Essential Learning

Spontaneous Bacterial Peritonitis

- **What is SBP and its pathophysiology? How does SBP usually present?**
  - Definition
    - SBP is an acute infection of peritoneal fluid without evidence of other intra-abdominal surgically treatable sources.
  - Pathophysiology
    - The exact pathophysiology of SBP in liver cirrhosis remains speculative but the most important mechanism likely involves bacterial translocation from the lumen of the gut to the mesenteric lymph nodes. Possible contributing factors include bacterial overgrowth, impaired phagocytic function in liver, and portal systemic hypertension.
    - Most cases involve only <u>one</u> infecting organism type, the majority of which are gram-negative enteric organisms (e.g., *Escherichia coli, Klebsiella pneumoniae*) or gram-positive *Streptococcus pneumoniae*.
  - Clinical presentation
    - Symptoms may include fever, abdominal pain (may be subtle compared to other types of peritonitis), new or increased ascites, abdominal distention, altered mental status, fatigue, malaise, and/or diarrhea.
    - Approximately 13% of patients with SBP will have no signs or symptoms.

- **How is SBP diagnosed?**
  - Prompt diagnostic paracentesis is essential and should be performed before antibiotics are initiated whenever possible.
    - A single dose of antibiotics dramatically reduces the likelihood of gram stain and culture growth.
    - In general, elevated INR is not a contraindication and FFP reversal is not recommended prior to the procedure.
    - LLQ is the preferred location, POCUS can help identify a suitable fluid pocket
      - Areas near surgical scars (appy?) should be avoided and the RLQ may be limited by a gas-filled cecum in a patient taking lactulose
  - Absolute neutrophil count (PMNs) ≥ 250, bacteria on ascitic culture or gram stain (single organism), and absence of secondary causes of peritonitis
  - Absolute PMN count can be determined by multiplying the total ascitic fluid cell count by the % PMNs in the differential.
    - In the case of traumatic paracentesis, one PMN should be subtracted from the absolute PMN count for every 250 red cells/mm3

- Other supporting findings include pH < 7.35, blood-ascites pH gradient > 0.1, serum ascites albumin gradient (SAAG) ≥ 1.1 (indirectly measures portal pressure), protein < 1, and glucose > 50
- Differentiating from secondary bacterial peritonitis (perforated bowel, appendicitis, cholecystitis) is important as mortality is approximately 80% if a patient with SBP undergoes unnecessary exploratory laparotomy and mortality approaches 100% if a patient with secondary bacterial peritonitis is treated with antibiotics alone with no surgical intervention.
    - Secondary bacterial peritonitis is suggested by PMNs ≥ 250 with multiple organism types on gram stain, protein > 1, glucose < 50, and LDH greater than the upper limit of normal for serum.

- **How is SBP treated?**
    - Third generation cephalosporin (cefotaxime 2 g q8hr or ceftriaxone 2 g q24hr). Cefotaxime may be more efficacious than ceftriaxone for SBP.
        - The early initiation of appropriate antibiotics is very important in patients with SBP; however, performing paracentesis first is ideal as even a single dose of antibiotic can lead to no growth on culture. You may start antibiotics once ascitic fluid is obtained without waiting for results. You should not wait for culture results if there is strong concern for SBP. If the procedure is unable to be performed quickly, antibiotics should be started.
    - Consider albumin (1.5 g/kg IV within 6 hours) as it has been shown to decrease risk of renal failure and in-hospital mortality
        - Give if creatinine > 1 mg/dL, BUN > 30 mg/dL, or total bilirubin > 4 mg/dL

- **What is hepatic encephalopathy and how is it classified?**
    - Hepatic encephalopathy is a clinical state of disordered cerebral function that may develop as consequence of acute or chronic liver disease
        - Although often obtained, measuring serum ammonia levels is not necessary for diagnosis
    - The West Haven Criteria classifies the severity of hepatic encephalopathy
        - Grade 1: Mild confusion, depression, slurred speech, tremor
        - Grade 2: Moderate confusion, lethargy, asterixis
        - Grade 3: Significant confusion, somnolence, amnesia
        - Grade 4: Coma

- **How is hepatic encephalopathy treated?**
    - Lactulose 20-30 g (30-45 mL) PO every 1-2 hours until 2 soft stools/day initially
    - Rifaximin 550 mg po BID may be added if patients are not adequately responsive to lactulose but should not replace lactulose therapy

- **POCUS Pearls**
    - To examine the abdomen for ascites, use the same approach as the FAST exam

- FAST – Focused Assessment in Sonography for Trauma
  - Now used widely in Emergency Ultrasound to assess for free fluid, not just in trauma patients
  - Fluid (blood or other) will appear as an anechoic stripe with sharp borders
  - The RUQ window is the most sensitive for free fluid
    - Don't forget to scan the infrarenal space as free fluid collects there first
  - Fluid can collect anywhere in the suprapubic space, be sure to scan transverse and sagittal
  - In the LUQ, fluid preferentially collects in the sub-diaphragmatic space but can also collect in the splenorenal space
- Use of POCUS is key for an undifferentiated distended abdomen as it can quickly demonstrate ascites, a distended bladder or even dilated loops of bowel

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