

Surgery I Clerkship Objectives

Cases/Discussion Questions

Abdominal Distention

1. List the differential diagnosis of intestinal obstruction.
2. Identify signs and symptoms of a large bowel obstruction.
3. Identify signs and symptoms of a small bowel obstruction.
4. Differentiate a small bowel obstruction from a large bowel obstruction.
5. Discuss the diagnostic studies available for large bowel obstruction.
6. List the known risk factors for colon carcinoma.
7. Identify the common symptoms of carcinoma of the colon, rectum, and anus.
8. List the appropriate laboratory and radiologic studies for the diagnosis of carcinoma of the colon, rectum, and anus.
9. Outline specific preoperative and postoperative management issues.
10. Discuss the surgical treatment of colon carcinoma, including anatomic relationships.
11. Discuss the indications for adjuvant medical treatment of carcinoma of the colon, rectum, and anus, i.e., chemotherapy and radiation therapy.
12. Discuss the role of CEA in the management of colorectal carcinoma.
13. Discuss the staging of colorectal carcinoma and their associated five-year survival.
14. Discuss the effect of obstruction or perforation on the prognosis of colorectal carcinoma.
15. Develop a cohesive post-operative care plan and follow-up surveillance plan in a patient with colorectal carcinoma.
16. Discuss the treatment of liver metastases.

Case History

Mrs. Martinez is a 52 year old Hispanic female who presents to you, the primary care physician in the ER, complaining of a two day history of diffuse cramping abdominal pain and bloating. She describes a gradual increase in her abdominal distension over the past three days. She came to the ER because she feels significantly more bloated over the past 24 hours. Her last bowel movement was three days ago. She now is anorexic and able to tolerate very small amounts of liquid. She claims she has had three months of bright red blood per rectum. The bloody stools are intermittent and typically seen as streaks of blood on the stool in the toilet bowl. She says her hemorrhoids have been acting up lately and so she discounted the blood to her hemorrhoidal disease. She also describes a decreasing caliber of stool over the past two months, in addition to increasing constipation. She denies a history of chronic constipation. She began taking over-the-counter laxatives, which were initially helpful but less so in the last month. She describes a 20 pound weight loss over the past two months. Also, she feels a little weaker and tires easily. She denies nausea, vomiting, fevers, or chills.

Discussion Questions

1. What is the differential diagnosis for abdominal pain?
2. How does the differential differ in women?

3. How does the differential differ in children? In the elderly?
4. What are important questions to include in the history?
5. Know when it began, the severity, acuity, what makes it better or worse.

Acute Abdomen

1. List the major categories of disease which cause pain in the abdomen.
2. Discuss the characteristics of the major types of acute abdominal pain especially their character, time course, and location.
3. Describe the clinical signs and significance of peritonitis.
4. Discuss common diagnostic tests (laboratory and radiological) used to help diagnose the acute abdomen. Include the following: WBC + differential, amylase, urinalysis, chest x-ray, plain abdominal film, abdominal series (plain abdominal film, lateral decubitus of the abdomen and chest x-ray), right upper quadrant ultrasound, computerized tomography (CT) of the abdomen.
5. Identify the common causes of severe abdominal pain that do not require surgery.
6. Discuss the differential diagnosis of a patient who presents with shock and acute abdomen.

Case History

A 65 year old male is brought to the ER with abrupt onset of acute abdominal pain. He is moaning loudly with pain. Vital signs include: BP 116/88, pulse 126 and irregular, respirations 26, afebrile. Abdominal exam reveals a flat abdomen that is soft and no tenderness is elicited. What might be wrong? How would you confirm it?

A 25 year old male is admitted to the ER with severe right-sided abdominal pain. He points all over the right side and down into the groin and scrotum. He is rolling around the bed unable to lie still. He gives a history of several similar episodes which all resolved spontaneously. What is the most likely diagnosis? What is the next diagnostic step?

A 16 year old female is admitted with generalized abdominal pain and profuse vomiting. There is mild diffuse tenderness in all quadrants. She has a low-grade fever (100.40F) and a WBC of 19,000 with a left shift. What is the differential diagnosis?

A 15 year old female presents with severe lower abdominal pain, mild fever and leucocytosis. Abdominal examination reveals a very tender RUQ. What is the likeliest cause of this tenderness and how would you confirm it?

A 63 year old African American male is "found down" in the street and brought in by the paramedics complaining of severe epigastric pain of extremely sudden onset. He has a rigid abdomen on examination. What is the next step in the workup?

A 25 year old Armenian man is transferred from an outside hospital with generalized abdominal pain of six hours duration. His past surgical history is significant for open cholecystectomy and

open appendectomy several years ago. He had a similar attack one year previously and was thought to have diverticulitis, but it resolved. Now, on examination he has a BP of 122/78, pulse is 105 and regular, temperature is 100.80F. Abdominal examination reveals generalized guarding and 2+ percussion tenderness all over the abdomen. What is the differential diagnosis, and what specific diagnosis is highest on your list of probabilities? What is the treatment?

Discussion Questions

1. How does the embryology and pattern of nervous enervation of the abdominal structures help analyze the cause of abdominal pain?
2. Stratify the differential diagnosis of abdominal pain beginning with the “worst case scenario” and develop a plan to rule out or confirm the most serious diagnosis first.
3. Differentiate between peritoneal versus “colicky type” pain caused by an obstructed hollow viscus.

Admit & In-Patient Orders

1. Describe the general guidelines to generate a credible medical record including proper signature, time, date, etc.
2. Describe the content categories of an inpatient admission order.
3. Describe appropriate abbreviations that can be utilized when writing an inpatient order.
4. Describe how to legally correct a written order.

Case History

45 year old diabetic female with acute cholecystitis. History of hypertension. Daily medications include glyburide 10mg daily and Vasotec (enalapril) 10mg daily. NKDA, Weight 160 lbs (72kg), Ht 5’6,” HR 75, BP 140/76, T 100.9, R 16, Sat 98% RA, Pain 7/10. Antibiotic to be used is Zosyn (piperacillin-tazobactam). Plan for surgery in am.

18 year old male status post MVA with Left pneumothorax. H/H 13/44, Pmhx Asthma, Meds: Albuterol prn. NKDA, VS T 98.8, R 30 BP 110/72 HR 101 Sat 97% on RA, Pain 6/10 Ht 5’11” Wt 190 pounds. Write orders as if the patient is just being admitted to Observation Unit. Consider how they will differ when transferred to floor.

