Intraabdominal Infections Peritonitis and Abscess

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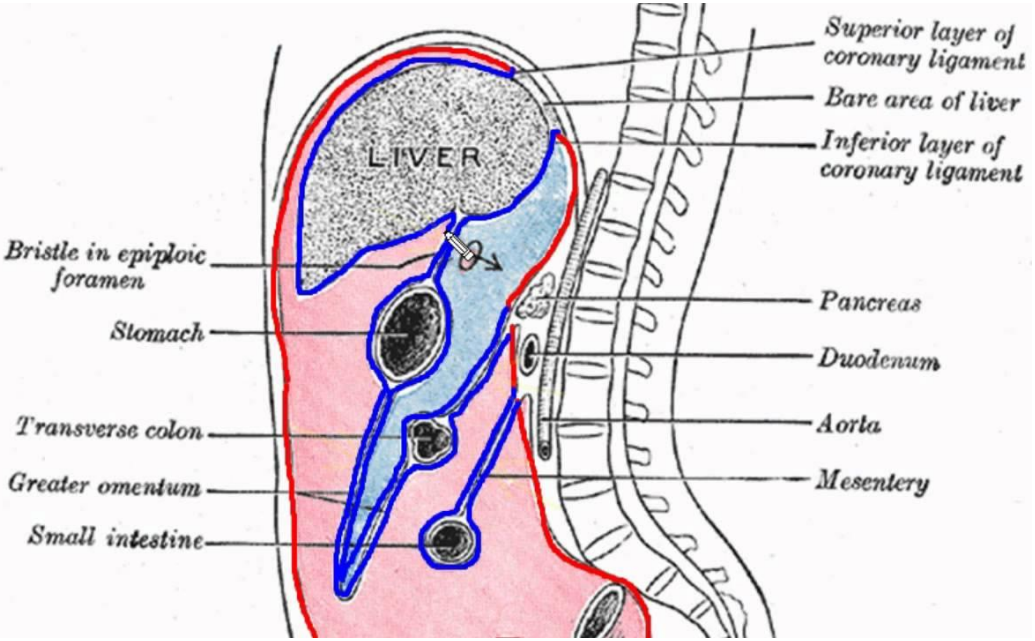
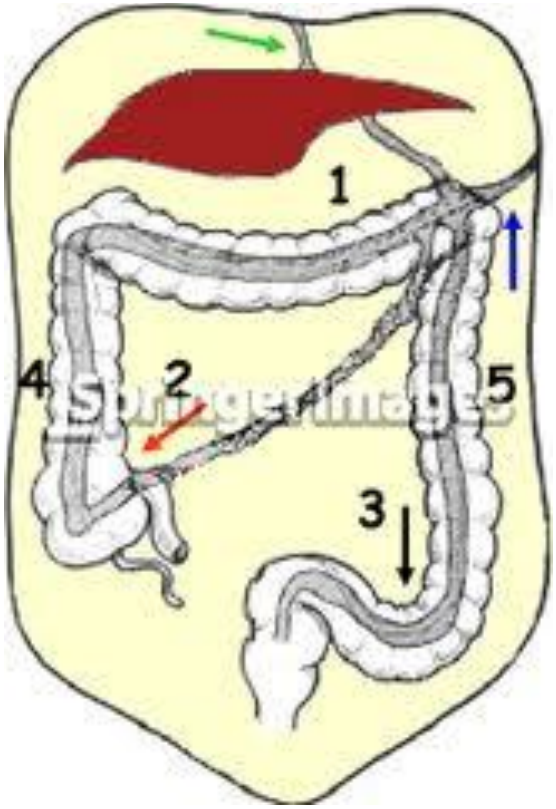
Classification

- Result of invasion and multiplication of enteric bacteria in the wall of a hollow viscus or beyond.
- Intraperitoneal: peritonitis, abscess.
- Visceral: liver, spleen, kidney, pancreas, tuboovarian
- Perivisceral: gallbladder, appendix, colon
- Interloop

Peritoneal cavity





Peritoneum is a membrane that covers the surface of both the organs that lie in the abdominal cavity and the inner surface of the abdominal cavity itself.

Intra-abdominal infections result in two major clinical manifestations

- Early or diffuse infection results in localized or generalized peritonitis.
- Late and localized infections produces an intra-abdominal abscess.

