Abdominal TB

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ESPGHAN goes AFRICA
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Abdominal TB

- First described 1843
- Small proportion of cases of childhood TB
  - Increasing incidence with immunosuppression
- Diagnostic and therapeutic challenge

“even in centres of excellence, early diagnosis and appropriate treatment is not infrequently delayed because of the non-specific and deceptive clinical presentation of abdominal TB”

Am J Gastroenterol 1993;88:744-50
Overview

1. TB – burden of disease
2. Types of Abdominal TB
   ▶ Pathology/pathophysiology
3. “Who gets TB”
4. Clinical presentation
5. “Making the diagnosis”
6. Investigations
7. Management
Introduction

- 8.7 million new cases active TB annually
  - 490,000 (6%) children
  - 13% co-infected with HIV
- 1.4 million TB deaths per year
  - 64,000 children
- 60% of cases in Asia
- 24% of cases in Africa
  - Highest population rates
- 3.7% MDR
<table>
<thead>
<tr>
<th>Country</th>
<th>Rate per 100 000</th>
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<td>Swaziland</td>
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WHO Global TB Report 2012
ABDOMINAL TB

PERITONEAL
- peritoneum
- omentum
- ascites

MESENTERIC
- lymphadenopathy

INTESTINAL
- ulcerative
- hypertrophic

SOLID ORGAN
- liver, spleen
- other
Pathogenesis/Pathology:
1. Intestinal (1)

- **Organism:**
  - Majority *mycobacterium tuberculosis*
  - Rarely *mycobacterium bovis*

- **Route of infection:**
  1. Swallowed sputum
  2. Lymphohaematogenous: miliary/primary TB infection
  3. Direct from adjacent organs (rare)

- **Areas involved**
  - Can lodge anywhere in intestine
  - Distal ileum-caecum (90%): most well developed lymphoid follicles
  - Rarely: jejunum-ileum, colon, ano-rectum duodenum, stomach, oesophagus
Pathogenesis/Pathology:
1. Intestinal (2)

- Bacilli penetrate mucosa and infect submucosal lymphoid tissue: results in epithelioid tubercle

- 1. ulcerative form
  - 2-4 weeks later: mucosal sloughing and ulceration
  - Multiple small irregular ulcers, transverse
  - Progresses to granulomas at base, caseous necrosis, fibrosis

- 2. hypertropic form
  - Abundant inflammatory response
  - Multinodular mass
Pathogenesis/Pathology:
1. Intestinal (3) Rarer forms

1. Oesophagus
   - Extrinsic compression by lymph nodes: fistula
2. Gastric
   - Antral narrowing, wall thickening, fistula
3. Duodenum
   - Extrinsic compression from lymph nodes, matted mass
4. Jejunem and ileum
   - Ulcers and strictures
5. Colon
   - Short segment (<5cm)
   - Long segment: contiguous with caecum
   - Shortening, distortion, narrowing, ulcers
Fig. 1. Ileocecal tuberculosis. Single-contrast barium enema study shows changes of advanced disease with fixed and narrowed terminal ileum and conical and shrunken cecum (arrows) due to fibrosis. These findings are non-specific and can most often mimic Crohn’s disease.
Fig. 4. Ileocecal tuberculosis. Axial contrast-enhanced CT images showing: (A) thickened ileocecal valve, along with circumferential wall thickening of the cecum (long arrow) and the terminal ileum (short arrows). (B) Concentric uniform mural thickening of terminal ileum (long arrows) and medial wall of cecum (short arrow) along with enlarged hypodense adjacent lymph nodes (arrowheads).
Pathogenesis:
2. Peritoneal (1)

- More frequent than intestinal TB in children
- Possible mechanisms:
  - Reactivation of latent foci from haematogenous spread
  - Lympho-haematogenous spread from active TB
  - Spread to peritoneum from ruptured mesenteric nodes
  - Contiguous spread from intestinal TB
- Involves: peritoneum, mesentery, omentum
- Ascites common
Pathology:
2. Peritoneal (2)

- Widespread tuberculous nodules
- Peritoneum and omentum thickened and hyperaemic
- Fibrous bands and adhesions
- Ascites
  - lattice like septa
- Omentum
  - Nodular
  - Smudged: ill defined infiltration
  - Caked: soft tissue replacement
Pathology:
2. Peritoneal (3)

1. “wet“ type (66%)
   1. Large amount viscous ascitic fluid
      ▷ Diffuse or loculated ascites
   2. Whitish miliary nodules(<5mm)