Airway Adjuncts & Intubation

1. State three early and three late signs of hypoxemia.
2. State the indications, concentration/liter flow rate, advantages, disadvantages, and nursing considerations for each of the following oxygen delivery devices:
 - a. Nasal cannula
 - b. Oxygen mask
 - c. Venturi mask
 - d. Non-rebreather mask
 - e. Bag-valve-mask

3. State the indications for insertion of the oropharyngeal and nasopharyngeal airways and demonstrate appropriate insertion of each.
4. State the various methods, and their indications, for opening the airway.
5. Ventilate an adult manikin with a bag-valve-mask device by demonstrating:
 - a. Correct head tilt-chin lift
 - b. Effective mask seal
 - c. Visible bilateral chest expansion
6. State three indications for endotracheal intubation.
7. Assemble and check all equipment required for intubation.
8. Select proper size ET tube and oral airway for an adult patient.
9. State the three methods for assessing correct placement of an endotracheal tube.
10. Compare the difference between nasal and oral endotracheal intubation.
11. State the complications associated with endotracheal intubation.

Benign Perianal Disease

1. Discuss the anatomy of hemorrhoids.
2. Differentiate between internal and external hemorrhoids.
3. Describe the role of the anal sphincters in maintaining fecal continence.
4. State common causes of hemorrhoidal disease. Include the following in your discussion: heredity, diet, pregnancy, and occupation.
5. Outline the principles of managing patients with symptomatic external hemorrhoids.
6. Describe the symptoms and physical findings of patients with internal hemorrhoids.
7. Outline the principles of managing patients with symptomatic internal hemorrhoids.
8. Discuss the role of anal crypts in perianal infection.
9. Describe the various types of perianal infections, including perianal, perirectal, ischiorectal, and pelvirectal infection.
10. Outline the symptoms and physical findings of patients with perianal infections.
11. Outline the principles of managing patients with perianal infections and their sequelae (i.e. perianal fistulas).
12. Define fissure-in-ano. Describe the symptoms and physical findings of patients with fissure-in-ano and outline the principles of management.

Case History

A 52 year old white male with a long history of constipation and hemorrhoids presents with bright red blood per rectum. He notes the blood on the tissue paper after bowel movements. As well, he notes hemorrhoidal prolapse during bowel movements requiring manual reduction. What is your management plan for this case?

Discussion Questions

1. What is the differential diagnosis in rectal masses?
2. What is the etiology of hemorrhoids?
3. Discuss the four classes of hemorrhoidal disease and describe the optimal management plan for each.

4. What are the complications of hemorrhoidectomy?
5. How would you manage a 68 year old white male who presents with a painful, thrombosed external hemorrhoid?

Mini Cases

For each of the following cases, suggest a plan for evaluation and treatment.

1. A 69 year-old white male with a history of a perirectal abscess seven years ago now presents with mild perirectal pain and purulent discharge. Examination reveals an external opening in the right posterior perianal region.
2. A 43 year old white male presents with severe right-sided perirectal pain. Examination reveals a temperature of 101°F. There is a tender, fluctuant mass in the right perirectal area with overlying erythema.
3. A 30 year old female presents with a two month history of pain and bleeding on defecation. She has a five year history of constipation. Examination reveals a one centimeter tear in the perianal skin in the posterior midline.
4. A 39 year old white female presents with severe perianal itching. The itching is noted to be worse at night, often awaking her from sleep. She describes her personal hygiene as scrupulous. Examination reveals marked erythema and excoriation of the perianal area. Work-up including barium enema and sigmoidoscopy fails to reveal any other colorectal pathology.
5. A 68 year old white female with a long history of constipation presents with a three year history of protrusion of the rectum during bowel movements. Initially, the protrusion spontaneously reduced but on several recent occasions, manual reduction has been required. The patient has noted some recent episodes of anal incontinence as well. Examination is unremarkable except for a somewhat lax internal sphincter.

Biliary Disease

1. List the common types of gallstones and describe the pathophysiology involved in their formation.
2. List several diseases known to predispose to gallstones.
3. Describe the signs and symptoms in a patient with biliary colic. Contrast these symptoms with those of acute cholecystitis.
4. List the tests commonly used to diagnose calculus biliary tract disease. Describe the indications for, limitations of, and potential complications of each.
5. Describe the likely natural history of a young patient with asymptomatic gallstones.
6. List the complications which can occur from biliary calculi.
7. Outline the medical and surgical management of a patient with acute cholecystitis.
8. Describe the symptoms and signs of choledocholithiasis; describe the management of this problem.
9. Contrast the liver enzyme abnormalities in obstructive jaundice and viral hepatitis.
10. List the most common bacteria which cause cholecystitis and cholangitis.

Case History

J.C. is a 46 year old white female who presents to the emergency room with epigastric and right upper quadrant pain at 4 a.m. The patient recalls that she ate fried chicken at approximately 7 p.m. the evening before. Approximately 30 to 45 minutes later she experienced the onset of nausea and emesis and noted that her temperature at that time was 101°F. The patient's history is remarkable for diet-controlled diabetes mellitus. Physical exam reveals a slightly overweight, 46 year old white female in moderate distress. Her VS include: BP 140/88, HR 94 and temperature 101.8°F. Her abdomen is soft with marked tenderness in the right upper quadrant and epigastrium. There is an exquisitely tender 4 centimeter mass palpable below the right liver edge.

Her chest x-ray is normal and admitting laboratory data include: hemoglobin 12.1, hematocrit 42, white blood cell count 14,300 with 58 polys and 17 bands. Total bilirubin is 2.2 and amylase 134. Other liver functions including ALT, AST and alkaline phosphatase are within normal limits.

Discussion Questions

1. What is the differential diagnosis in the presentation of epigastric and/or RUQ pain, nausea, vomiting, and fever?
2. What are the risk factors associated with cholelithiasis? How does diabetes affect the natural history of gallstones?
3. What initial laboratory and diagnostic studies should you obtain considering both competent patient care and cost containment?
4. Why is laparoscopic cholecystectomy desirable over open cholecystectomy?
5. List common complications of laparoscopic cholecystectomy.

