WISCONSIN TB SUMMIT

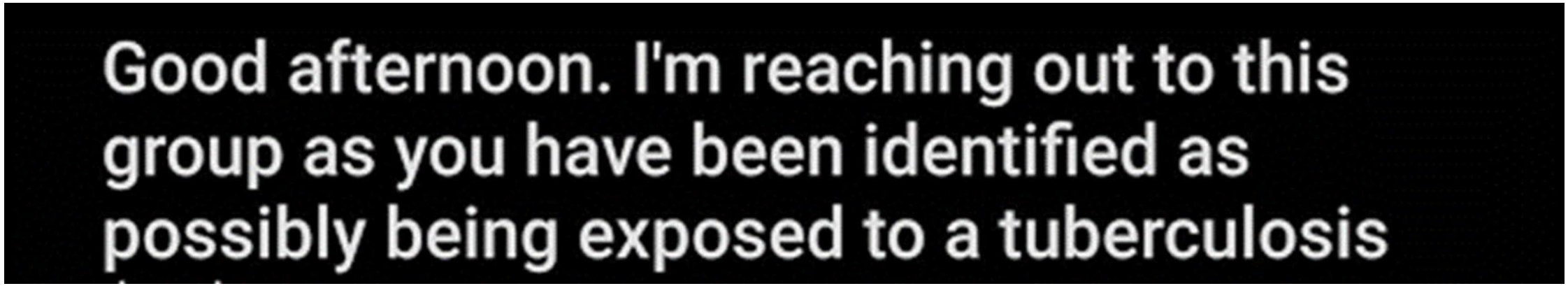
GASTROINTESTINAL & PERITONEAL TUBERCULOSIS

Matt Shoemaker, D.O.

April 14, 2026

DISCLOSURES

- None



LEARNING OBJECTIVES

- Extrapulmonary tuberculosis epidemiology
- Gastrointestinal tuberculosis epidemiology
- Intestinal tuberculosis pathogenesis
- Intestinal tuberculosis presentation
- Intestinal tuberculosis diagnosis
- Tuberculous peritonitis pathogenesis
- Tuberculous peritonitis presentation
- Tuberculous peritonitis diagnosis
- Gastrointestinal tuberculosis treatment

Yet the captain of all these men of death that came against him to take him away was Captain Consumption, for he it was that brought him down to the grave.

The Life and Death of Mr. Badman
John Bunyan (1680)

TUBERCULOSIS HAS A MIND OF ITS OWN

Ockham's razor – "Plurality must never be posited without necessity"
William of Ockham 1287-1347

Hickam's dictum - "Patients can have as many diseases as they damn well please."
Dr. John Bamber Hickam 1914-1970

Eur Respir J. 2020;55(2):1901959.

Some might have more than 1 extrapulmonary site of disease

EXTRAPULMONARY TUBERCULOSIS

- U.S. 2022 (CDC)
  - 18%
- Low-prevalence areas
  - 20.9%
- Endemic areas
  - As high as 25%
    - SE Asia
- Higher incidence in HIV

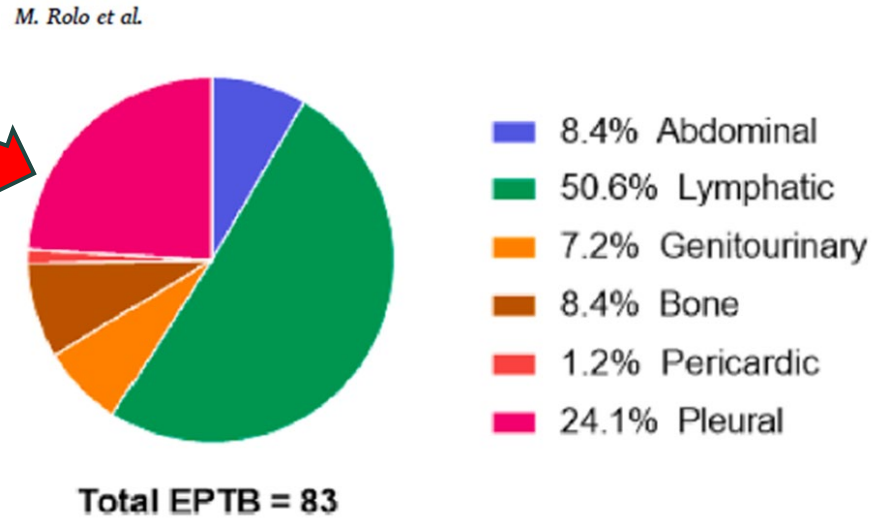
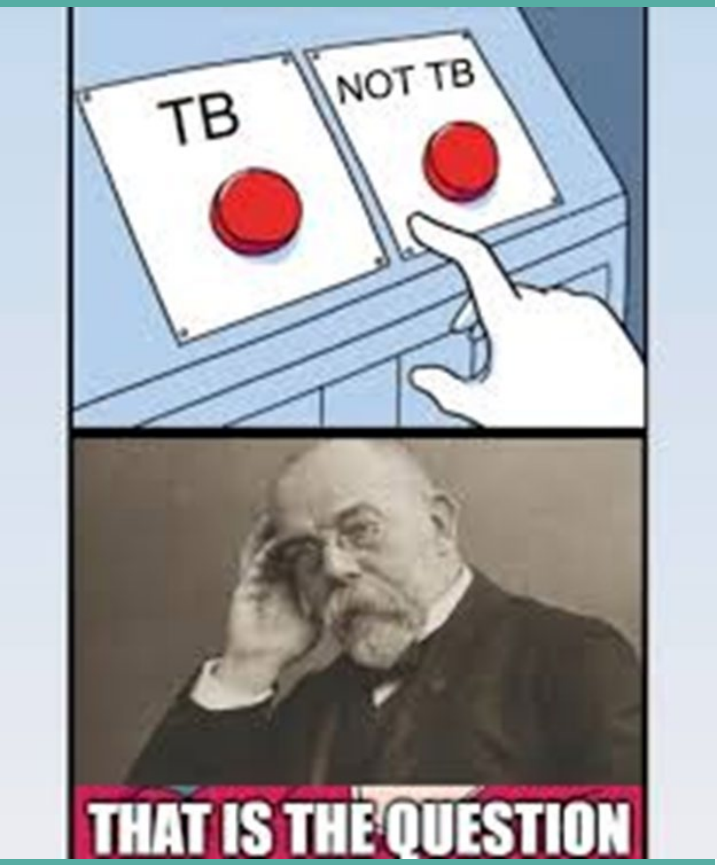


Fig. 2. Distribution of EPTB in anatomic locations.

J Clin Tuberc Other Mycobact Dis. 2023 May 12;32:100377.

EXTRAPULMONARY TUBERCULOSIS



- Can occur anywhere it pleases
- Less transmissible
  - Unless drainage aerosolized
- Challenging to diagnosis
  - Paucibacillary, *say what???*
- Non-specific clinic presentation
  - *Mimickers*
- Delays in diagnosis ⟹ poor prognosis

https://www.youtube.com/watch?v=nmyQ2J1ixew

Which statement is true regarding tuberculosis:

Move the checkmark next to the correct answer. It is programed to appear when you click forward.