Primary Pritonitis

- Caused by the spread of an infection from the blood & lymph nodes to the peritoneum. Very rare < 1%
- …from hematogenous dissemination, usually in the setting of an immunocompromised state.
- Primary peritonitis is most often spontaneous bacterial peritonitis (SBP) seen mostly inpatients with chronic liver disease.
- Usually occurs in people who have an accumulation of fluid in their abdomens (ascites).
- The fluid that accumulates creates a good environment for the growth of bacteria.

Secondary Peritonitis

- Caused by the entry of bacteria or enzymes into the peritoneum from the gastrointestinal or biliary tract.
- This can be caused due to an ulcer eating its way through stomach wall or intestine when there is a rupture of the appendix or a ruptured diverticulum.
- Also, it can occur due to an intestine to burst or injury to an internal organ which bleeds into the internal cavity.

Tertiary peritonitis

- TP often develops in the absence of the original visceral organ pathology.

Peritonitis

Type	Definition	Microbiology
Primary	Due to bacterial translocation or hemtogenous seeding. No break in integrity of GI tract	Monomicrobial; coliforms or streptococci
Secondary	Microscopic or macroscopic perforation	Polymicrobial; coliforms, gram-positive cocci and enteric anaerobes
Tertiary	Persistent or recurrent peritoneal infection developing after treatment of secondary peritonitis	Nosocomial organisms; enterococci, staphylococci; resistant gram negative bacilli and yeast
Dialysis associated	Seeding of peritoneum due to dialysis catheter or breaks in sterility	Usually monomicrobial; skin flora, yeast

- Proximal bowel – $10^{4-5}/mm^3$; gm (-) aerobic bac.
- Terminal ileum - $10^9/mm3$
- Colon - $10^{10-12}/mm^3$ gm (-) aerobic & anaerobic

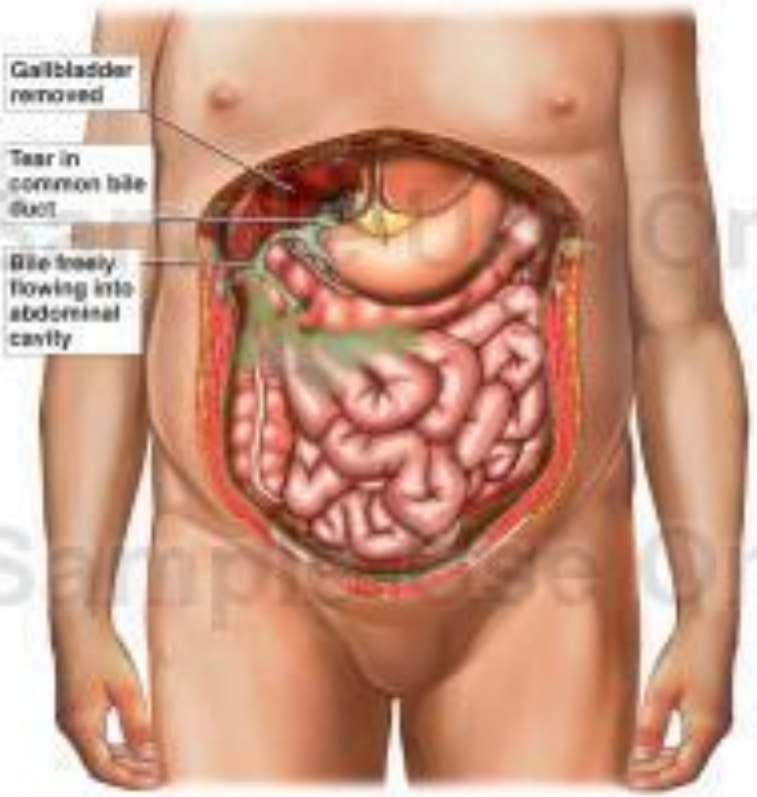
Table 1. Etiology of Acute Bacterial Peritonitis

Classification	Etiology
Primary peritonitis	Alcoholic cirrhosis, ascites, indwelling peritoneal dialysis catheter, fallopian tubes (females), ventriculoperitoneal shunting for hydrocephalus, tuberculosis
Secondary peritonitis	Operation, trauma, perforation
Tertiary peritonitis	Persistence/recurrence after 48 hours of apparent resolution of primary or secondary peritonitis