Mini Cases

For each of the following cases, suggest a plan for evaluation and treatment.

1. A 58 year old female is admitted with right upper quadrant pain. Her temperature is 101.2°F with otherwise stable vital signs. White blood count is 12,300, bilirubin is 4, alkaline phosphatase is 1½ times normal, and an ultrasound shows gallstones and a dilated common duct measuring 1.3 cm.
2. A 70 year old white male with insulin-dependent diabetes mellitus presents with nausea, vomiting, right upper quadrant pain, and fever. Abdominal series shows air in the wall of the gallbladder.
3. A 44 year-old healthy female is noted to have gallstones by ultrasound performed for a suspected ovarian cyst. She has no symptoms of biliary tract disease.

Breast Cancer 101

1. Differentiate between benign and malignant diseases of the breast; include their presentation, physical examination findings, and treatment.
2. Outline the diagnosis and management of a patient with nipple discharge.
3. List the major risk factors for breast cancer.

4. Describe the current recommendations for screening mammography.
5. Outline the fundamentals for diagnosing and managing a breast mass.
6. List the diagnostic modalities and their sequence in working up a patient with a breast mass.
7. Describe the categories of malignant breast disease and the differences in their management.
8. Outline the presentation and management of a patient with inflammatory breast cancer.
9. Describe the staging for breast cancer.
10. Outline current treatment options for a patient with non-invasive breast cancer.
11. Outline current treatment options for a patient with invasive breast cancer.
12. Outline the need for lymph node removal and its risks and benefits.
13. Describe the rationale for adjuvant chemotherapy, hormonal therapy, and radiation therapy for breast cancer.

Diverticular Disease

1. Discuss the major etiologies of diverticular disease including age, diet, and vascular anatomy of the colon.
2. Describe the clinical signs and symptoms of diverticular disease. Differentiate between the signs and symptoms of diverticulitis and diverticulosis including signs of inflammation and bleeding.
3. Discuss the complications of diverticular disease including bleeding, obstruction, perforation, and fistula formation.
4. Describe the management of symptomatic but uncomplicated diverticulosis.

Case History

M.H. is a 68 year old white male with a five year history of intermittent crampy abdominal pain who presents to the emergency room with a 48 hour history of left lower quadrant pain and fever of 101°F. His past medical history is remarkable for cholecystectomy seven years ago. His only other medical problem is mild obesity. He has been advised by his physician to lose weight but he insists that he must have three “squares” a day with meat at every meal. He stopped smoking at age 40 and drinks only occasionally. He takes no medications at the present time. Physical exam reveals a slightly overweight white male in moderate distress. Temperature is 100.8°F and blood pressure is 144/90. His physical exam is unremarkable except for a soft abdomen with localized tenderness in the left lower quadrant, mild guarding, but no peritoneal signs. The stool is guaiac negative. Laboratory studies reveal a hemoglobin of 13.8, hematocrit 41, white blood cell count of 16,300 with 80 polys, 16 bands, and 4 lymphocytes. BUN, creatinine, and electrolytes are normal.

What is the differential diagnosis for this case? What is your plan for initial management? Do you plan any further studies at this time?

Forty-eight hours after admission the patient continues to complain of left lower quadrant pain and examination now reveals a tender mass in the left lower quadrant. What is your management plan at this time.

Discussion Questions

1. What are the etiologic factors for developing diverticular disease?
2. What are the two principle complications of diverticulosis?
3. What are the four complications of diverticulitis?
4. When surgically managing diverticulitis, discuss when a two stage procedure versus a one stage procedure is indicated.
5. What is the role of percutaneous catheter drainage for a diverticular abscess? How does the patient benefit if this procedure is successful?

Mini Cases

For each of the following cases suggest a plan for evaluation and treatment.

1. A 52 year old white female with recurrent crampy abdominal pain and intermittent diarrhea is noted on barium enema to have moderately severe left-sided diverticular disease with significant spasm.
2. A 64 year old white male presents with a complaint of passing air in his urine.
3. A 65 year old white male receives a barium enema examination for suspected diverticular disease. When the radiologist reviews the study, she is unable to differentiate between diverticular disease with inflammatory scarring and carcinoma.
4. A 69 year old white female with a long history of diverticular disease presents to the emergency room with an acute abdomen. Emergency surgical exploration reveals a free perforation of a sigmoid diverticular abscess with fecal spillage.
5. A 69 year old white male with a seven year history of diverticular disease presents with left lower quadrant pain. His last bowel movement was four days prior to admission but the patient reports passing small amounts of flatus.

Esophageal Disease

1. Understand the concepts of structural disease versus functional disease as applied to the esophagus.
2. Describe typical and atypical symptoms of esophageal disease.
3. List the functions of the Upper Esophageal Sphincter, Lower Esophageal Sphincter, and the Esophageal Body.
4. Describe two important tests for diagnosing structural problems in the esophagus and two tests for identifying functional disease.
5. List the relative merits of medical and surgical treatment of common benign esophageal diseases such as GERD and Achalasia.
6. Discuss the diagnostic work-up and treatment plan for a patient with Barrett's Esophagus and Gastroesophageal Reflux Disease.
7. How are esophageal tumors diagnosed and how are they staged?
8. Describe the surgical treatments for esophageal cancer.

Case History

A 45 year old male complains of heartburn which is partially relieved by Lansoprazole and has been present for four years. He also has intermittent attacks of dysphagia and on occasions has regurgitated his food. He admits to a weight gain of 30 pounds since he stopped smoking two packs of cigarettes daily, but he continues to have wheezing and cough. He also drinks four beers daily. Medications include Theophylline for bronchospasm and Prilosec.

Discussion Questions

1. What is the differential diagnosis?
2. What tests would you schedule?
3. After his work-up, a diagnosis of Barrett's Esophagus is made. What is your plan for management?
4. What complications are possible with GERD and Barrett's Esophagus?
5. If a biopsy shows dysplastic epithelium, how would you manage this patient?

Case History

A 63 year old black male presents with a two month history of increased difficulty swallowing. Initially, he noted problems swallowing solid foods but now has trouble swallowing even liquids. Over the last month he has noted increasing substernal pain. He admits to a 12 pound weight loss over the last two months. His past medical history is notable only for a myocardial infarction two years ago. He has a long history of ethanol abuse and smokes one pack of cigarettes per day.