	A	Tuberculosis is an ancient disease that I do not need to worry about in 2026
✓	B	Tuberculosis can occur anywhere it pleases
	C	Tuberculosis only infects the lungs
	D	Tuberculosis only infects tuberous plants

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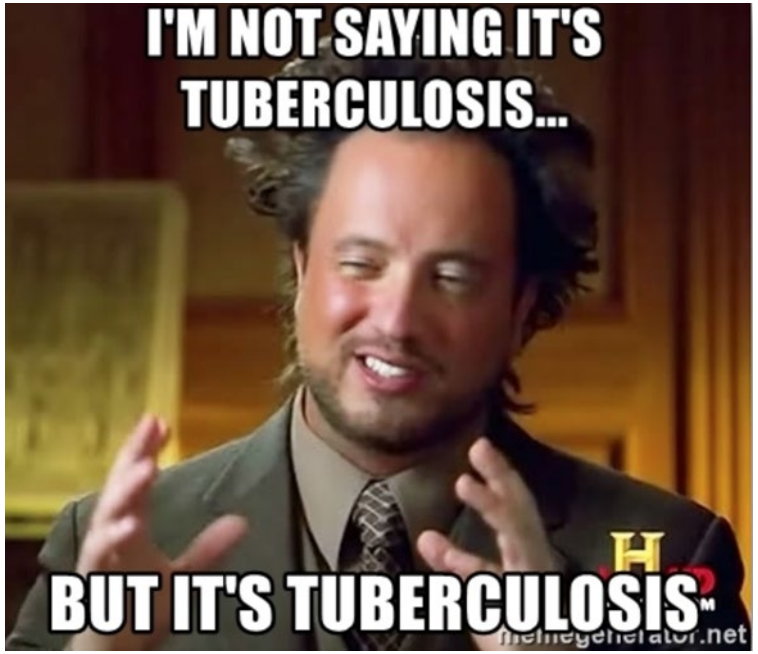
GASTROINTESTINAL TUBERCULOSIS

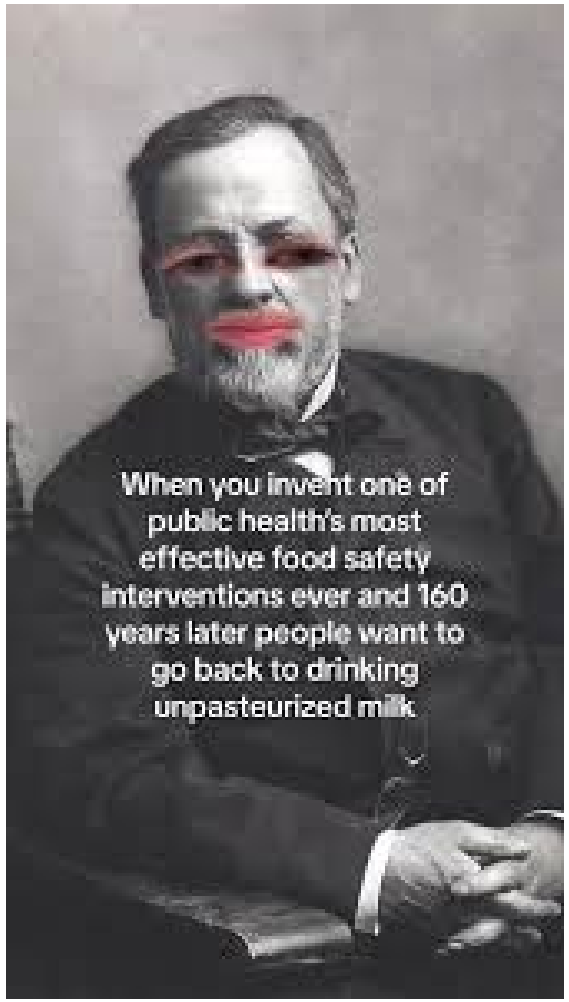
- 6th most prevalent form of extrapulmonary tuberculosis
- Incidence
  - 11-16% of extrapulmonary tuberculosis
  - 2-3% of overall tuberculosis
  - 31-50% concurrent pulmonary tuberculosis
- Epidemiology
  - No sex predisposition
  - Equal age distribution
- ***Mortality*** – 6-20% untreated



GASTROINTESTINAL TUBERCULOSIS RISK FACTORS

- Low socio-economics
  - Malnutrition
  - Overcrowding
  - Low medical literacy
  - Lack of proper medical attention
- Medications
  - Corticosteroids
  - Cancer chemotherapy
  - Anti-tumor necrosis factor agents
  - Bone marrow transplant
  - Solid organ transplant
- Immunocompromise
  - HIV
  - Malignancy
  - Diabetes mellitus
  - Renal failure
  - Liver cirrhosis
  - Malnutrition
  - Alcoholism
  - Illicit drug abuse
- Other
  - Unpasteurized dairy – *M. bovis*

UNPASTEURIZED DAIRY ASSOCIATED INFECTIONS



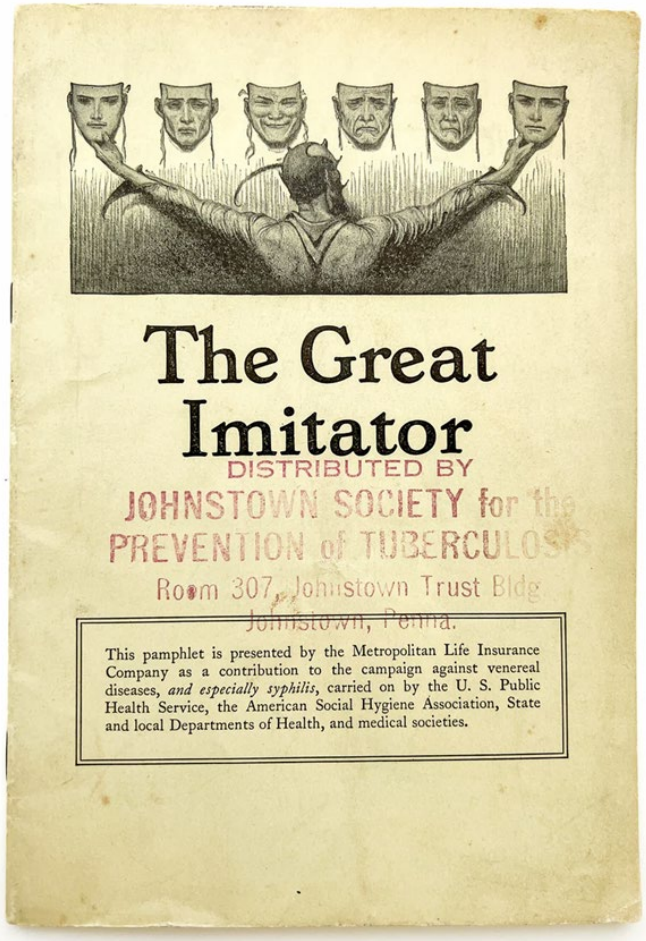
Louis Pasteur
1822-1895

- Brucella abortus (cow)
- Brucella melitensis (goat/sheep)
- E coli O157:H7
- Campylobacter jejuni
- Chlamydia abortus
- Clostridium botulinum
- Cryptosporidium parvum
- Echinococcus granulosis
- Giardia duodenalis
- Leptospira hardjo
- Listeria monocytogenes
- Mycobacterium bovis
- Mycobacterium avium paratuberculosis
- Salmonella enterica
- Staphylococcus aureus
- Yersinia enterocolitica

Dairy Res. 2023;90(4):325-331.

