Ascites
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Ascites
- Pathologic fluid accumulation within the peritoneal cavity
- Cirrhosis - most common cause of ascites
- In cirrhosis, ascites suggests advanced liver disease and poor prognosis
- Other causes - heart failure, malignancy, infections (i.e., TB), others

Pathogenesis (Cirrhotic Ascites)
- Portal Hypertension
- Increased Nitric Oxide
- Vasodilation
- Renal Sodium Retention
- Overflow of Intravascular Volume
- Ascites Formation

Clinical Features
- Increasing abdominal distention
- Weight gain
- Abdominal pain - ‘tense’
- On exam, flank dullness and shifting dullness
- Fever - may suggest infection of fluid

Clinical Features
- History and P.E. may give clues to etiology
  - cirrhosis - wasting, gynecomastia, jaundice, spider angiomas, palmar erythema, caput medusa
  - cardiac ascites - JVD, shortness of breath, history of heart disease
  - TB peritonitis - history of TB exposure, fever
  - malignancy - known malignancy, weight loss

Paracentesis
- Should be done to determine the etiology of ascites
- Also helpful to determine if fluid is infected
- Can be done at bedside unless small amount of fluid - ultrasound guidance
- Generally done in supine position in the R or L lower quadrants
**Paracentesis**
- ~ 30 cc obtained for diagnostic purposes
- ‘purple top’ for cell count
- ‘red top’ for chemistries
- blood culture bottles for culture

**Ascitic Fluid Analysis**
- Appearance of fluid
  - cloudy - infection/presence of neutrophils
  - ‘bloody’ - often traumatic tap, possibly malignancy
  - ‘milky’ - chylous fluid - high triglycerides
  - dark brown - ?bilirubin

**Ascitic Fluid Analysis**
- What tests to send for?
  - routine - cell count, albumin, total protein
  - others - culture, glucose, LDH, amylase, gram’s stain
  - rarely sent - TB smear/culture, cytology, triglyceride, bilirubin

**Serum-Ascites Albumin Gradient (SAAG)**
- Albumin is principal onctically active protein in serum
- Difference in serum and ascitic fluid albumin concentration correlate with portal pressure (serum minus ascites albumin)
- SAAG > 1.1 g/dL - portal HTN
- Accuracy - 97%

**Serum-Ascites Albumin Gradient (SAAG): Caveats**
- Obtain serum and ascites albumin on same day, as close to each other as possible
- Lipid interferes with albumin assay - falsely high SAAG
- High globulin fraction (> 5 g/dL) can narrow SAAG
  - to correct: SAAG x (0.16) x (serum globulin[g/dL] + 2.5)
Cell Count

- Used to evaluate for infection
- PMN > 250/mm - spontaneous bacterial peritonitis
- In TB peritonitis, high WBC but usually lymphocyte predominant
- If bloody tap, subtract 1 PMN/250 RBC - corrected PMN

Ascitic Fluid Analysis

- Culture
  - inoculate blood culture bottle at bedside increases yield
- Total protein
  - 80% cirrhotics < 2.5 g/dL
  - cardiac ascites - > 2.5 g/dL

Ascitic Fluid Analysis

- LDH
  - in 2° peritonitis, may be several fold higher than serum
- Amylase
  - in pancreatic ascites, > 2000 U/L and > 5x the serum value
- Bilirubin
  - in biliary ascites, > 6 g/dL and > serum level

Ascitic Fluid Analysis

- Gram stain
  - useful if +, seldom +, if multiple organisms - consider gut perforation
- Cytology
  - + in peritoneal carcinomatosis
  - increased yield
    - fresh sample examined
    - 3 or more serial samples
    - more fluid

Treatment

- Sodium restriction
  - 2 g a day or 88 mmol/d
  - can monitor compliance by measuring random $U_{Na}$ and $U_{K}$, $U_{Na}/U_{K}$ ratio > 1 indicates natriuresis
  - if weight gain and $U_{Na}/U_{K}$ > 1, likely not compliant with dietary sodium restriction

- Diuretics
  - Aldactone
    - mainstay
    - can be used alone in mild ascites
  - Furosemide - not effective when used alone
  - Amiloride if problems with breast tenderness from aldactone
  - During initiation of therapy, 0.5 - 1.0 kg/day weight loss is reasonable
Treatment

- Fluid restriction
  - generally not recommended
  - in majority, ‘salt retention’ >> ‘fluid retention’
  - in some patients, hyponatremia occurs
    • may be due to non-osmotic release of ADH and diuretics
    • hyponatremia usually well tolerated at Na > 110
    • will need fluid restriction at a Na level of ~125
      - 1.0 to 1.5 L a day

- Large volume paracentesis
  - safe
  - effective in tense ascites
    • in lieu of aggressive IV diuresis
  - option for patients with refractory ascites

Complications of diuretics

- hyperkalemia/hypokalemia
- volume depletion
- renal failure
- hyponatremia
- hepatic encephalopathy

