**Ascites**

**Definition**
Accumulation of free fluid in the peritoneal cavity.

**Types**

**Exudate**
Due to local peritoneal conditions as:
1. **Tuberculous peritonitis:**
2. **Malignant ascites:**
   a) Massive, hemorrhagic & rapidly accumulating.
   b) Malignant cells on aspiration.
   c) Abdominal mass (tumour) may be felt after tapping.
3. **Pseudomyxoma peritonii:**
   a) Rupture mucocoele of the appendix.
   b) Rupture mucocoele of the gall bladder.
   c) Pseudomucinous cystadenoma of the ovary.

<table>
<thead>
<tr>
<th>Types</th>
<th>Transudate</th>
<th>Hypo albumaaemia</th>
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<tbody>
<tr>
<td></td>
<td>Portal hypertension</td>
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<td>b. Protein losing enteropathy</td>
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<td>c. Malnutrition</td>
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<td>Haemorrhagic</td>
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<td>1. Traumatic (especially rupture spleen).</td>
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<td>2. Malignancy.(most common in HCC in HCV patient)</td>
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<td>3. Hemorrhagic blood diseases.</td>
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<td>4. Ruptured ectopic pregnancy.</td>
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<td>5. Acute pancreatitis.</td>
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**Chylous**
Due to thoracic duct obstruction caused by lymph nodes, tumour or filariasis.

*Features:*
- c. Clears on addition of ether.
- d. Stains orange with Sudan III

**Pathogenesis of ascites in cirrhosis**
1. **Splanchnic vasodilatation** is the main factor mediated by nitric oxide, a vasodilator released when portal hypertension causes shunting of blood into the systemic circulation.
2. ↓ Systemic arterial pressure → activation of renin angiotensin system with secondary aldosteronism, ↑ sympathetic nervous activity.
4. Hypoalbuminemia.

**Characteristic of ascetic fluid**

- **Aspect**
  - Straw-colored: parenchymal liver disease portal hypertension.
  - Cloudy: Bacterial peritonitis, pancreatitis.
  - Bloody: Trauma, tumor, invasive technique. Blood disease, internal Hag.
  - Green: Biliary tract diseases, ruptured bowel.
  - Milky: Tumor, T.B, Lymph obstruction.

- **Specific gravity**
  - Transudate: between 1005 – 1015.
  - Above 1015, in cases of exudates

- **Protein**
  - Transudate: 1-2 g/100 ml.
  - Higher values in: infection, Budd-Chiari syndrome, pancreatitis, T.B, malignant, myxedema, nephrogenous ascites.
  - Lower values in: portal hypertension, hepatic veins occlusion, heart failure.

- **Cellular contents**
  - Polymorphs and peritoneal mesothelium but polymorphs not exceed 100 ×10^6/L. If polymorphs more than 250 ×10^6/L, indicates infection.
  - Red cells: not exceed 1000 ×10^6/L, if ↑ indicate hemorrhagic ascites.

- **Electrolyte concentrations**
  - Are those of other extracellular fluid.

**History**
- Abdominal distension, dyspepsia, respiratory distress.

**Clinical picture**

- **Inspection**
  - Diffuse abdominal enlargement with full flanks.
  - The umbilicus is shifted downwards & everted + hernia.
  - In chronic cases: wide subcostal angle - divarication of recti.
  - White abdominal striae (stria albicans).
  - Dilated veins on the anterior abdominal wall: may be due to portal hypertension or IVC obstruction.

- **Palpation**
  - Fluid transmitted thrill (in tense ascites).
  - Liver & spleen may be felt by dipping method.
  - Abdominal swelling may be felt in malignancy &TB.

- **Percussion**
  - Resonance over the umbilicus & dull flanks (> 2L).
  - Shifting dullness from side to side (> 1.5L).
  - Knee elbow position (300-500cc)

- **Auscultation**
  - **Puddle sign:** in knee elbow position, put the diaphragm on the umbilicus & scratch from outside towards the umbilicus till change of tone → +ve = fluid.
  - **Venous hum:** may be heard in cases of portal hypertension (Kenawi sign).
### Clinical picture of the 2ry effects of ascites:

1. Right-sided pleural effusion.
2. Elevation of the diaphragm causing:
   a. Congested neck veins.
   b. Shift of the apex of the heart upwards & outwards.
   c. Dulness over the lung base (basal collapse).
3. Edema following ascites (in LCF).

### Complications

#### Hydrothorax
- Pleural effusion usually ranges from 0.4% to 10%. 60% is right sided.
- Bilateral effusion and left sided one is less frequently.
- If left sided effusion develops alone, TB is suspected.