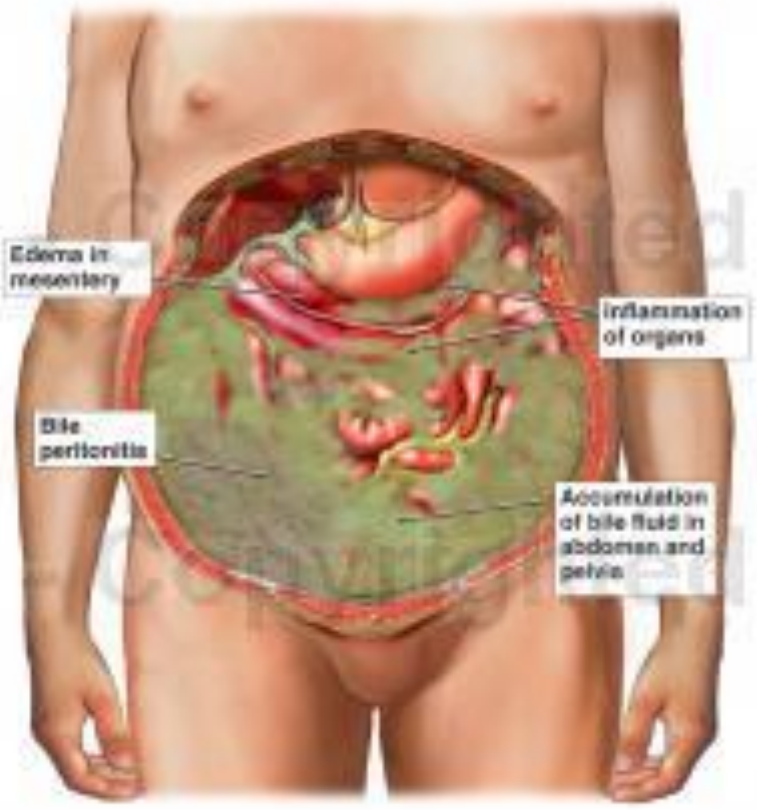
Source: References 1, 2.

