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CCRN/PCCN Review Course

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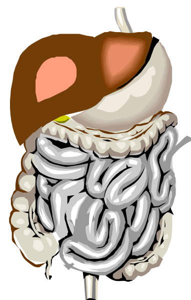
Gastrointestinal System



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The author has no conflicts of interest to disclose

Overview

- Acute Liver Failure
- Chronic Liver Failure
- Acute GI Hemorrhage
- Bowel Infarction, Obstruction, Perforation
- GI Surgeries
- Pancreatitis

Acute Liver Failure

- Definition:
- Altered mental status and coagulopathy occurring within 26 weeks of onset of illness
- Fulminant Hepatic Failure – same only develops within 8 weeks of onset of symptoms

Etiology of Cirrhosis

- **Alcoholic liver disease - most common cause in the U. S. A.**
- **Chronic viral hepatitis B, C and D**
- **Chronic autoimmune hepatitis**
- **Inherited metabolic diseases (e. g. hemochromatosis, Wilson disease)**
- **Chronic bile duct diseases (e. g. primary biliary cirrhosis)**
- **Chronic heart failure**
- **Parasitic infections (e. g. schistosomiasis)**
- **Nonalcoholic steatohepatitis (NASH)**
- **Long term exposure to toxins or drugs**
- **Cryptogenic**

Cirrhosis facts

- Cirrhosis results from damage to liver cells from toxins, inflammation, metabolic derangements and other causes
- Damaged and dead liver cells are replaced by fibrous tissue.
- Decreased blood flow to the liver and blood back up in the portal veins and portal circulation drive complications
- Platelet counts fall R/T splenic sequestration.

Cirrhosis facts

- Decreased bilirubin secretion
- Serum albumin concentration falls
- Insulin resistance and diabetes mellitus
- Later stages or in severe liver failure, hypoglycemia
- Hepatic encephalopathy

Diagnosis

- Labs:
  - Albumin level
  - PTT
  - Bilirubin levels
  - Transaminase level
  - Platelet count
- Ultrasound
- EGD
- Liver Biopsy

Complications of Cirrhosis

- Respiratory Compromise
- Variceal Hemorrhage
- Spontaneous Bacterial Peritonitis
- Hepatic Encephalopathy

Hypoglycemia

- No gluconeogenesis
- Monitor blood sugar

Cerebral Edema

- ICP monitoring
  - ICP <20 mmHg
  - CPP 60-100mmHg
- Sedated on ventilator
- EEG monitoring

Hepatic Encephalopathy

- Caused by ammonia and other by-products of protein digestion that are not cleared by the liver from the bloodstream
- Asterixis

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Hepatic Encephalopathy Treatments

- **Identify and correct precipitant**
- **Restrict dietary protein (short-term)**
- **Correction of hypokalemia**
- **Liver transplant**
- **Reduction in Protein load:**
  - **UGI bleed: NGT lavage to clear**
- **Avoid constipation**
- **Administer lactulose**

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Supportive Treatments

- Protect airway
- Antidote if indicated
- Correct coagulopathy
- Lactulose
- Dialysis
- ICP monitoring and Mannitol
- Cautious use of sedatives

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Treatment

- Low sodium diets
- Diuretics
- Beta blockers
- Paracentesis
- Shunts
- Antibiotics

Upper GI Bleeding Etiologies

- Esophageal / gastric varices
- Ulcers
- Foreign bodies
- Esophagitis
- Carcinoma

Acute GI Bleed - Blood Loss

- **< 15% Blood Loss**
  - **Normal HR, UO, BP -orthostatic hypotension**
- **15-30% Blood Loss**
  - **HR > 100**
  - **UO 25-30cc/hr**
  - **BP Normal - narrowing pulse pressure**
- **30-40% Blood Loss**
  - **HR > 120**
  - **UO < 30cc/hr**
  - **BP below baseline**

Variceal Bleeding

- Hemorrhage is the most common cause of death (50%) in cirrhosis patients
- A medical emergency
- Results from impaired clotting and portal hypertension

Clinical Findings

- Sudden onset of hematemesis
- Anxiety and fear
- Painless
- Abdominal distention
- Hyperactive bowel sounds
- Vital sign changes

Diagnosis

- Labs
- Endoscopy
- Angiography

Variceal Bleeding Management

- Early Intubation / oxygen
- NG decompression / lavage
- Blood / fluid resuscitation
- Pharmacologic treatment
- Endoscopy
- Transjugular Intrahepatic Portosytemic Shunt
- Balloon tamponade
- Surgical intervention

Pharmacologic Treatment

- Somatostatin
- Vasopressin
- Octreotide

Endoscopy

- Diagnostic to identify site of bleeding
- Therapeutic Interventions:
  - Sclerotherapy
  - Band Ligation
  - Epi Injection

TIPS

- **T**ransjugular **I**ntrahepatic **P**ortosystemic **S**hunt
- Used in acute bleeding not controlled by endoscopy
- Can be a bridge to transplant

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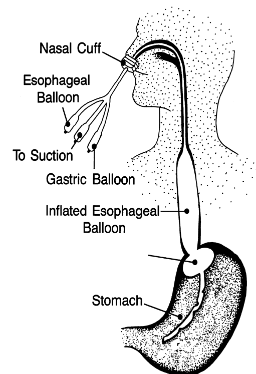
Minnesota & Sengstaken - Blakemore Tubes



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Major Complications of Tamponade Tubes

- **Ruptured esophagus**
- **Asphyxia**
- **Aspiration**
- **Erosion of gastric wall**

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Peptic Ulcers

- Too much acid or loss of protection of mucosa from digestive enzymes
- Ulcers occur in stomach or duodenum