Discussion Questions

1. What is the differential diagnosis for this presentation?
2. What signs on physical exam would indicate malignancy?
3. How would you proceed with the work-up?
4. The complete work-up points to a carcinoma in the middle third of the esophagus. What is the likely cell type for carcinoma in this location?
5. Discuss the treatment options for this patient including the advantages and disadvantages and prognosis for each option.
6. What is the natural history of esophageal carcinoma?

Case History

A 56 year old woman has a two year history of chest pain. It does not have a clear relationship to exercise but is described as "vice like." She complains of intermittent trouble eating solid foods. Recently, liquids also give a sensation of discomfort and are occasionally regurgitated.

Discussion Questions

1. What is the differential diagnosis?
2. What tests, in order of priority, would you request?
3. A diagnosis of diffuse esophageal spasm is made. How would you manage this patient?
4. If gastroesophageal reflux was found to be present, would that alter what you would offer the patient?

Mini Cases

For each of the following cases suggest a diagnosis and management plan.

1. A 56 year old white male with a long history of gastroesophageal reflux symptoms presents with dysphagia. Endoscopy reveals a stricture of the esophagus, 39 centimeters from the incisors.
2. A 74 year old white male presents with a history of a choking sensation during eating. He notes frequent regurgitation of undigested food 12 to 36 hours after meals as well. He has a cough when he lies down and has had three episodes of aspiration pneumonia.
3. A 32 year old white female complains of progressive dysphagia with solids and liquids. She states that initially there was pain with swallowing that has now resolved. Barium swallow reveals a markedly dilated esophagus terminating in a narrowed segment near the gastroesophageal junction.
4. A 71 year old white male complains of severe substernal chest pain one hour after undergoing endoscopy. Physical exam reveals cervical tenderness and crepitus. A chest x-ray shows gas in the mediastinum.

Fluid and Blood Resuscitation

1. Describe how the length and radius of an intravenous catheter influences delivery rate.
2. Discuss various intravenous placement sites and note the pros and cons of each of the following:
 - a. Femoral
 - b. Internal jugular
 - c. Superior vena cava
 - d. Intraosseous
3. Differentiate between the following fluids and their use in resuscitation.
 - a. Ringer's Lactate
 - b. Normal Saline
 - c. Hypertonic Saline
 - d. Colloids
4. Discuss the indications for the following blood products. Include:
 - a. Packed red blood cells
 - b. Fresh frozen plasma
 - c. Platelets

- d. Cryoprecipitate
- e. Factor VII

Gastrointestinal Bleeding

1. Define hematemesis, hematochezia, melena, and guaiac positive stool. State their significance with regard to the level of the bleeding source.
2. Outline the resuscitation plan for a hypotensive patient with a massive gastrointestinal hemorrhage.
3. In order of frequency, list the most common causes of upper and lower gastrointestinal bleeding in the general population, in adults (age 16 years and above), and in the infant (birth to two years).
4. Outline the work-up of the adult patient presenting with occult blood on rectal exam.
5. List criteria for surgical intervention in a patient with gastrointestinal hemorrhage.

Case History

J.S. is a 55 year old white male with a long history of mild epigastric pain now presenting with hematemesis. His past medical history is remarkable for a previous MI eight years ago and now occasional angina with exertion. His medications are metoprolol 25 mg TID and baby aspirin once a day. Examination reveals a blood pressure of 110/72 and a pulse of 88 lying down. Orthostatics reveal a BP drop of 92/62 and pulse of 116 upon standing. The abdomen is soft and benign, no fluid wave and no caput medusae are noted. The stool is guaiac positive.

1. What is your management plan for resuscitation in this patient?
2. What is the differential diagnosis in this setting?
3. How do you plan to pursue the diagnosis?

Discussion Questions

1. List the common causes of upper GI bleeding for adults and children.
2. What are the various non-operative treatments upper GI bleeding?
3. Why is lavage done in patients with an upper GI bleeding?
4. What therapy can be administered to the multiple injured patient in the ICU to prevent acute mucosal erosions and subsequent upper GI bleeding?

Case History

G.R. is a 64 year old white male with a long history of intermittent crampy abdominal pain. For several days prior to admission, he has noted that his stools are somewhat looser than normal as well as dark in color. Two hours before coming to the emergency room he began passing bright red blood per rectum. He has had no previous hospitalizations for abdominal pain but was diagnosed as having diverticular disease after a barium enema in 1982. Physical examination reveals a slightly overweight, white male, somewhat pale in color. Blood pressure is 105/60 and pulse is 104. Orthostatic changes are noted. The abdomen is soft and non-tender with no abdominal masses. Bowel sounds are increased. Rectal exam reveals bright red blood in the rectal vault. Diagnostic

studies include a chest x-ray and abdominal series that are read as normal. Hemoglobin is 12, hematocrit 31, PT and PTT normal. He is typed and crossed for six units of packed red cells.

Discussion Questions

1. What is the differential diagnosis for lower GI bleeding in this age group?
2. What is your plan for diagnosis work-up and management in this case?
3. After four hours and a total of 5 units of packed red blood cells, the bleeding stops. Twenty-four hours later the bleeding resumes with mild hypotension. What is your plan at this time?
4. What diagnostic modalities are available for the work-up of lower GI bleeding?
5. Why is angiography considered both diagnostic and therapeutic?
6. What are the indications for surgery in patients presenting with diverticular bleeding?

Mini Cases

Suggest an appropriate plan for evaluating and managing each of the following cases.

1. A 69 year old chronic alcoholic presents with hematemesis. He noted the onset of hematemesis after violent retching.
2. A 92 year old white female from a local nursing home with organic brain syndrome, congestive heart failure, and severe pulmonary disease has persistent lower GI bleeding. On angiography, the site of bleeding is identified as the hepatic flexure.
3. A 6 year old white male is brought to you by his parents with recent bright red blood per rectum. What is the most likely diagnosis? Which test would you order? What is the treatment?
4. A 64 year old white male is found to have guaiac positive stool and anemia on routine physical examination.
5. A 34 year old Mexican American female presents with bloody diarrhea. She gives a recent history of eight to ten bowel movements per day, containing both blood and mucus, and associated with tenesmus. Sigmoidoscopy is negative, but colonoscopy reveals multiple ulcerations extending from the cecum to the midtransverse colon.