Post-operative Bile Leakage with Resulting Peritonitis

Initial Post-operative Condition

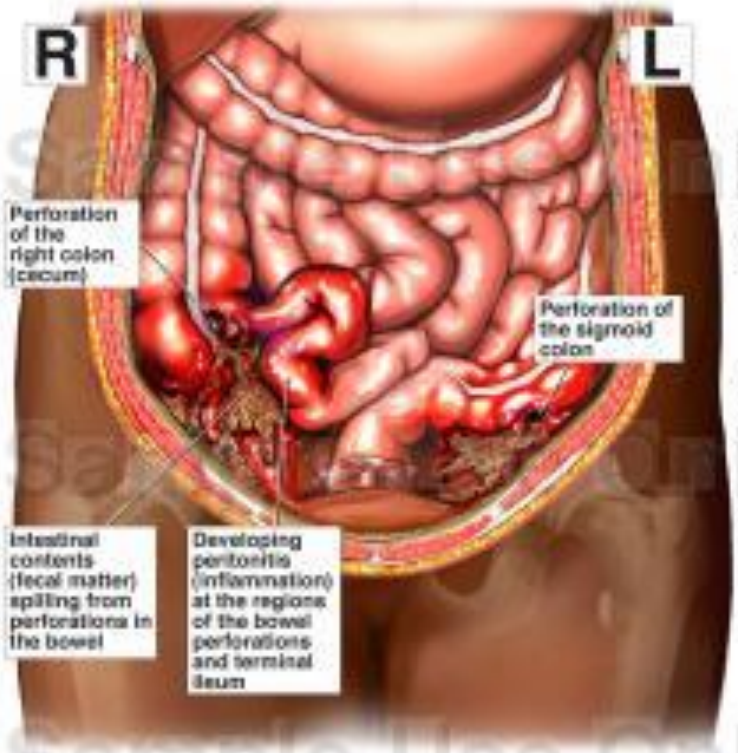


Subsequent Post-operative Condition

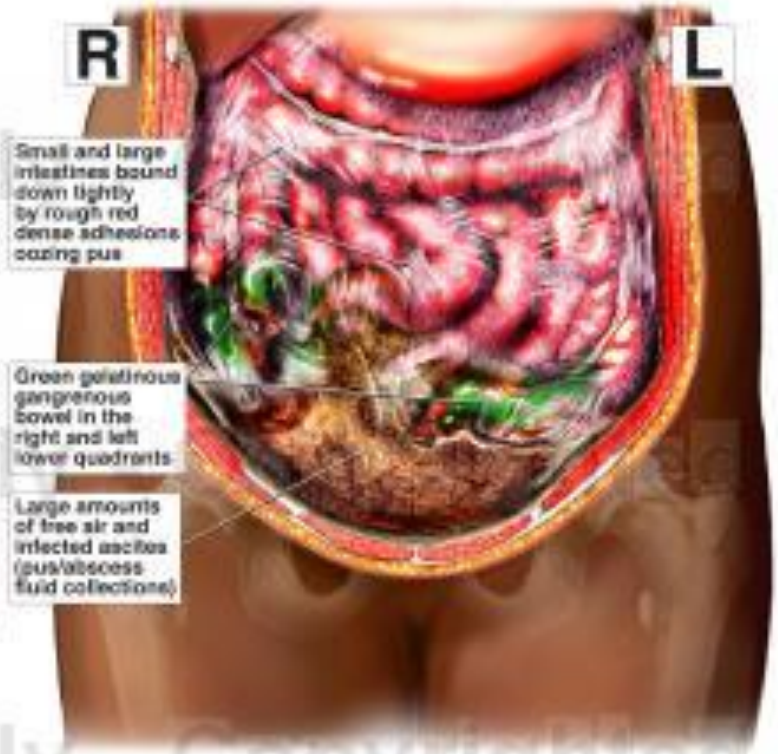


Intra-operative Bowel Injuries with Subsequent Peritonitis

Injury to the bowels developing



Resulting condition



Both cases are very serious & can be life threatening if not treated properly!!!

- Injury to a hollow organ may so signs of:
  > black tarry stool
  >bright red blood in the fecal discharge
  >bloody vomitus

* Always remember there may be referred **pain**.

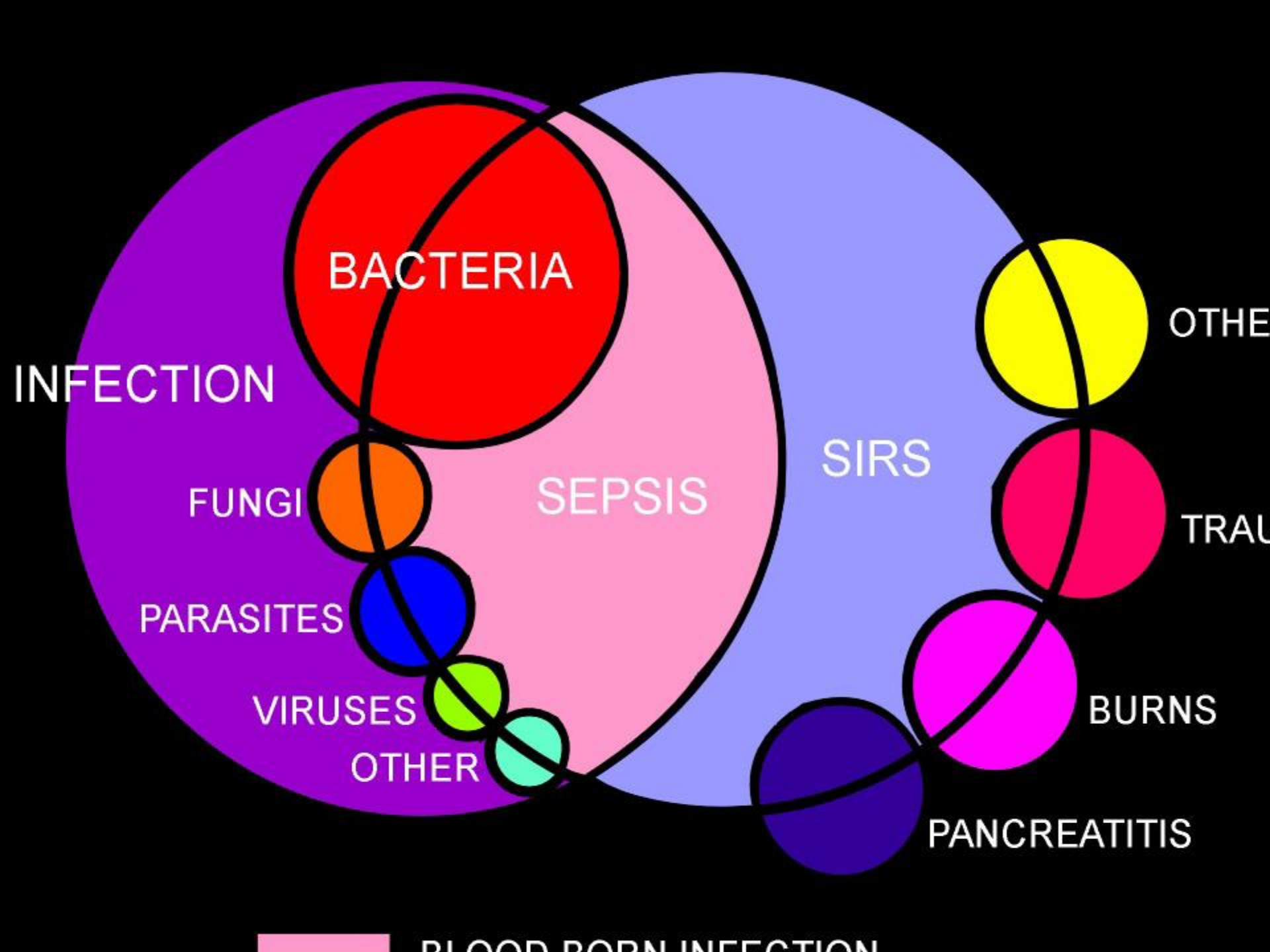
Systemic Inflammatory Response Syndrome (SIRS)

