Peritonitis: Causes, Symptoms and Treatment

Peritonitis is an acute or chronic inflammation of the peritoneum—the serous membrane lining the abdominal cavity and covering the visceral organs. It is a life-threatening condition that requires prompt diagnosis and management.

Anatomical and Physiological Background

The **peritoneum** is divided into:

- **Parietal peritoneum** : lines the abdominal wall.
- **Visceral peritoneum** : covers abdominal organs.
- The **peritoneal cavity** between these layers normally contains a small amount of sterile serous fluid that permits frictionless organ movement.

Peritoneal fluid is produced and absorbed continuously by mesothelial cells. This dynamic system can be disrupted by infection or chemical irritation, leading to **peritonitis** .

Classification of Peritonitis

1. **Primary (Spontaneous Bacterial Peritonitis - SBP)**

- Occurs without evident intra-abdominal source.
- Most common in **patients with cirrhosis and ascites** .
- Usually monomicrobial (e.g., *E. coli* , *Klebsiella* , *Streptococcus pneumoniae*).

2. **Secondary Peritonitis**

- Due to perforation or inflammation of abdominal organs.
- Examples:
    - Perforated peptic ulcer
    - Ruptured appendix
    - Diverticulitis
    - Bowel ischemia
    - Postoperative leaks
- Usually polymicrobial (aerobes + anaerobes).

3. **Tertiary Peritonitis**

- Persistent or recurrent infection despite treatment, often seen in ICU settings.

Etiology and Risk Factors

Localized Causes :

- Appendicitis
- Cholecystitis
- Diverticulitis
- Pelvic Inflammatory Disease (e.g., Salpingitis)

Generalized Causes :

- Gastrointestinal perforation (ulcer, ischemia)
- Pancreatic leakage (chemical peritonitis)
- Continuous ambulatory peritoneal dialysis (CAPD)
- Spontaneous bacterial peritonitis (in cirrhotic patients)

Pathophysiology

- **Infection or irritants (e.g., bile, pancreatic enzymes)** enter the sterile peritoneal cavity.
- **Inflammatory cascade** is initiated:
  - Mast cells release **histamine** and **cytokines**
  - Increased **capillary permeability** ? fluid shift (third-spacing)
  - Influx of **neutrophils and macrophages**
  - **Fibrinogen** is deposited ? fibrin forms to localize infection (may lead to adhesions)
- **Complications** include:
  - **Paralytic ileus** due to peristalsis inhibition
  - **Sepsis** or **septic shock** if bacteria/toxins enter the bloodstream
  - **Multiorgan failure**

Clinical Presentation

Local Symptoms :

- Acute onset **severe abdominal pain** , worsened by movement or coughing
- **Abdominal tenderness, guarding, or rigidity**
- **Rebound tenderness**
- **Distension**

Systemic Symptoms :

- **Fever**
- **Tachycardia, Tachypnea**
- **Malaise**
- **Dehydration, oliguria**
- **Hypotension** (in septic shock)
- **Encephalopathy** (in cirrhosis + SBP)

Physical Examination Findings

- **Involuntary guarding** of abdominal muscles
- **Board-like rigidity**
- **Absent or decreased bowel sounds** (paralytic ileus)
- **Rebound tenderness**

- **Percussion tenderness**
- **Signs of shock** : cold extremities, low BP

Diagnostic Investigations

Laboratory Tests :

- CBC: leukocytosis with left shift
- CRP, ESR: elevated
- Urea, creatinine, electrolytes: assess hydration and renal function
- LFTs: especially in suspected SBP
- Serum amylase/lipase: in pancreatitis

Imaging :

- **Erect abdominal X-ray** : free air under diaphragm (if perforation)
- **Ultrasound/CT scan** : detect abscesses, fluid collections
- **Laparoscopy** : for diagnostic uncertainty or surgical planning

Peritoneal Fluid Analysis (paracentesis):

- Appearance: turbid, purulent
- Cell count: PMNs > 250 cells/?L in SBP
- Gram stain, culture, sensitivity
- Albumin gradient (SAAG) to assess cause

Management

General Supportive Measures :

- **IV fluids** and **electrolyte resuscitation**
- **NPO** and nasogastric tube decompression
- **Broad-spectrum antibiotics** :
  - Common regimens: *ceftriaxone* + *metronidazole* , or *piperacillin-tazobactam*
- **Pain control** : cautiously, after surgical evaluation

Definitive Treatment :

- **Surgical intervention** :
  - **Exploratory laparotomy** : indicated in secondary peritonitis
  - Control of source: e.g., appendectomy, ulcer repair
  - **Peritoneal lavage** : removes pus and necrotic material
- **Abscess drainage** (ultrasound or CT-guided)
- **Management of underlying conditions** (e.g., cirrhosis, dialysis)

For Spontaneous Bacterial Peritonitis (SBP) :

- Empiric antibiotics: *cefotaxime* or *ceftriaxone*
- Consider **albumin infusion** to prevent hepatorenal syndrome

Complications

- **Sepsis and septic shock**
- **Multiple organ dysfunction syndrome (MODS)**
- **Intra-abdominal abscess**
- **Bowel obstruction from adhesions**
- **Wound dehiscence and infections**
- **Enterocutaneous fistula formation**

Prognosis

- Prognosis depends on:
  - Timeliness of diagnosis
  - Etiology
  - Patient's comorbidities (e.g., cirrhosis, immunosuppression)
- Mortality is high in untreated cases or with delayed intervention.

High-Yield Summary for NCLEX/USMLE

Feature	Key Points
Common bacteria	*E. coli* , *Klebsiella* , *Streptococcus* , *Pseudomonas*
Classic signs	Board-like abdomen, rebound tenderness, fever
First imaging study	Upright abdominal X-ray
Definitive diagnosis	Paracentesis (esp. in ascites)
Key labs in SBP	PMNs > 250 cells/?L
Treatment	Broad-spectrum antibiotics + surgery if needed
Surgical indication	Secondary peritonitis (perforated viscus, abscess, etc.)