GASTROINTESTINAL TUBERCULOSIS

- Can infect any part of the GI tract ***or*** abdominal organs
  - Singly or in combination
  - May occur ***without*** pulmonary disease
- Vague symptoms
- Mimicker of other intraabdominal diseases



New York: Metropolitan Life Insurance Co., ca. 1930s.

GASTROINTESTINAL TUBERCULOSIS PATHOGENESIS

- Hematogenous/lymphatic spread
  - Bacteremia during active disease
  - Miliary
- Swallowing infected sputum
  - Ingestion of bacilli
- Direct spread from adjacent organs
- Consumption of unpasteurized dairy – *M. bovis*
- Ruptured mesenteric lymph nodes
- Direct contamination – Peritoneal dialysis

https://phil.cdc.gov/Details.aspx?pid=23254

GASTROINTESTINAL TUBERCULOSIS PATHOGENESIS

Bacilli enter GI tract & traverses the mucosa to lodge in submucosa

Bacilli induce inflammatory changes

Serosal/submucosal edema, cellular infiltration, & lymphatic hyperplasia

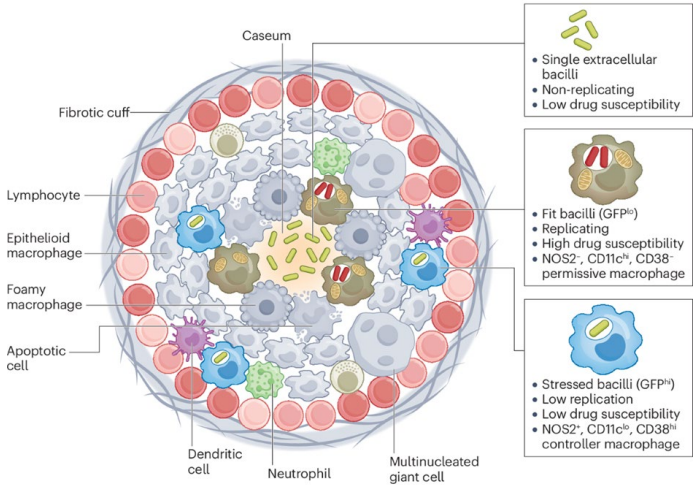
Development of granulomas

Small papillary mucosal elevations

Lymphangitis, endarteritis, and fibrosis

Mucosal ulceration, caseating necrosis, & luminal narrowing

Spread to lymph nodes & peritoneum



Nat Rev Immunol 25, 370–384 (2025)

Gastrointestinal tuberculosis occurs predominately through which mechanism?

Move the checkmark next to the correct answer. It is programed to appear when you click forward.

A	Inhaling airborne bacilli into the lungs
B	Sexual transmission
C	Ingesting bacilli into the GI tract
D	Wizards and warlocks

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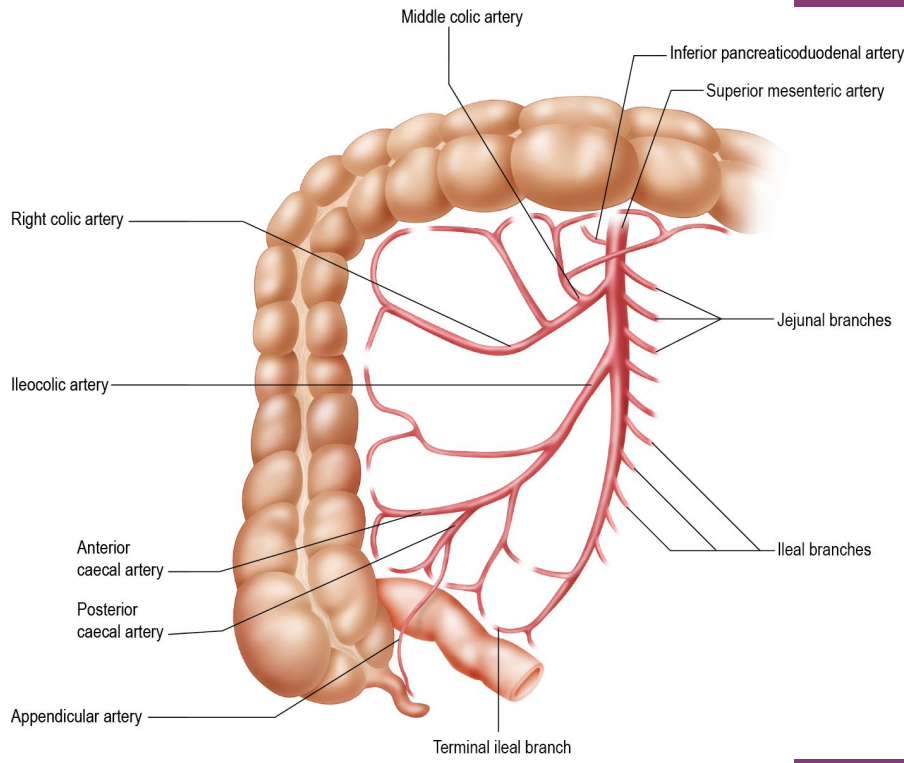
GASTROINTESTINAL TUBERCULOSIS ANATOMIC SITES

- Intestinal 50%
  - Esophageal 0.3%
  - Stomach 2%
  - Duodenum 0.3%
  - Jejunum/Ileum 35%
  - Ileocecal 42%
  - Appendix 1%
  - Colonic 12%
  - Anorectal 7%
- Peritoneal 43%
- Mesenteric lymph nodes 8%