2. “fibrotic-fixed” type (21%)
   1. Large omental masses
   2. Matted and tethered bowel loops with adhesions

3. Fibro-adhesive “dry” or “plastic” type (13%)
   1. Caseous nodules(cheesy yellow)
   2. Fibrous peritoneal reaction
   3. Dense adhesions
Fig. 10. Tuberculous peritonitis. Axial contrast-enhanced CT images show: (A) thickening and heterogeneous density with a smudged pattern of the greater omentum (arrowheads) and the mesentery (short arrows). Note also enlarged mesenteric lymph node (long arrow) and left psoas muscle abscess (*). (B) Large amount of high-density ascitic fluid with marked thickening and enhancement of peritoneum (arrows). Note also the infiltrated mesentery of small bowel (*) and the free air (arrowheads) resulting from ileocecal perforation (not shown).
Pathogenesis/Pathology: 3. Mesenteric Lymphadenitis

- **Routes:** ingestion sputum (lymphatic drainage), haematogenous or adjacent organs
- **Lymph nodes involved:**
  - mesenteric
  - para-aortic
  - periportal
- **May not have peritoneal or intestinal disease**
- **Pattern varies:**
  - Increased normal size nodes
  - Local clusters of enlarged nodes
  - Large conglomerated masses
Tuberculous lymphadenitis

Fig. 8. Tuberculous lymphadenopathy. Sonogram scan reveals some hypoechoic lymph nodes (N) in a patient with abdominal tuberculosis. Ileocecal wall thickening was seen on CT scans (not shown).

Fig. 9. Lymphadenopathy tuberculosis. Transverse contrast-enhanced CT image shows enlarged periaortic lymph nodes with calcification (arrows), and one retroaortic hypodense lymph node with peripheral enhancement (arrowhead). Massive lymph node calcification at the celiac axis was seen (not shown). Note the anterior displacement of the left kidney by an large psoas abscess (*).
Tuberculous lymphadenitis

Fig. 7. Tuberculous lymphadenitis. Transverse contrast-enhanced CT images showing: (A) multiple enlarged mesenteric and pericecal lymph nodes with characteristic hypodense centers and peripheral enhancement (arrows). Note also colonic wall thickening. (B) A heterogeneous mixed density composed of a large conglomerate of peripheral enhancing lymph nodes in the mesenteric compartment (arrows).
Pathogenesis/Pathology:
4. Solid organ

- Haematogenous from pulmonary or miliary TB
- From GI lesions through portal vein
- Usually non-specific hepato-splenomegaly

Ultrasound
- Diffuse hyperechogenicity
- Multiple hypoechoic lesions

CT scan
- Multiple hypodense small masses throughout organs from 1 to 3 mm
- Early: contrast enhancement
Fig. 11. Tuberculous involvement of the liver and spleen. Axial contrast-enhanced CT images show tiny low-density foci scattered throughout the enlarged liver and spleen (arrows) in a patient with disseminated tuberculosis. A chest film showed pulmonary tuberculosis (not shown).
Complications of abdominal TB

- Small bowel obstruction
  - Peritoneal or omental adhesions, adhesions to enlarged lymph nodes, compression by nodes or hyperplastic intestinal Tb with strictures
- Perforation
- Abscess formation
- Fistulae: enterocutaneous, rectal, TOF
- Intussusception
- Vascular: intestinal ischaemia, pseudoaneurysms, haemorrhage, portal vein thrombosis
- Lymphatic: chylous peritonitis, intestinal lymphangiectasia
Abdominal TB epidemiology

“Who gets abdominal TB?”

- Peak incidence 3\textsuperscript{rd} and 4\textsuperscript{th} decade
- 10\% of cases under 10 years of age
- Age range: newborn infant to adolescent
- Mean age 9 years
- SA: >50\% under 5 years
- Developed world - immigrants
Clinical presentation(1)

- Varied and non-specific
- Most sub-acute/insidious

**Symptoms:**
- Common:
  - abdominal pain,
  - abdominal distension
  - LOW
- Other: vomiting, constipation, diarrhoea, anorexia
- Rare: GI Bleed: haematochezia
Clinical presentation

Clinical exam:

- Systemically ill
- Malnourished
- Pale
- Low grade fever
- Ascites, abdominal mass
- Hepatomegaly, +/- splenomegaly
- “doughy” abdomen (10%)
- Bowel obstruction
### How do they present?