Hemodynamic Monitoring

1. Describe the purpose of the pulmonary artery catheter.
2. Describe how the pulmonary artery catheter is placed.
3. Discuss the purpose of each lumen of the pulmonary artery catheter.
4. Discuss potential complications of the pulmonary artery catheter.
5. Discuss the importance of the pulmonary artery wedge pressure (PAWP) and how it is measured.
6. Describe the difference between a cardiac output (CO) and cardiac index (CI) and discuss how they are measured.
7. Discuss the clinical maneuvers that can be done to improve a patient's CO/CI.
8. Define oxygen delivery (DO_2), oxygen consumption (VO_2), oxygen extraction ratio

(O_2ER), and systemic venous oxygen content (SVO_2).

9. List the interventions that may increase DO_2 .
10. List two interventions that are commonly manipulated to increase the DO_2 .
11. List the etiologies of shock and their effects on CI, SVR, PAWP, CVP, SVO_2 , and HR.
12. Discuss common therapies used to decrease VO_2 .

ICU Tutorial (No objectives available.)

Iraq Experience (No objectives available.)

Liver and Portal Hypertension

For Hypertension:

1. Define portal hypertension and classify its etiology.
2. Review the portal circulation and describe the changes that occur in portal hypertension.
3. Describe five clinical manifestations of portal hypertension.
4. List four complications associated with portal hypertension.
5. Outline the diagnostic methods appropriate for each complication of portal hypertension.
6. Outline the treatment methods available for variceal hemorrhage, including the principles for reduction of portal pressure.
7. Describe the medical and surgical treatment of a patient with ascites.
8. Describe the prognosis for patients with portal hypertension.

For Liver:

1. What is the initial diagnostic radiologic test for a suspected liver mass?
2. Compare the etiologies of the various types of cystic masses in the liver.
3. What are the preferred methods for treating different types of liver abscesses?
4. List a differential diagnosis for a solid liver mass.
5. What radiologic tests can be used to distinguish the type of solid mass?
6. Describe the treatment modalities available for hepatic neoplasms.

Case History

A 48 year old white male presents to the emergency room with massive hematemesis. He has a history of hepatitis C secondary to a blood transfusion 20 years earlier with contaminated blood. Physical examination reveals a tachypneic, hypotensive male in moderate distress. Numerous spider angiomas are present over his anterior chest wall. A caput medusae is noted over his anterior abdominal wall. His abdomen is distended but no fluid wave is demonstrated. The spleen is palpable two centimeters below the costal margin. The neurologic examination is unremarkable, with no evidence of encephalopathy. Laboratory studies reveal a hemoglobin of 9.2, hematocrit 31%, sodium 132, potassium 3.7, serum bilirubin 1.8, serum albumin 3.1, PT 15.2 seconds, PTT 38 seconds. The remainder of liver functions tests are normal. The patient undergoes fluid

resuscitation but has persistent bleeding from his nasogastric tube, despite octreotide (Sandostatin) administration.

Discussion Questions

1. What is the diagnostic test of choice to identify the source of bleeding? If bleeding varices are identified, how should the bleeding be immediately controlled? What is his Child's classification?
2. The bleeding is controlled and the patient recovers and is discharged. Over the next six months, while on an endoscopic sclerotherapy program, he has four bleeding episodes requiring transfusions. What is the treatment option (nonsurgical and surgical) to permanently control variceal bleeding?
3. If a decision is made to perform a surgical portasystemic shunt what is the best choice between end to side portacaval shunt and distal splenorenal shunt? How do these shunts differ in regard to incidence of encephalopathy, shunt patency, and long-term survival? Differ in regard to incidence of encephalopathy, shunt patency, and long-term survival?
4. Discuss the above treatment in regard to the underlying liver disease. Does sclerotherapy affect portal hypertension? What would be the next definitive treatment? Discuss the role and indication of liver transplantation.

Case History

A 49 year old Korean woman presents with acute, vague abdominal pain. She is otherwise healthy but her past medical history is remarkable for a previous history of hepatitis. Physical exam is unremarkable and her liver function tests are normal. A right upper quadrant ultrasound reveals a four centimeter solid mass in the right lobe of her liver.

Discussion Questions

1. How would you pursue the diagnosis in this case? Which laboratory tests would you order and why? What is your differential diagnosis of a solid liver mass? What are the relative merits of nuclear medicine, liver scan, CT scan, angiography, and fine needle aspiration for cytology?
2. CT scan reveals a solitary four centimeter mass in the liver. There is no evidence of metastatic disease and a primary hepatic neoplasm is suspected. What is your recommendation for treatment? How would you determine the resectability of the tumor both from anatomical and physiological point of view? Which lab result would help in the decision making?

Mini Cases

For each of the following cases suggest a plan for evaluation and management.

1. A 64 year old male with multiple previous episodes of acute pancreatitis presents now with massive hematemesis. His liver function tests and previous liver biopsy are all normal. After stabilization, upper GI endoscopy reveals isolated gastric varices. What is the likely etiology and treatment?
2. A 61 year-old white male has been hospitalized for eight days after his fourth upper GI bleed secondary to esophageal varices and alcoholic cirrhosis. Over the last 48 hours he has become increasingly lethargic and asterixis is demonstrated on exam. The prothrombin time (PT) 17 seconds, (INR 2.5), albumin 2.5 g/dl, with a serum ammonia level twice normal. What is the likely diagnosis and what treatment do you recommend? What is the patient's Child classification?
3. A 31 year old white female presents with onset right upper quadrant pain, hypotension and a hematocrit of 22%. Her past medical history is remarkable for an eight year history of oral contraceptive use. What is the most likely diagnosis? When and what test would you order to confirm diagnosis and what are the therapeutic options?
4. A 21 year old Hispanic male presents with a two week history of right upper quadrant abdominal pain, shaking chills, and temperatures as high as 103°F. He reports a previous history of diarrhea, which has since resolved. Ultrasound reveals a hypoechoic cystic mass in the right upper quadrant of the abdomen. What is the most likely diagnosis? What blood tests would support this diagnosis? What treatment do you recommend?