Etiologies

- **Helicobacter pylori**
- **Drugs, alcohol, caffeine, smoking**
- **High emotional stress**
- **High physiologic stress**
  - **ARDS, Sepsis, MI, etc**
  - **Burns – Curling's ulcers**
  - **Cerebral trauma – Cushing's ulcers**

Clinical Findings

- **Abdominal / Epigastric pain**
- **Hematemesis / Coffee grounds**
- **Melena / Hematochezia**
- **Restlessness**
- **Hemodynamic changes**
- **Orthostatic changes**

Diagnosis

- Labs
- X-ray
- Endoscopy
- Angiography

Peptic Ulcer Management

- NG decompression
- Gastric lavage
- Blood products / fluid resuscitation
- Early intubation
- Pharmacologic treatment
- Endoscopy
- Surgical intervention

Pharmacologic Treatment

- Histamine blockers
- Proton pump inhibitors
- Antibiotic therapy

Overall Treatment Priorities of Upper GI Bleeding

- Airway protection
- Identify location of bleeding
- Achieve hemostasis

Lower GI Bleeding Etiologies

- Rectal varices
- Neoplasms
- Diverticulosis
- Inflammatory bowel disease

Diagnosis / Treatment

- **Barium enema**
- **Colonoscopy**
- **Arteriography**
- **Surgical intervention**
- **Treatment is similar to other types of GI bleeding**

Abdominal Emergencies

- Bowel infarction
- Bowel obstruction
- Bowel perforation

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Bowel Infarction

- Necrosis of the intestinal wall resulting from ischemia
- Etiologies:
  - Atherosclerosis
  - Aortic clamping
  - Hypercoagulability
  - Thrombus / emboli

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Clinical Findings

- **Severe acute abdominal pain**
- **Rigid, board-like abdomen - maybe**
- **Rebound tenderness - maybe**
- **Hypoactive or absent bowel sounds**
- **N/V, dehydration**
- **Urgent and bloody bowel movements**
- **Fever, septic vital signs**
- **Anorexia**
- **Leukocytosis**

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Diagnosis

- **Differential diagnosis is complex**
- **Labs ↑H/H, BUN, amylase, WBC**
- **Stool guaiac +**
- **Angiography**
- **Sigmoidoscopy**

Treatment

- **Fluid and electrolyte replacement**
- **NG decompression**
- **Surgical intervention**
  - **Thrombectomy**
  - **Embolectomy**
  - **Resection of infarcted intestine**

Bowel Obstruction

- Functional or paralytic obstruction - caused by loss of peristalsis – also called paralytic ileus
- Mechanical obstruction caused by factors that occlude lumen of intestine

Mechanical Obstruction

- Etiologies SB:
  - Adhesions
  - Hernias
  - Volvulus
  - Foreign body
  - Tumors
- Etiologies LB:
  - Tumor
  - Stricture
  - Intussusception
  - Fecal impaction
  - Diverticulitis

Paralytic Obstruction

- **Etiologies:**
  - Abdominal surgery
  - Peritonitis
  - Ischemia
  - Sepsis
  - Narcotics
  - Pneumonia

Clinical Findings

- Depends on location of obstruction
- Upper
  - Crampy epigastric pain
  - Vomiting
- Lower
  - Vague crampy diffuse pain
  - Late vomiting
  - Distended, increased tinkling sounds
  - Dehydrated

Diagnosis

- Small Bowel
  - Labs
  - Upper GI
  - X-ray
- Large Bowel
  - Labs
  - Stool
  - X-ray
  - Colonoscopy

Treatment

- Fluid and electrolyte replacement
- NG decompression
- Surgical Intervention

Bowel Perforation

- Spillage of intestinal contents into peritoneum
- Etiologies:
  - Peptic ulcers
  - Bowel obstruction
  - Appendicitis
  - Penetrating abdominal wound

Clinical Findings

- Abrupt severe abdominal pain
- Rigid, board-like abdomen
- Absent dull liver d/t free air
- Abdominal tenderness
- Bowel sounds – usually absent
- Fever, septic vital signs
- Presence of free air on x-ray

Diagnosis

- WBC's elevated
- X-ray – free air
- Upper GI contraindicated

Treatment

- Surgical intervention
- Fluid and electrolyte replacement
- Antibiotics
- NG decompression

GI Surgeries

- Esophagus
- Stomach
- Pancreas

- Complications:
  - Anastomotic leaks
  - Aspiration

Gastric Bypass

- Roux En Y
- Elective
- Rarely in ICU
- Complications:
  - Pulmonary embolus
  - Anastomotic leaks
  - Wound infections
- Often done laparoscopically

Pancreaticoduodenectomy

- Pancreatic CA
- AKA: Whipple procedure
- Removal of the pancreatic head and duodenum
- Technically difficult
- Complications:
  - Hemorrhage
  - Anastomotic leak

Pancreatitis

- Diffuse inflammation, and autodigestion of the pancreas

- Results from premature release of exocrine enzymes from the pancreas

- Alcoholism most common cause

- Gallstones causing obstruction of pancreatic ducts is next most common etiology

Forms of Acute Pancreatitis

- **Interstitial pancreatitis**
  - **95% of cases, 5% mortality**
- **Necrotizing (hemorrhagic) pancreatitis**
  - **5% of cases, 50% mortality**

Clinical Findings

- **Severe, stabbing, midepigastic pain**
- **Pain radiates to back in 50% of patients**
- **Pain increases and becomes more diffuse if hemorrhage is present**
- **N/V, Hypocalcemia**

Clinical Findings

- **Fever, diaphoresis, anorexia, dehydration**
- **Severe pain, restlessness**
- **Abdomen distended, tender**
- **Jaundice**
- **Urine dark and foamy**
- **Stool – steatorrhea – pale, foul smelling**