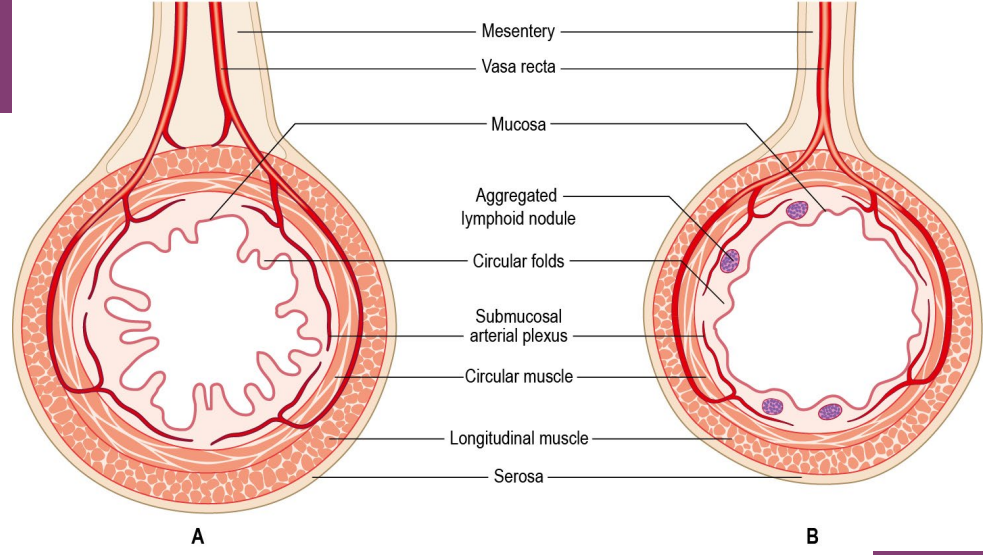
Ileocecal 80%



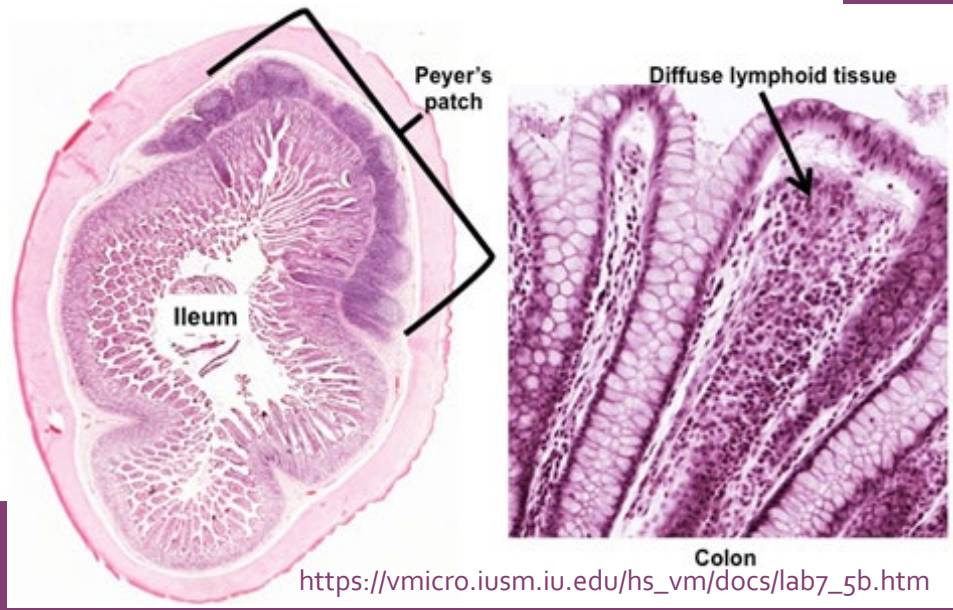
Gray's Anatomy, 43rd Edition (2026)

INTESTINAL TUBERCULOSIS

- ***Why the ileocecal region???***
  - Relative physiologic stasis of the area
  - High rate of absorption with more complete digestion
    - Minimal digestive activity
  - Abundance of lymphoid tissue
    - Peyer's patches
      - GI associated lymphoid tissue
      - Phagocytize bacilli
  - Narrow lumen



Gray's Anatomy, 43rd Edition (2026)



https://vmicro.iusm.iu.edu/hs_vm/docs/lab7_5b.htm

INTESTINAL TUBERCULOSIS PRESENTATION

- Nonspecific chronic abdomen pain 80-90%
- Right lower quadrant mass 25-50%
- Fever 15-50%
- Anorexia 30-90%
- Weight loss 66%

- Change in bowel habits 20%
  - Constipation 7%
  - Diarrhea 35%
  - Hematochezia 5-15%
- Obstruction 33-50%
- Current or previous pulmonary TB 25%

INTESTINAL TUBERCULOSIS DIAGNOSIS

- Requires a high index of suspicion
  - Nonspecific presentation
  - *Mimickers*
  - Misdiagnosed 50-70%
    - Even in endemic countries
- Paucibacillary
  - ↓ sensitivity/specificity microbiologic studies
- If you don't think about it…

Table 1
Infectious and noninfectious causes of gastrointestinal granulomas

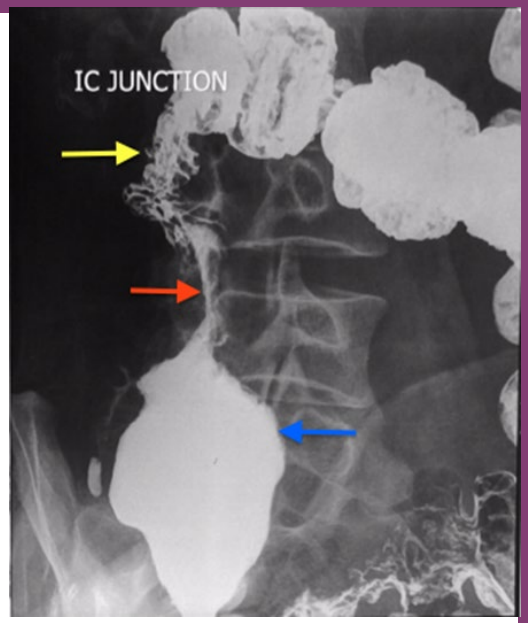
Categories	Diseases
Infectious disease	Systemic: tuberculosis, histoplasmosis, actinomycosis, Whipple disease Parasitic: enterobiasis, schistosomiasis Venereal: syphilis, lymphogranuloma venereum
Inflammatory bowel disease	Crohn disease
Vasculitis	Behçet disease Churg-Strauss syndrome Giant cell arteritis Granulomatosis with polyangiitis
Primary immunodeficiency disorder	Chronic granulomatous disease Common variable immunodeficiency
Foreign material	Barium Starch Suture Talc
Miscellaneous	Sarcoidosis Diverticular colitis Drugs (diclofenac, biologics) Eosinophilic granulomas Granulomatous gastritis and gastroenteritis

Gastroenterol Clin North Am. 2021;50(2):341-360.

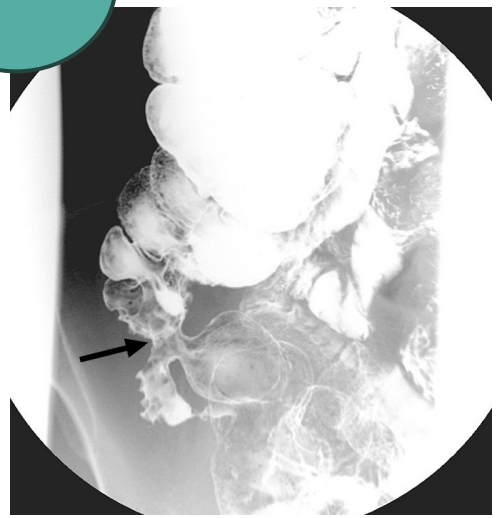
INTESTINAL TUBERCULOSIS IMAGING

- CXR – Active TB 25-30% *or* healed T
- KUB – Not helpful
- Barium studies
  - Mucosal ulceration
  - Segmental narrowing/strictures
  - Fistulas
  - Pipestem colon
  - Cone shaped, retracted cecum

Does this remind you of another illness???



https://radiopaedia.org/cases/ileocaecal-tuberculosis-1



https://ajronline.org/doi/10.2214/AJR.15.15580

Table 2. Some differentiating features of intestinal TB and Crohn's disease.

