastasizes by direct extension through the gastric wall and the lymphatic system and via peritoneal spread.

**Why does this patient suffer from dyspareunia and dyschezia?**
These symptoms result from metastasis via peritoneal spread to the pouch of Douglas (the rectouterine cul-de-sac). This may be felt on rectal examination as an anterior rectal wall mass or a "Blumer shelf." Gastric carcinoma metastasis to the ovary is called a Krukenberg tumor.

**What is a Virchow node?**
A Virchow node is an enlarged left supraclavicular lymph node. If it is found on physical examination, likelihood of metastatic disease is increased. Additional signs of lymphatic metastasis include a Sister Mary Joseph node (periumbilical nodule) and an Irish node (left axillary node).
### CASE 26

A 3-month-old girl born prematurely has been maintained on parenteral nutrition since a length of her bowel was resected secondary to necrotizing enterocolitis when she was 2 weeks of age. The resected bowel included the ascending colon, ileum, and distal portion of the jejunum. She is unable to thrive on enteral feeding alone.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tr>
<td><strong>What condition explains the patient's inability to thrive solely on enteral feeding?</strong></td>
<td>Short bowel syndrome due to extensive bowel resection leading to malabsorption.</td>
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<tr>
<td><strong>After resection of the ileum, which specific molecules will be malabsorbed?</strong></td>
<td>Vitamin B₁₂ and bile salts are absorbed exclusively in the ileum and thus are deficient in short bowel syndrome.</td>
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<td><strong>The remainder of the patient's jejunum has adapted by increasing the number of cells in the villi, thereby lengthening the villi. What term describes this type of adaptation?</strong></td>
<td>Adaptation that increases the number of cells within a tissue is known as hyperplasia. This is in contrast to hypertrophy, in which the cells increase not in number but in size.</td>
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| **During bowel transplantation, which branch(es) of the aorta must be identified and anastomosed to supply blood to the jejunum, ileum, and ascending colon?** | - The superior mesenteric artery supplies blood to the intestine from the proximal jejunum to the proximal transverse colon.  
  - The celiac trunk supplies the stomach, liver, spleen, and duodenum.  
  - The inferior mesenteric artery supplies the distal transverse colon, descending colon, and sigmoid colon. |
| **How might octreotide be used in this patient?** | As a somatostatin analog, octreotide inhibits the release of gastrin. This reduces gastric secretions that would otherwise be in excess compared to the length of bowel and further impede absorption. |
| **How will malabsorption of bile salts affect this patient's prothrombin time (PT) and partial thromboplastin time (PTT)?** | Malabsorption of bile salts leads to an inability to properly absorb fat and fat-soluble vitamins (ADEK). PT and PTT both increase secondary to a lack of vitamin K, which is a necessary cofactor in the γ-carboxylation of multiple clotting factor glutamate residues. |