1. Fever of more than 38°C (100.4°F) or less than 36°C (96.8°F)

2. Heart rate of more than 90 beats per minute

3. Respiratory rate of more than 20 breaths per minute or arterial carbon dioxide tension (PaCO 2) of less than 32 mm Hg

4. Abnormal white blood cell count (>12,000/µL or < 4,000/µL or >10% immature [band] forms)


BACTERIA
INFECTION
FUNGI
SEPSIS
SIRS
PARASITES
VIRUSES
OTHER
OTHE
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BURNS
PANCREATITIS

Signs & Symptoms

- Swelling & tenderness in the abdomen (rebound+)
- Fever & Chills
- Loss of Appetite
- Nausea & Vomiting

Signs & Symptoms

- Increased Breathing & Heart Rates (tachypnea & tachycardia)
- Shallow Breaths
- Low BP (less than 90 mmHg)
- Limited Urine Output (less than 30 ml/h)
- Inability to pass gas or feces (paralytic ileus)

Exam & Evaluation

- Feel & press the abdomen to detect any swelling & tenderness in the area as well as signs of fluid has collected in the area.

- Listen to the bowel sounds & check for difficulty breathing, low blood pressure & signs of dehydration.

- **Dehydration…too much fluid loss**

Evaluation

- The usual sounds made by the active intestine and heard during examination with a stethoscope will be absent, because the intestine usually stops functioning.
- The abdomen may be rigid and boardlike
- Accumulations of fluid will be notable in primary due to *ascites*.