**Causes of effusion:**
- a) Hypoalbumina
- b) Plasma leakage from a hypertensive azygous venous system.
- c) Lymph leaking from thoracic duct.
- d) acquired diaphragmatic defects
- e) Co-existence of other disease as : Meig’s syndrome, and congestive heart failure.

#### Spontaneous bacterial peritonitis
- Presents with abdominal pain, rebound tenderness, absent bowel sounds & fever in patient with cirrhosis & ascites.
- The source of infection can not usually identified.
- Escherichia coli is the organism most frequently found.
- The condition should be differentiated form other intra abdominal emergencies.
- Treatment with cefotaxime should be started immediately & recurrence is common.

#### Hernia
- Due to ↑ intra abdominal pressure: inguinal, umbilical

#### Varicose veins
- Due to compression of venous return of lower limbs and the testicle.

#### Urinary sympotm
- As urgency, ↑ urinary tract infection, difficulty up to retention of urine

### Differential diagnosis

1. Obesity: due to fat.
2. Distension: due to gas
3. Full urinary bladder
4. Pregnant uterus: due to massive amniotic fluid.
5. Ovarian cysts: huge
6. Large pancreatic cyst.

### Malignant ascites
- Rapidly accumulated
- Macroscopically bloody in 10% of cases only
- High protein contents
- High lactate dehydrogenase and cholesterol
- Cytological Ex: reveals 60-90% malignant cells
- Polyclonal and monoclonal antibodies against tumor marker may be helpful.

### Investigations

1. **Abdominal Ultrasound** is the best particularly in the obese and those with small volumes of fluid.
2. **Serum-Ascites Albumin Gradient**
   - **SAAG:** serum albumin – ascitic fluid albumin (g/dL)
   - **High gradient** (≥2.1 g/dL) indicates portal hypertension with 97% accuracy
   - **Low gradient** (<1.1 g/dL) indicates absence of PHT with 97% accuracy
   - Replaced exudative (>2.5 g/dL total protein) and transudative ascites (poor accuracy of 56%).

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<thead>
<tr>
<th>High gradient</th>
<th>Low gradient</th>
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<tbody>
<tr>
<td>1. Cirrhosis</td>
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<td>2. Budd-Chiari synd.</td>
<td>2. Malignant</td>
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<td>4. Cardiac ascites</td>
<td>4. Pancreatic ascites</td>
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<td>5. Myxedema</td>
<td>5. Biliary ascites</td>
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<td>6. Ophulous ascites</td>
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### Bed rest
- Helps mobilization of fluid, giving good urinary exertion especially if there is low salt intake.

### Diet
- Nac: less than 0.5gm/Day
- Proteins: 100gm/day, expect if encephalopathy develops.
- Low fat and high carbohydrate.
- Excess of vitamins in form of fruits and vegetables.
- Not more one liter of fluids, per day.
- Body weight must be more than decrease in 1kg/4day.

### Drugs
- Should be given, if weight loss less than 1kg/in four days inspite of good diet, salt-restriction rest
- **Potassium losing (1st group):** thiazides, fursemide, bumetamide, ethacrynic acid give Kα supplement.
- **Potassium sparing (2nd group):** spironolacton, amiloride and triamterene. They are weak diuretic and can be added to 1st group diuretic without adding potassium.
- To avoid complications of diuretics ➔ Treat the ascites slowly. Allowing at least 2 weeks to get good response.

### Treatment

#### Paracentesis
- It is aspiration of ascitic fluid from the peritoneal cavity.
- Indications:
  1. Sluggish response to diuretics
  2. Poor urinary output
  3. Need for more than 160mg of furosemide and 400mg of spironolactone.
  4. Tense ascites causing respiratory distress.
- Complication
  - Shock
  - Injury
  - Infection
  - Peritoneal Hag.
  - Encephalopathy
  - Hepato-renal syndrome

#### Surgical
- 1. Portoneo-venous (levene) shunt: is a long tube with a non return valve running subcutaneously from the peritoneum to the internal jugular vein in the neck, which allows ascitic fluid to pass directly into the systemic circulation.
- Contraindication ➔ Protein > 4.5 g/l (occlusion), Loculated ascites, Coagulopathy, Advanced renal/cardiac disease, GI malignancy
- **Complication** ➔ Infection, Hematogenous spread of mets, DIC, Pulmonary edema, Pulmonary emboli
- 2. Omentopexy
- 3. Porto caval method