Mechanical Ventilation

1. Describe the goals of mechanical ventilation.
2. Differentiate between volume cycled and pressure cycled ventilators.
3. Identify the parameters that need to be set on a ventilator.
4. Describe the various modes of ventilation and provide indications for each. Include the following:
 - Assist Control – Pressure and Volume
 - Synchronized Intermittent Mandatory Ventilation – Pressure and Volume
 - Pressure Regulated Volume Control
 - Airway Pressure Release Ventilation
 - Continuous Positive Airway Pressure
5. Discuss the use of the following ventilator adjuncts:
 - Positive End Expiratory Pressure (PEEP)
 - Pressure Support
6. List benefits of potential complications of PEEP.
7. Discuss weaning criteria for mechanical ventilation.
8. Discuss the primary cause and prevention of oxygen toxicity.
9. Using a mechanical ventilator discuss which settings are used to change the paCO_2 and paO_2 .

Pancreas

1. Discuss the diagnostic approach to patients with acute abdominal pain.
2. Create a differential diagnosis for acute epigastric abdominal pain.
3. List the five most common etiologies of acute pancreatitis.
4. Discuss the definition of acute versus chronic pancreatitis.
5. Discuss the prognostic criteria for acute pancreatitis.
6. List the most common complications of acute pancreatitis.

Case History

R.S. is a 49 year old white male with a long history of alcohol abuse. He presents to the emergency room with a 36 hour history of severe mid-epigastric abdominal pain associated with persistent nausea and vomiting. He states that he has not been able to eat any solid food for the past two days. He describes the pain as radiating through his abdomen to his back and knife-like in character. He denies any previous surgical procedures and his only medical problems include diet-controlled diabetes mellitus and a history of peptic ulcer disease treated medically. His present alcohol consumption includes two to three mixed drinks per day and 12 to 15 beers each weekend. Physical exam reveals a 49 year old male in acute distress. Temperature is 100.8°F, pulse 104, and blood pressure 96/60 without orthostatic changes. There is mild scleral icterus present. The chest is clear. The abdomen is soft but markedly tender in the epigastrium with rebound. Bowel sounds are absent. There are no palpable masses. Rectal exam reveals guaiac negative stool. A chest x-ray reveals a pleural effusion on the left side with some haziness of the lung fields. White blood cell count is 14,000 with 12 bands. Hemoglobin is 14.2, hematocrit 48, electrolytes within normal limits. Serum amylase is 4,280. Creatinine is 1.1, BUN 25, calcium 7.4, glucose 240. Liver functions include an LDH of 200, bilirubin 3.1, ALT and alkaline phosphatase are within normal limits. Arterial blood gases reveal a pO₂ of 78 on room air, pCO₂, 44.0 and pH 7.36.

Discussion Questions

1. What is the differential diagnosis with the presentation of epigastric pain, nausea, and emesis?
2. What are the etiologic factors involved in acute pancreatitis?
3. How do you explain the hypotension, jaundice and left sided pleural effusion?
4. What is the pathophysiology of the development of adult respiratory distress syndrome (ARDS) in acute pancreatitis?
5. What laboratory and diagnostic studies do you need initially in acute pancreatitis, considering both good patient care and cost containment?
6. Define the role of CT in assessing the severity of acute pancreatitis.
7. Discuss the clinical significance of Ranson's criteria.
8. Is there a role for surgery in acute pancreatitis?
9. Describe the optimal management for a newly diagnosed pancreatic pseudocyst. Do pseudocysts resolve spontaneously? What are the complications of a pancreatic pseudocyst? Discuss internal versus external drainage.

Mini Cases

1. A 52 year old male returns to the hospital three weeks after an episode of acute pancreatitis with persistent abdominal pain and a serum amylase of 1700.
2. A 55 year old white male with a seven cm pancreatic pseudocyst develops increasing abdominal girth over a 72 hour period.
3. A 55 year old white, non-alcoholic male is admitted for the fourth episode of acute pancreatitis. Biliary disease has been ruled out. His serum calcium has been slightly elevated with previous admissions and is presently 12.2.
4. A 49 year old white female is admitted with acute pancreatitis. Ultrasound reveals gallstones and dilated common duct. Her amylase returns to normal after five days. Physical examination is unremarkable at that time.
5. A 52 year old white male presents with painless jaundice and a 12 pound weight loss. Abdominal CT reveals a three cm mass in the head of the pancreas.

Skin & Soft Tissue

For Skin:

1. Describe several kinds of benign nevi and pigmented lesions.
2. Describe the gross morphologic and pathologic differences between benign and malignant nevi and discuss the approach to diagnosis.
3. List predisposing factors for melanoma.
4. Describe the major prognostic variables of melanoma; include a discussion of Clark's level and Breslow depth.
5. Identify possible areas of metastasis of melanoma and outline steps to determine the extent of disease.
6. Outline local, regional, and systemic therapy for melanoma.
7. Distinguish gross pathologic differences between basal and squamous cell carcinomas and list predisposing causes and likely areas of clinical sites.
8. Distinguish the natural history, the curability, and the propensity to metastasize of basal and squamous cell carcinomas.
9. Describe medical and surgical therapies available for both types of skin cancer.

For Sarcoma:

1. Describe the clinical features of a sarcoma presenting in the head or neck, the trunk and the extremity.
2. Describe the techniques to diagnose and adequately stage a soft tissue tumor of the extremity.
3. Outline medical, surgical, and radiotherapy modalities which can be applied to soft tissue tumors.

4. List factors that are associated with a poorer prognosis for soft tissue sarcomas.
5. Identify four clinical features of nevi suggesting malignancy and a need for biopsy.
6. Identify non-pigmented ulcerative and non-ulcerative lesions requiring biopsy.

Case History

A 49 year old white male presents with a pigmented skin lesion on his right lateral thigh. He states the lesion has been present for approximately three years but has grown darker in color over the last 9 to 12 months. He has no other complaints. He is healthy with no significant medical problems. He takes no medications. On physical examination his vital signs are normal. Chest exam is unremarkable. Abdominal exam is normal. On examination of the extremities there is a 1.5 centimeter pigmented lesion on the right lateral aspect of his distal thigh. There are no other pigmented lesions noted. Examination of the groins reveals no adenopathy. An excisional biopsy is performed under local anesthesia revealing a Clark's level three melanoma with a thickness of two mm.