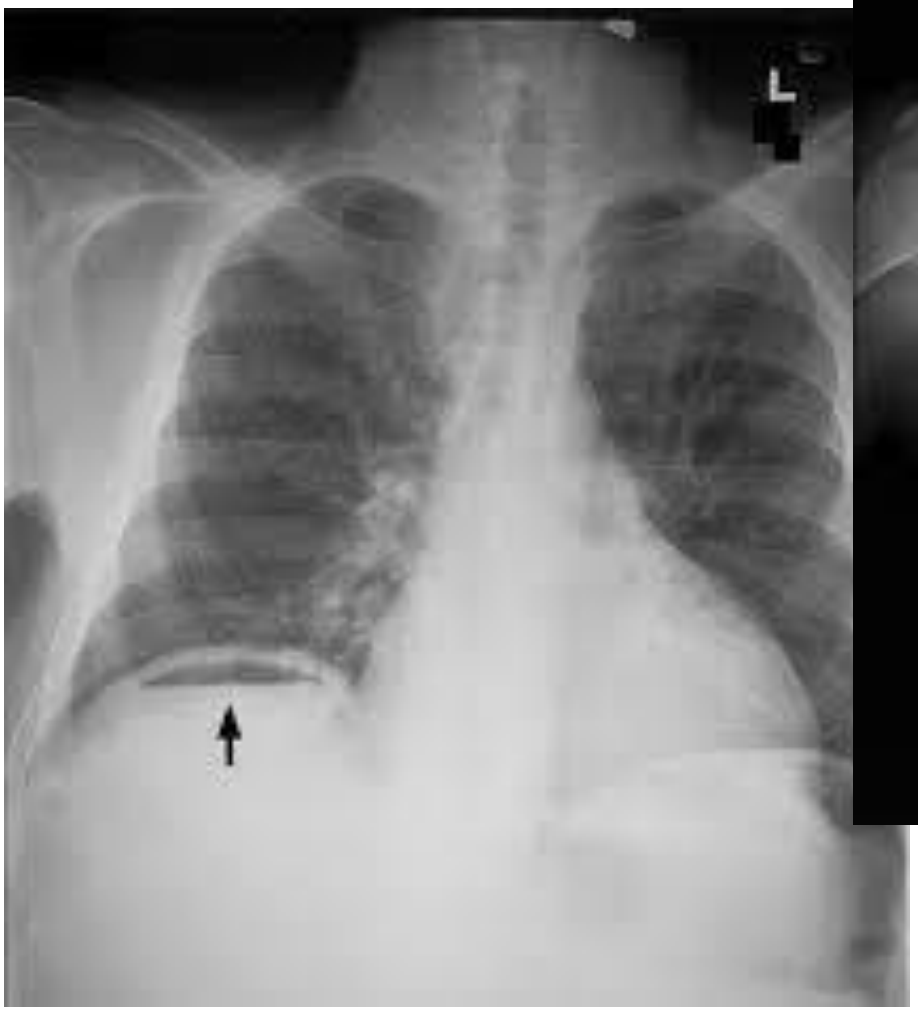
Rad & Lab

- Blood Test (WBC, CRP, Procalcitonin..)

- Samples of fluid from the abdomen

- Chest X-rays
- US
- CT Scan

- Peritoneal lavage.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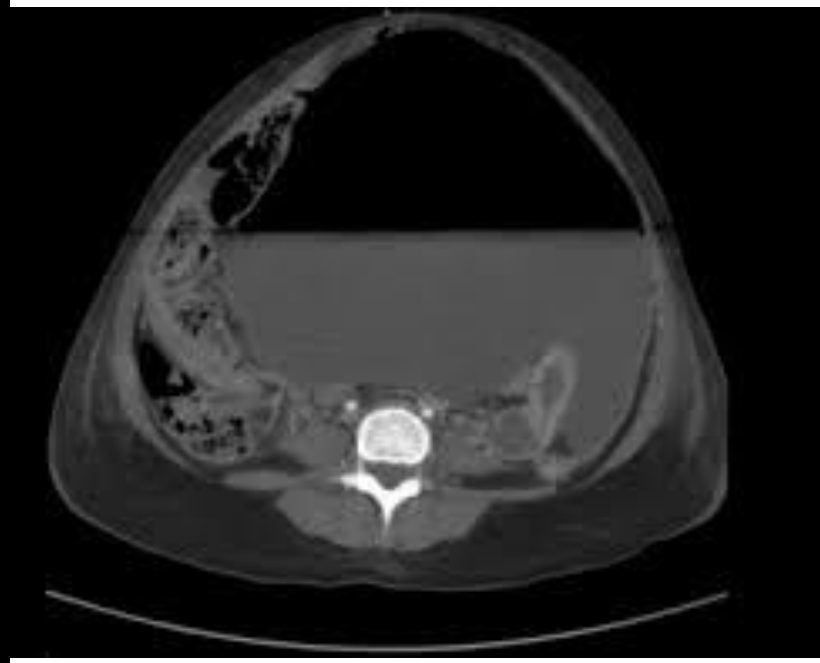


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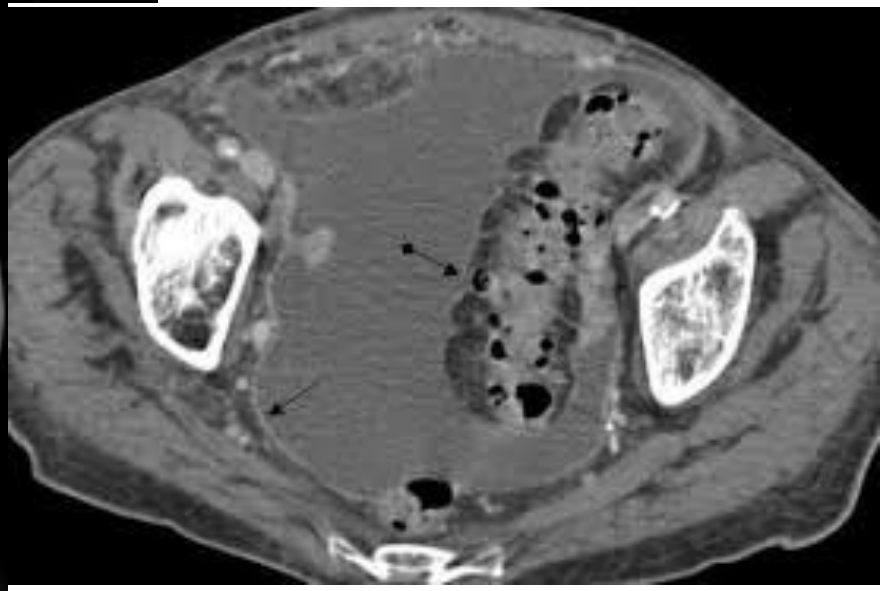