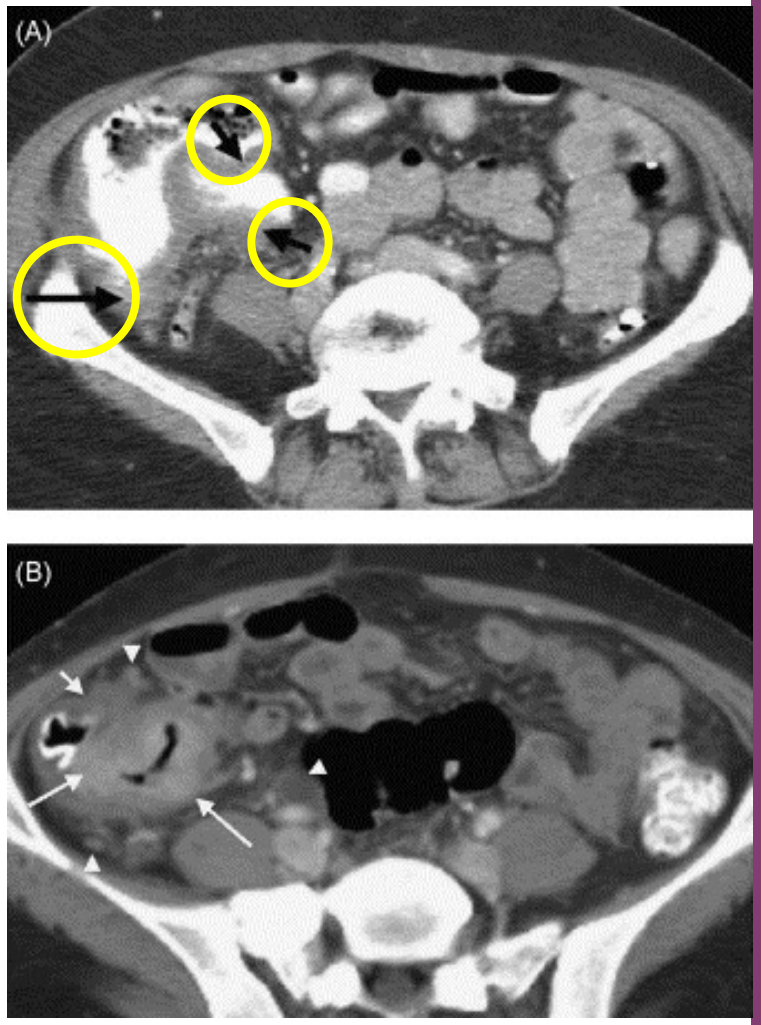
	Intestinal TB	Crohn's disease
Endoscopic findings	Transverse or circumferential ulcer Cheesy exudates Adjacent inflammed mucosa patulous or deformed ileocecal valve	Linear, serpiginous or cobblestone ulcers near normal adjacent mucosa Normal ileocecal valve Aphthous ulcers [recto-anal]
CT scan	mural thickening without stratification short segment Inflammed mesentery without vascular engorgement concentric strictures	mural thickening with stratification long segment involvement, skip lesions Hypervascular mesentery [comb sign]; fibrofatty proliferation of mesentery eccentric strictures
Regional lymph nodes	Large necrotic lymphadenopathy; matted	Small inflammatory lymphadenopathy
Ascites	usually present	absent/uncommon
Histology	Submucosal granuloma necrotizing/caseating; confluent Large granulomas (>200μm) Frequent granulomas (>5/biopsy) ulcer lined by histiocytes AFB/PCR positive	Mucosal granuloma Non necrotizing/non confluent Small granulomas (<200μm) Sparse granulomas (<5/biopsy) Focally enhanced colitis AFB negative
Clinical	Short history (<6 months) Fever with evening chills abdomen lump/ascites Pulmonary symptoms	>6–12 months no fever pattern perianal lesions extra intestinal manifestations

INTESTINAL TB VS. CROHN'S

Indian J Tuberc. 2025;72 Suppl 1:S7-S11.

INTESTINAL TUBERCULOSIS IMAGING

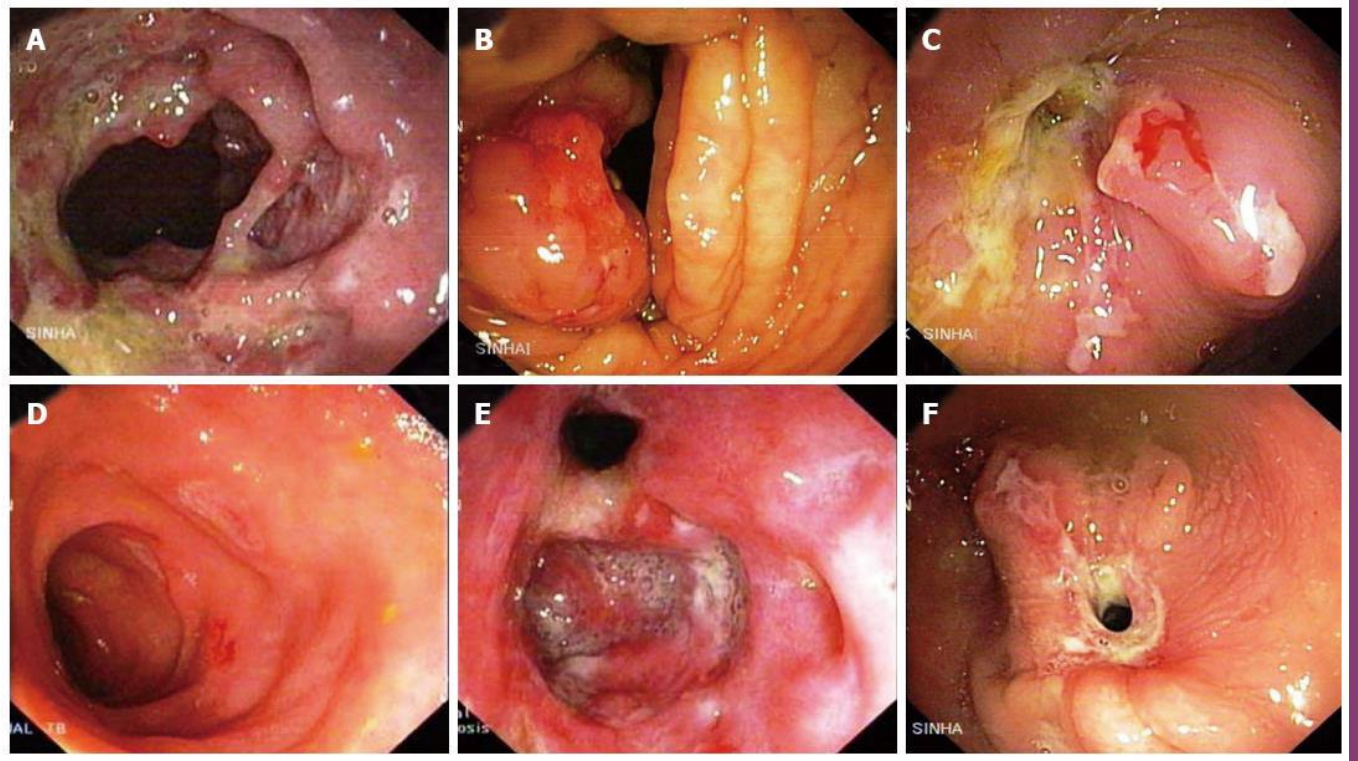
- CT abdomen/pelvis
  - Enlarged para-aortic nodes
  - Asymmetric bowel wall thickening
  - Ascites
  - Inflammatory mass
    - Bowel wall, lymph nodes, & omentum
  - Terminal ileum narrowing
    - Thickening & gaping of ileocecal valve
- MRI abdomen/pelvis
  - Fistulas