Hold diuretics and reassess the use of diuretics

Reasons why a patient may not be responding to dietary salt restriction/diuretics

- non-compliant
- taking NSAIDS
- taking medications with salt
  • NaHCO pills
  • saline infusions

Refractory Ascites

Up to 10% of patients with cirrhotic ascites

Defined as
  - Failure of medical therapy
    • maximum diuretic doses
    • complications with diuretics
  - Recurs rapidly after therapeutic paracentesis

Therapeutic options

- serial paracentesis
- TIPS
- peritoneovenous shunt
- transplantation
Albumin with paracentesis

- Controversial
- Post-paracentesis volume and electrolyte problems versus lack of survival differences and the cost of albumin
- Experts recommend giving IV albumin 8 - 10 g/L if > 5L withdrawn

TIPS for Refractory Ascites

- Side to side portocaval shunt

<table>
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<tr>
<th>Study</th>
<th>N</th>
<th>TIPS</th>
<th>LVP</th>
<th>Survive TIPS</th>
<th>Survive LVP</th>
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<td>Gines et al</td>
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<tr>
<td>Sanyal et al</td>
<td>109</td>
<td>58%</td>
<td>16%</td>
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Transplantation

- Ultimate treatment for refractory ascites
- All patients with cirrhosis who develop ascites should be referred for liver transplant evaluation
  - prognosis significantly worse upon onset of ascites

Complications of Ascites

- Spontaneous Bacterial Peritonitis (SBP)
- Pleural Effusions/Hepatic Hydrothorax
- Abdominal Wall Hernias

Spontaneous Bacterial Peritonitis (SBP)

- Infection of ascites w/o a known contiguous source of infection (i.e., gut perforation or abscess)
- Prevalence ~30% in hospitalized cirrhotics
- Mortality - 20%, >50% in past
  - diagnostic tap when symptoms are present or there is worsening renal/liver function
- High recurrence - 70% within 1 year

Spontaneous Bacterial Peritonitis (SBP)

- Diagnosis made on the basis of a ascites PMN count > 250/mm³
- A positive fluid culture is not necessary
  - may be helpful in guiding antibiotic sensitivity
  - blood cultures - may isolate organism
- Monomicrobial versus polymicrobial in 2° bacterial peritonitis
  - E. coli, streptococci, Klebsiella - most common pathogens
**Spontaneous Bacterial Peritonitis (SBP)**

- **Treatment**
  - 3rd generation cephalosporin or B-lactam/B-lactamase
  - most often used is cefotaxime
    - 2 g Q12h = 2 g Q6h
  - duration is 5 - 10 days (one study showed no differences between 5 and 10 days)
  - repeat paracentesis in 48h if no clinical improvement

- **Prevention of recurrence (2° prophylaxis)**
  - recommended for those with a history of SBP
  - norfloxacin 400 mg a day
    - long-term
    - as long as ascites is present
  - alternatives (if sensitive/allergic to norfloxacin)
    - ciprofloxacin 750 mg a week
    - bactrim DS QD

- **Primary prophylaxis**
  - not currently recommended for all patients
  - recommended in patients with gastrointestinal bleed
    - short-term (i.e., 7 days)
      - norfloxacin 400 mg BID po or ng
      - IV antibiotics if unable to take po

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Cefotaxime</th>
<th>Cefotaxime W/ Albumin</th>
<th>P value</th>
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<tbody>
<tr>
<td>Resolution of infection – no. (%)</td>
<td>59 (94)</td>
<td>62 (98)</td>
<td>0.26</td>
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<td>Death – no. (%)</td>
<td>21 (33)</td>
<td>9 (15)</td>
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<td>In-hospital</td>
<td>18 (33)</td>
<td>6 (10)</td>
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<td>90 days</td>
<td>26 (45)</td>
<td>14 (22)</td>
<td>0.03</td>
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Sort, P. NEJM 1999; 341: 403-9

**Pleural Effusions**

- Hepatic hydrothorax
- Unilateral, right-sided
- Due to defects in the diaphragm
- Transudate on pleural fluid analysis
- Can become infected - spontaneous bacterial empyema

**Abdominal Wall Hernias**

- Common in patients with ascites
- Umbilical, incisional, or inguinal
- Can potentially become incarcerated or occasionally rupture
- Surgery may be required in those who ruptured, have skin ulceration, crusting, or discoloration

- **Treatment**
  - salt-restriction and diuretics
  - TIPS - second line option
Abdominal Wall Hernias

Summary

- Key tests with a diagnostic paracentesis
  - cell count, albumin, total protein
- For SAAG, serum and ascites albumin should be done on same day
- All patients with new ascites and all cirrhotics with ascites admitted to the hospital should have a diagnostic tap

Summary

- Salt restriction is important
- Aldactone and furosemide are diuretics of first choice
- LVP, TIPS, peritoneovenous shunts, and transplantation are options for refractory ascites
- Refer all cirrhotics with ascites for transplant evaluation