Discussion Questions

1. List the risk factors for developing melanoma. What skin lesions are considered premalignant lesions?
2. Compare and contrast Clark's system with Breslow's system for classifying melanomas. Discuss each system's usefulness in management and outcome prediction.
3. Discuss the role of groin and axillary node dissection in managing melanomas.
4. Suggest factors that determine the prognosis of a melanoma.

Mini Cases

1. A 39 year old white male presents with several small pigmented lesions surrounding a previous melanoma excision site two years ago on the right forearm. He also has lymphadenopathy on axillary examination.
2. A 69 year old white male presents with a one cm ulcerated lesion on the tip of his nose.
3. A 59 year old farmer presents with a one centimeter ulcerating lesion on the right lateral aspect of his lower lip. Punch biopsy reveals squamous cell carcinoma.
4. A 49 year old white male presents with a ten centimeter mass in the soft tissue of his right mid lateral thigh. An incisional biopsy reveals a fibrosarcoma. His chest x-ray is normal and there is no evidence of metastatic disease.
5. A 61 year old white male is found to have a 12 centimeter retroperitoneal mass on work-up for vague abdominal pain. At time of abdominal exploration frozen section diagnosis of the mass is liposarcoma.

Spleen

1. Discuss management options for splenic trauma.
2. Identify early and late complications following splenectomy.
3. Describe the clinical presentation and diagnostic evaluation of idiopathic thrombocytopenic purpura.
4. Describe treatment options for idiopathic thrombocytopenic purpura, and identify the difference(s) in managing pediatric versus adult patients.
5. Describe causes, complications, and treatment of splenic vein thrombosis.

Mini Cases

1. 28 year old male status post automobile accident with an isolated splenic hematoma.
2. Two weeks post splenectomy the same patient presents with left upper quadrant pain, left shoulder pain, and a low-grade temperature.
3. Four year old boy being evaluated for easy bruising found to have platelet count of 12,000.
4. Chronic alcoholic presents to emergency room with hematemesis.

Stomach & Duodenum

For Gastric and Duodenal Ulcers:

1. Describe the pathogenesis of gastric and duodenal ulcer.
2. Discuss the role of helicobacter pylori in ulcer formation.
3. Identify the pathophysiology of ulcers and discuss the significance of their anatomic location (e.g., anterior duodenal – risk for perforation; posterior duodenal – risk for penetration and hemorrhage; pyloric channel – risk for obstruction; gastric – risk malignancy).
4. Identify the differences between gastric ulcers and duodenal ulcers.
5. List the main symptoms of peptic ulcer disease.
6. Describe the value of each of the following diagnostic studies in a patient with suspected peptic ulcer disease: upper gastrointestinal x-rays, endoscopy and biopsy, gastric analysis and serum gastrin.
7. Outline the medical treatment of peptic ulcer disease include the following:
 - Antacids
 - H2 blockers
 - Proton pump inhibitors
 - Surface coating agents
 - Diet
 - Contraindicated medications (steroids, aspirin),
 - Treatment of helicobacter pylori
8. List the clinical features of the Zollinger-Ellison syndrome.
9. List the complications of peptic ulcer disease that require surgical treatment.

10. Describe the clinical presentation of each complication of peptic ulcer disease and outline diagnostic plans in appropriate sequence for each.
11. Define intractability of peptic ulcers.
12. Name the common and newer operations for duodenal and gastric ulcers and discuss the physiologic rationale, risks, and effectiveness of each.
13. Discuss the side effects of the common operations for duodenal and gastric ulcers including a description of the dumping syndrome.

For Gastric Neoplasms:

1. Identify the premalignant conditions and epidemiology of gastric cancers.
2. Classify the common gastric neoplasms (adenocarcinoma, lymphoma, carcinoid, and leiomyosarcoma).
3. List diagnostic modalities for gastric neoplasms.
4. List the general principles of curative and palliative surgical procedures for gastric neoplasms and discuss the role of adjunctive/alternative treatment (chemotherapy and radiation therapy).

Case History

J.B. is a 49 year old white male who presents to the emergency room after the sudden onset of severe epigastric pain. He describes moderate epigastric pain that has been present for the last two to three weeks. His past medical history is significant in that he was diagnosed as having a duodenal ulcer by endoscopy two years ago and was treated with cimetidine (Tagamet) for one year. His other past medical history includes hypertension treated with and Hydrochlorothiazide. He smokes a pack of cigarettes a day. He drinks moderately although he admits up to three to four shots of vodka per day recently with a change of job. Physical examination reveals a white male in severe distress. Blood pressure is 96/60 with a pulse of 102. The chest is clear. The abdomen is rigid with marked voluntary and involuntary guarding. No bowel sounds are present. The stool is guaiac negative. Admitting laboratory studies include a hemoglobin of 14, hematocrit 41, amylase 140. Electrolytes, BUN, and creatinine are within normal limits.

Discussion Questions

1. What further diagnostic studies do you need in this patient, and what is your plan for management?
2. How does endoscopy compare with an upper GI study for diagnosing ulcer disease? When is emergency endoscopy indicated? Does early endoscopy influence survival?
3. What are four common complications of peptic ulcer disease?
4. How does the pathogenesis differ in a peptic ulcer versus a gastric ulcer?
5. How can you differentiate benign versus malignant gastric ulcers on an upper GI study?
6. List the etiologic agents in acute erosive gastritis.
7. How do the various surgical procedures for peptic ulcer disease vary with respect to operative mortality and ulcer recurrence rate?
8. What is the suspected role of prostaglandins in the pathogenesis of gastric ulcer disease?
9. What is the difference in a truncal vagotomy and a highly selective vagotomy? Why is a

pyloroplasty performed with a truncal vagotomy?

10. List the possible post-gastrectomy syndromes.

Mini Cases

For each of the following cases suggest a plan for evaluation and management.

1. A 42 year old white male had an endoscopy performed for persistent pain and a 1.5 centimeter duodenal ulcer was found. What would be the next step in the management of this patient?
2. A 57 year old white male underwent an upper GI study for abdominal pain and early satiety. The study shows a two centimeter gastric ulcer. What would you do next?
3. A 61 year old white female with a long history of peptic ulcer disease presents with nausea and emesis. Upper GI reveals a J-shaped stomach and gastric outlet obstruction. Please outline a treatment plan.
4. A 45 year old white male presents with diarrhea and recurrent gastric ulceration after an antrectomy, vagotomy, and Billroth II gastrojejunostomy for duodenal ulcer disease three years ago. His serum gastrin is markedly elevated. Please outline a treatment plan.
5. A 48 year old white female underwent an antrectomy, vagotomy, and Billroth II anastomosis six months ago for duodenal ulcer disease. Since the operation she has had persistent complaints of profound lightheadedness, nausea, and diaphoresis occurring shortly after every meal. She has a documented weight loss of 12 pounds over the last three months.