Eur J Radiol. 2005;55(2):173-180.

INTESTINAL TUBERCULOSIS ENDOSCOPY

- Colonoscopy
  - Transverse ulcers
  - Chessy exudates
  - Polyps
  - Fistulas
  - Ileo-cecal valve deformities
  - Luminal narrowing
- Capsule study???



World J Gastroenterol. 2014;20(40):14831-14840.

Diagnosis of intestinal tuberculosis is…

Move the checkmark next to the correct answer. It is programed to appear when you click forward.

A	Difficult due to similarities with inflammatory bowel disease
B	Easily confirmed by presenting symptoms
C	Easily confirmed by imaging
D	Easily confirmed by endoscopy

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INTESTINAL TUBERCULOSIS MICROBIOLOGY

- AFB smear
  - Sensitivity <5%
- AFB culture
  - Sensitivity 40%; Specificity 100%
- Xpert MTB/RIF PCR
  - Sensitivity 8-61%; Specificity 100%

AFB smear 5000-10,000 bacilli/mL

AFB culture 10-100 bacilli/mL

INTESTINAL TUBERCULOSIS HISTOPATHOLOGY

- Sensitivity 40-50%
- Findings
  - Caseating granulomas
    - Sensitivity 40-70%
  - Caseating necrosis
  - Confluent granulomas
  - Chronic inflammatory changes

Table 5. Important causes of granulomatous inflammation pertaining to abdomen [78,80–82].

Intestinal	Visceral	Lymph nodal	Peritoneal
1. Infectious	**1. Infectious**	**1. Infectious**	**Infectious**
Bacterial	**Bacterial**	**Bacterial:**	*Mycobacterium tuberculosis*
Mycobacterium tuberculosis	*Mycobacterium tuberculosis*	*Mycobacterium tuberculosis*	*Non-tubercular mycobacteria (NTM)*
Non-tubercular mycobacteria (NTM)	*Non-tubercular mycobacteria (NTM)*	*Non-tubercular mycobacteria (NTM)*	**Autoimmune**
Salmonella typhi	*Coxiella burnetii*	*Coxiella burnetii*	Sarcoidosis
Yersinia pseudotuberculosis	*Actinomyces*	*Actinomyces*	Granulomatosis with polyangiitis (GPA)
Campylobacter spp.	*Bartonella henselae*	*Bartonella henselae*	Chronic granulomatous disease (CGD)
Whipple's disease (*Tropheryma whipplei*)	*Brucella*	*Brucella*	**Neoplastic**
Chlamydia trachomatis serovar L1, L2, L3 (LGV)	*Rickettsia spp.*	**Fungal**	Lymphoma
Rickettsia (*Treponema pallidum*)	*Salmonella typhi*	*Aspergillus*	**Others**
Fungal	**Fungal**	*Blastomyces*	Foreign body (undigested food particle, oil, post-operative by surgical glove powder, cotton lint, chemicals used for peritoneal lavage, etc)
Histoplasma	*Aspergillus*	*Cryptococcus*	Idiopathic
Cryptococcus spp.	*Blastomyces*	*Histoplasma*	
Coccidioides	*Candida*	*Coccidioides*	
Parasitic	*Histoplasma*	*Sporothrix schenckii*	
Enterobius vermicularis	*Coccidioides*	**Parasitic**	
Schistosoma	**Parasitic**	*Leishmania*	
Leishmania	*Echinococcus*	*Toxoplasma*	
2. Autoimmune	*Leishmania*	**Viral**	
Crohn's disease	*Toxoplasma*	*Cytomegalovirus*	
Sarcoidosis	*Schistosoma*	*Epstein-Barr virus*	
Vasculitis	**Viral**	**2. Autoimmune**	
Granulomatosis with polyangiitis, Eosinophilic Granulomatosis with polyangiitis, Behcet's disease Giant cell arteritis)	*Cytomegalovirus*	Granulomatosis with polyangiitis (GPA)	
	Epstein-Barr virus	Eosinophilic Granulomatosis with polyangiitis (EGPA)	
	Hepatitis A	Sarcoidosis	
Common variable immunodeficiency	*Hepatitis C*	**3. Neoplastic:**	
Autoinflammatory diseases	**2. Autoimmune**	Hodgkin lymphoma	
Inherited disorders (Chronic granulomatous disease, Hermansky-Pudlak syndrome, Blau syndrome	Crohn's disease	Langerhans cell histiocytosis	
	Primary biliary cholangitis	HLH (Hemophagocytic lymphohistiocytosis)	
3. Neoplastic	Sarcoidosis	Langerhans cell sarcoma	
Lymphoma	Chronic granulomatous disease	Dendritic cell sarcoma	
4. Others	**3. Neoplastic**	Erdheim Chester disease	
Foreign body reaction (Talc, barium, starch, pulse granuloma, etc.)	Hodgkin lymphoma	Rosai Dorfman Disease	
Drugs (Diclofenac, Biologics)	HLH (Hemophagocytic lymphohistiocytosis)	**4. Others:**	
Idiopathic	Rosai Dorfman Disease	Foreign body granuloma	
	4. Others		
	Berylliosis		
	Foreign body reaction		
	Drugs		

Expert Rev Anti Infect Ther. 2025;23(2-4):197-215.