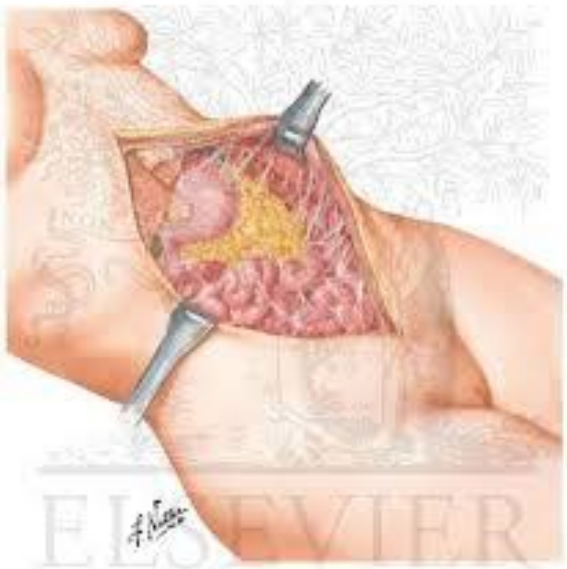
Table 2. Likely Pathogens to Target for Empiric Antimicrobial Therapy

Site	Pathogen
Primary Peritonitis	
Cirrhosis	*Escherichia coli; Klebsiella* spp, pneumococci (many others)
Peritoneal dialysis	*E coli; Klebsiella, Streptococcus, Staphylococcus, Pseudomonas* spp
Secondary Peritonitis	
Stomach or duodenum	*E coli; Streptococcus* spp
Biliary tract	*E coli; Klebsiella* spp, enterococci, *Clostridium* and *Bacteroides* spp (latter two are rare)
Small or large intestine	*E coli; Klebsiella, Proteus, Clostridium, Bacteroides* spp
Appendix	*E coli; Pseudomonas, Bacteroides* spp
Liver	*E coli; Klebsiella* spp, enterococci, *Staphylococcus* spp, amoebae, *Bacteroides* spp (rare)
Spleen	*Streptococcus, Staphylococcus* spp

spp: species. Source: Reference 1.

Microbiology

Location	Colony counts	Flora
Stomach	1000 CFU/ml	Gram positive, oral flora
Upper small gut	Scant	Same + coliforms
Distal small gut	1-100 million CFU/ml	Coliforms + enterococcus + anaerobes
Colon	10-100 billion CFU/ml	Coliforms + enterococcus + Anaerobes + streptococci



Prognosis

- Untreated peritonitis is poor, usually resulting in death.

- With Tx, prognosis is variable, dependent on the underlying causes.

Prognosis

- Age
- Comorbidities
- Duration of contamination
- Presence of foreign material
- Type of microorganisms
- Site of contamination
- Mortality is 3% in setting of early abdominal perforation. Increases to 60% in established peritonitis with organ failure
- Inadequate antimicrobial therapy doubles mortality

Treatment Approach

- Hospitalization is common.
- Surgery is often necessary to remove the source of infection (apendicitis, perforeated ulcer..).
- Antibiotics are prescribed to control the infection & intravenous therapy (IV) is used to restore hydration.

Management

- Early diagnosis: history, exam, data, imaging
- Supportive measures: IV fluids, sepsis protocol
- Source control
- Antimicrobial therapy

Management issues

- How will you control the source?
- Percuteous drainage? (via US/CT)
- Laparoscopic drainage?
- Open lap?
- What empiric antibiotics would you choose?
- Is this uncomplicated or complicated?
- Upper GI flora vs Lower GI flora? (gastric flora less dangerous from colonic flora)