Surgical Infections

1. List the factors which contribute to infection following a surgical procedure.
2. List the types of surgical infections.
3. Describe the diagnostic features and indicated treatment for common skin infections.
4. Discuss four common hand infections and describe the treatment for each.
5. Describe the clinical features and treatment of anaerobic and synergistic gangrene.
6. List the causes of postoperative fever and discuss the diagnostic steps for evaluation.
7. Describe the indication and method for providing routine and reverse isolation.
8. Describe the diagnostic evaluation for intra abdominal abscess.
9. Identify the antibiotic of choice for acute cholecystitis, perforated sigmoid diverticulitis, empyema of the lung and a vascular graft infection.

Cases and Discussion Questions

The following cases and discussion questions deal with a variety of infections and inflammatory reactions that occur in surgical patients.

1. A 23 year old woman is three weeks status post-cadaveric renal transplantation. She received cyclosporin, prednisone, and Imuran (azathioprine) baseline immunosuppression. At one week, post transplant, she received high dose methylprednisolone to treat a rejection episode. She has developed a fever, dry cough, and a chest roentgenogram showing bilateral fluffy infiltrates. The differential diagnosis is pneumocystis carini vs. cytomegalovirus pneumonia. What alterations in the patient's immune defenses may have led to this opportunistic infection?
2. A 55 year old female with previous known symptomatic cholelithiasis (ultrasound shows gall stones) develops right upper quadrant abdominal pain, jaundice, a shaking chill, and fever of 104°F (oral). She is 2+ tender in the RUQ and has a Murphy's sign. She develops tachycardia, hypotension 6/40, and mental confusion. What is the most likely cause of her hypotension (be specific about the mediators involved and what effects they have)?
3. A 65 year old male is admitted to your hospital because of severe left lower quadrant pain, fever of 102°F (oral), 3+ tenderness, a vague mass in the LLQ, and a WBC=16,400. What is the most likely diagnosis? What diagnostic imaging would you use? Describe the treatment and rationale for each recommendation.
4. What can be done preoperatively and intraoperatively to decrease the incidence of postoperative infection in surgical patients?
5. On surgical services, we require the wearing of gloves when touching any patient or anything on his or her bed. Gloves are always changed between patients and hands washed. Why do we have these policies?
6. It is your first night on call as a surgical intern and the nurse informs you at 2:00 a.m. that an open-cholecystectomy patient in his second post-operative day has a fever of 101°F (oral). What is your plan for evaluation and management?
7. A 25 year old male was repairing the roof of a stable when he lost his footing, slipped, and fell from the roof onto a barbed wire fence that is lying on the ground. He presents to the emergency room with multiple puncture wounds to his right arm and trunk. He assures you that he received his series of tetanus immunizations as a child but has had none since. What is your plan for wound management and tetanus prevention? What would you have done if he could not remember ever having tetanus immunization?
8. A 74 year old female is recovering from a right hemicolectomy (for cecal adenocarcinoma) done four days ago. She received three doses of erythromycin and neomycin orally preoperatively and cefoxitin on call to the operation with a second cefoxitin dose 6 hours later. The nurse calls you because today she has become febrile (102°F oral) and is having copious watery bowel movements. How should you evaluate this patient? From just the information given above, what is the most likely diagnosis for the diarrhea?

9. A 48 year old diabetic patient first noticed redness around a recent insulin injection site in the right anterior thigh. Over the last 24 hours, this has spread from the size of a quarter to become a very painful 6 inch in diameter circle of hemorrhagic bullae with surrounding swelling and erythema. How do you differentiate between a subcutaneous abscess, necrotizing fasciitis, cloistral cellulitis, and gas gangrene?
10. You are walking down the driveway of your home when you reach down to pat the normally quiet friendly neighbor's dog. The dog, unexpectedly, snarls and then bites your hand, quite deeply; lacerating the skin and causing deep puncture wounds. What should you do and what medical care should your bite receive?

Surgical Nutrition

1. Identify surgical patients who require nutritional support.
2. Calculate nutritional requirements using a variety of methods.
3. Determine what type (enteral vs. parenteral) of nutritional support is appropriate for surgical patients.
4. List advantages and disadvantages of enteral nutrition.
5. List advantages and disadvantages of parenteral nutrition.
6. Design and implement a plan to evaluate and follow a patient's nutritional status.

Mini Cases

1. After his surgical rotation, a third year medical student is admitted to the hospital for two weeks of intensive neuropsychiatric testing and therapy. What is the ideal nutritional support for this patient?
2. A 22 year old man undergoes exploratory laparotomy after a stab wound to the abdomen. A small bowel laceration is found and repaired. What is the ideal nutritional support for this patient?
3. A 58 year old cachectic man presents with severe dysphagia and is eventually diagnosed with esophageal cancer. He requires six weeks of chemotherapy and radiation prior to surgery. He currently can not take anything by mouth. What is the ideal nutritional support for this patient?
4. A 25 year old man is shot in the abdomen and undergoes exploratory laparotomy. At operation, he has the majority of his small bowel resected due to injury of his superior mesenteric artery. After his initial recovery, what is the ideal nutritional support for this patient?
5. A 35 year old man has been in the ICU for two months after a motor vehicle crash during which he suffered multiple injuries. He has been on enteral and parenteral supplementation throughout his hospital course. How will you determine his nutritional status?

Trauma Overview

1. Identify the criteria for a Trauma Team Activation (TTA) at LAC+USC Medical Center.
2. Identify the correct initial sequence of priorities to be followed in assessing the multiple-injured patient.
3. Outline the primary and secondary evaluation surveys used to assess the multiple-injured patient.
4. Identify diagnostic and therapeutic actions for treating specific traumatic injuries as outlined in the Assessment and Management of Trauma (Red Book).
5. Discuss the protocols for treating trauma patients as outlined in the Assessment and Management of Trauma (Red Book).