WISCONSIN
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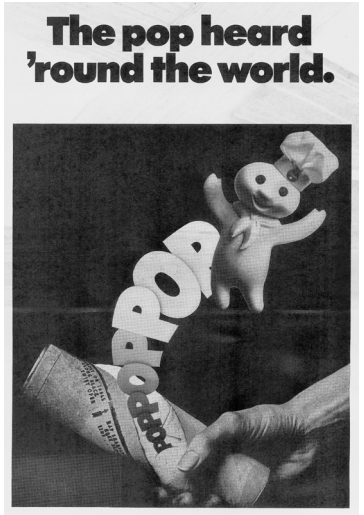
This is
definitely
tuberculosis

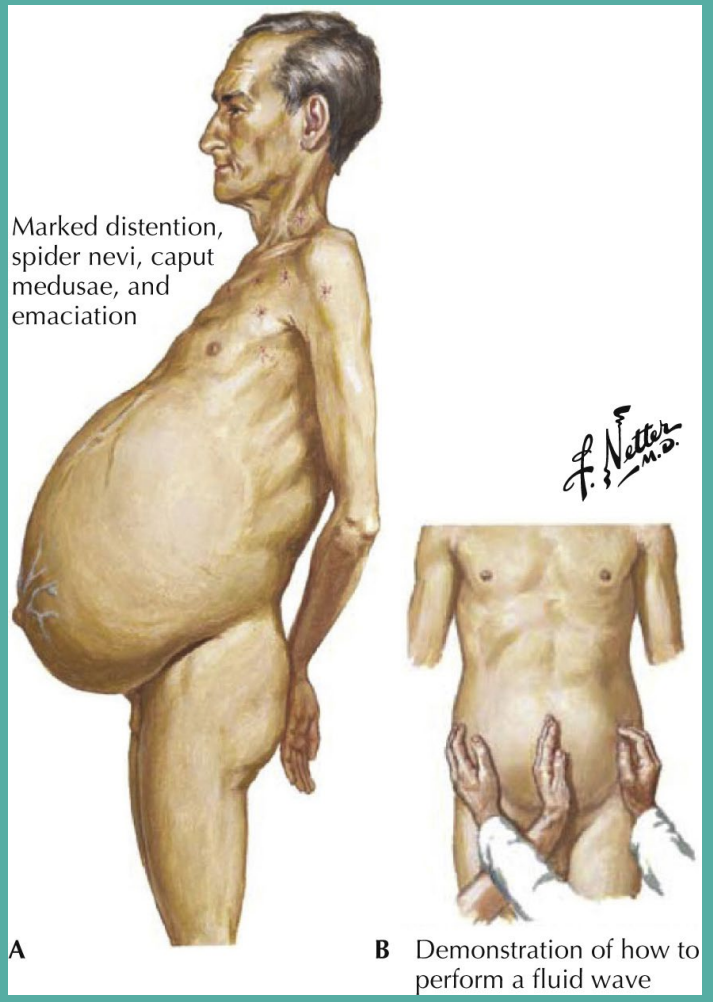
TUBERCULOUS PERITONITIS PRESENTATION

BMC Res Notes. 2013;6:88.

- Subacute, insidious onset
- Active/healed TB on CXR – 1/3
- Ascites 35-100%
- Abdomen pain 49-100%
- Fever 52-76%
- Abdomen distention 63-73%
- Constipation 7-31%
- Diarrhea 5-20%
- *"Doughy"* abdomen 5-13%
- Hepatomegaly 2-8%
- Splenomegaly 2-4%



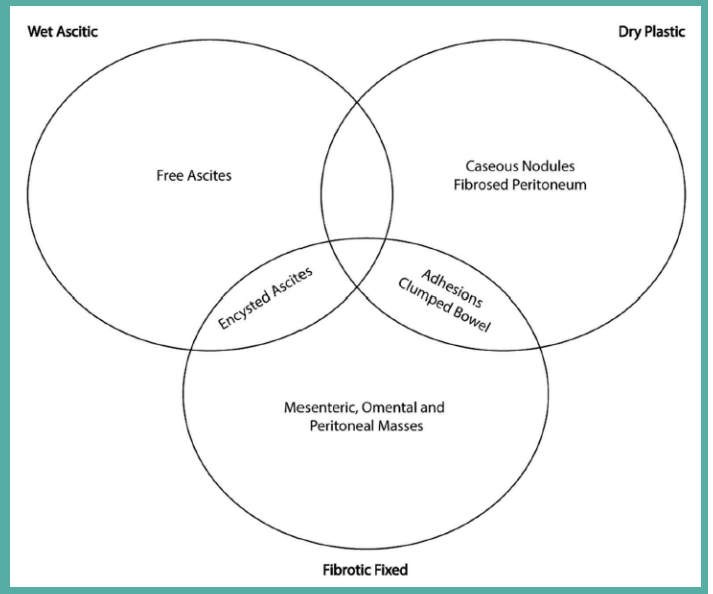
TUBERCULOUS PERITONITIS PATHOGENESIS



Netter's Integrated Review of Medicine

- Peritoneal lymphatic obstruction → blocking fluid reabsorption
  - Exudative ascites
  - Lymphocytic predominance
  - SAAG **low** (<1.1 g/dL)
- Portal HTN due to portal vein compression by TB lymph nodes
  - Transudative ascites
  - SAAG *HIGH* (>1.1 g/dL)
  - *RARE*

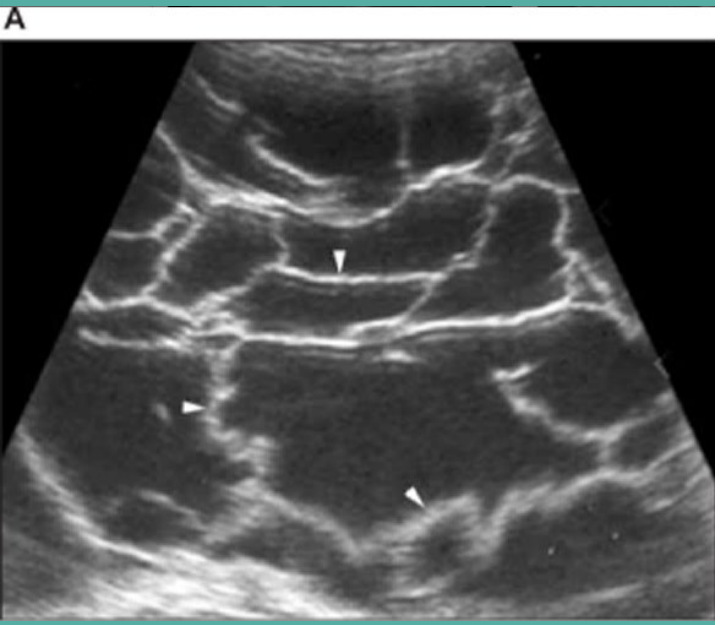
TUBERCULOUS PERITONITIS DIAGNOSIS



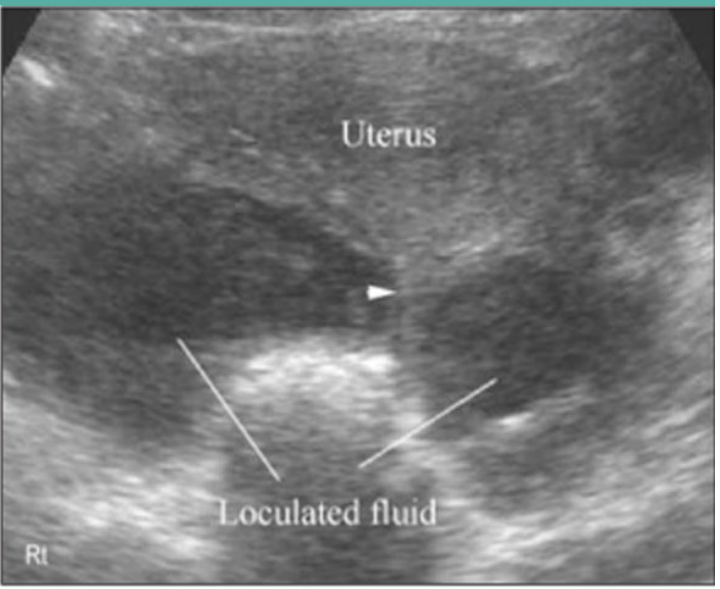
Expert Rev Anti Infect Ther. 2019;17(8):547-555.

- Difficult to diagnosis
- High index of suspicion
- Average duration of symptoms prior to diagnosis – weeks to months
  - 1-14.5 months
  - 5.2 months (mean)
- Multiple types
  - Wet – 73%
  - Dry plastic – 5-13%
  - Fibrotic-fixed – 14-22%

TUBERCULOUS PERITONITIS IMAGING

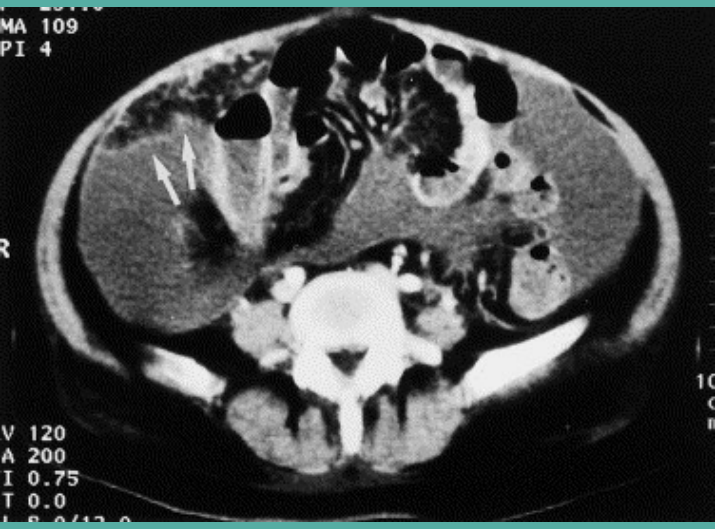


J Ultrasound Med. 2007;26(1):77-82.

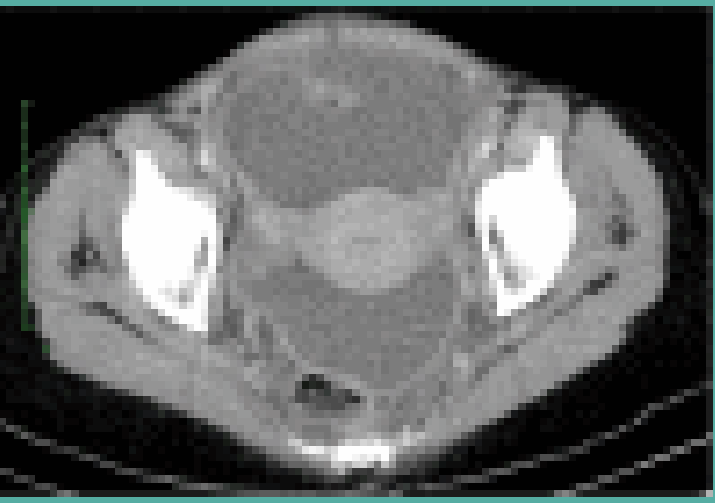


- CXR – 1/3 active/healed TB
- Ultrasound abdomen
  - Ascites 45-100%
    - Echogenicity related to its exudative nature
  - Loculated ascites
  - Thickening of the peritoneum
    - Clumping of bowel loops – side by side or to anterior abdominal wall
  - Peritoneal nodules
    - Granulations at the visceral and parietal peritoneum
  - Lymph nodes
    - Sometimes confluent

TUBERCULOUS PERITONITIS IMAGING



Clin Imaging. 2004;28(5):340-343



BMC Res Notes. 2013;6:88.

- CT abdomen/pelvis
  - Ascites, typically high density (25 to 45 HU)
    - At early stages it may have a fluid density
  - Lymph nodes
    - Hypodense center (caseation) with hyperdense rim
    - Calcified
  - Thickening of the mesentery and omentum
    - Mesenteric macro-nodules??? >5 mm
  - Regular and uniform thickening of peritoneum
    - Smooth
  - Agglutination of the intestinal loops

TUBERCULOUS PERITONITIS MICROBIOLOGY

- AFB smear (ascites)
  - Sensitivity <10%
- AFB culture
  - Solid media (Lowenstein-Jensen)
    - Sensitivity 35%
  - Liquid media (BACTEC)
    - Sensitivity 66-83%
- Xpert MTB/RIF PCR
  - Sensitivity 8-61%; Specificity 100%

1 liter ascites ultra-centrifuged

BMJ Case Rep. 2019;12(8):e230794.

Tuberculous peritonitis…

Move the checkmark next to the correct answer. It is programed to appear when you click forward.

A	Is easy to distinguish from ascites due to cirrhosis
B	Is easy to distinguish from peritoneal carcinomatosis
C	Presents with acute and fulminant symptoms
D	Is accompanied by active/healed TB on CXR in 1/3 cases

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GASTROINTESTINAL TUBERCULOSIS TREATMENT

- Standard 6-month RIPE regimen for the majority
  - Some caveats
    - NO PZA in intensive phase
    - Pulmonary cavitary diseases with (+)AFB ***cultures*** at 2-months
    - Meningitis – 9-12 months
    - Bone/joint – including spine – 6-9 months
      - 9-12 months if hardware or *NO* rifampin
- **NO** role for adjunctive corticosteroids

GASTROINTESTINAL TUBERCULOSIS TREATMENT

Intensive phase		Continuation phase		Total doses
Drugs	Interval and doses	Drugs	Interval and doses	
RIF INH PZA EMB	Daily for 8 weeks 5-7 days per week 40-56 doses (8 weeks) DOT	RIF INH	Daily for 18 weeks 5-7 days per week 90-126 doses (18 weeks) DOT	130-182 doses (26 weeks) DOT

Treatment of gastrointestinal tuberculosis…

Move the checkmark next to the correct answer. It is programed to appear when you click forward.

A	9-month RIPE regimen
B	6-month BPaLM regimen
C	6-month RIPE regimen
D	12-month RIPE regimen

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QUESTIONS & ANSWERS

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