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<td>92</td>
<td>42</td>
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<td>Ascites</td>
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<td>44</td>
<td>7</td>
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<td>56</td>
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<td>Extra-abdominal lymph node enlargement</td>
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<td>47</td>
<td>18</td>
<td>49</td>
<td>19.2 (extra-abdominal tuberculosis)</td>
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Making the diagnosis..........

- High index of suspicion

1. History and clinical examination
   - Positive household contact: varies from 30-80%

2. Laboratory features of systemic chronic disease
   - Elevated ESR, normochromic anaemia, thrombocytosis

3. TB investigations

4. Ascitic fluid analysis

5. Imaging

6. Surgical methods
TB investigations

**Tuberculin skin test**
- Positive in 44-68%
  - Indicates recent TB infection in children under 5
- False negative Mantoux/TST
  - Overwhelming disease eg miliary TB
  - Improper administration
  - Severe malnutrition

**CXR**
- Active TB 20-80%
Other TB investigations

- Bacteriologic evidence TB
  - Gastric aspirates, induced sputum, FNAB superficial nodes
  - geneXpert
- IFN-gamma assays
Ascitic fluid analysis

- elevated protein > 25g/L
- low serum ascites albumin gradient (< 11 g/l)
- usually lymphocyte predominant
- elevated ADA (adenosine deaminase)
  - May be normal in low protein ascites and HIV
- 10% positive ZN (3-25%)
- Culture positive 10-30%
Imaging

- Abdominal Xray
  - Intestinal obstruction, calcification

- Ultrasound
  - Lymph nodes: Central hypoechoic areas
  - Ascites: clear or strands, loculations, debris
  - Mass, liver/spleen

- CT scan
  - Lymph nodes: central low attenuation (liquefaction), peripheral enhancement (DDx: lymphoma, pyogenic), calcification
  - Intestinal wall thickening
  - Omental caking
Surgical diagnostic methods

- Laparoscopy
- Laparotomy
- Colonoscopy
Laparoscopy

- Sensitivity 85-100%
- Straw coloured ascites
- Yellow-white nodules on peritoneum
- Fibrous bands and adhesions
- Hyperaemic oedematous bowel loops
- Lymph node enlargement

**Biopsy** peritoneum and lymph nodes:
- Caseating granulomas and/or AFBs, culture, PCR
Laparotomy
Colonoscopy

- Ulcers
  - Tranverse superficial
  - Irregular margins
  - Usually ileocaecal

- Oedematous deformed ileocaecal valve

- Pseudopolyps

- Strictures
Differential diagnosis

1. Ileocaecal
   1. Crohns disease
   2. Lymphoma
2. Differential for ascites
3. Mass/lymph nodes
   1. MAC
   2. Lymphoma
   3. Yersinia
   4. Round worm mass
   5. Retroperitoneal tumours
4. Other surgical
   1. Appendicitis, Hirschungs, psoas abscess, urachus abn
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<tr>
<th>Feature</th>
<th>Tuberculosis</th>
<th>Crohns Disease</th>
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<td>Clinical</td>
<td>CXR may show TB</td>
<td>Perianal fistula</td>
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<td>Extraintestinal manifestations eg</td>
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<tr>
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<td></td>
<td>arthralgia, erythema nodosum</td>
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<td>Imaging</td>
<td>Preferential thickening</td>
<td>Uniform, lesser thickening bowel wall</td>
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<td>ileocaecal valve and medial wall</td>
<td>Mural stratification</td>
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<tr>
<td></td>
<td>caecum</td>
<td>Normal omentum and peritoneum</td>
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<td>Few small regional lymph nodes, low density</td>
<td>Enlarged soft tissue density lymph nodes</td>
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<tr>
<td></td>
<td>centres</td>
<td>Mesenteric fibrofatty proliferation (&quot;creeping fat&quot;)</td>
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<td>Multiple short strictures</td>
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<td>Colonoscopy</td>
<td>Fewer than 4 segments involved</td>
<td>Anorctal lesions</td>
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<td></td>
<td>Patulous ileocaecal valve</td>
<td>Apthous ulcers</td>
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<td>Transverse ulcers</td>
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<td>Granulomas: multiple, large,</td>
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<td>confluent, submucosal</td>
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<td>disproportionate submucosal inflammation</td>
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Effect of HIV co-infection on TB abdomen

- Increased number with extrapulmonary TB
- Younger
- Fever, LOW, night sweats more common
- Ascites and jaundice less common
- Intra-abdominal lymphadenopathy more common with CT

- Disseminated TB more common
- AFB positive lymph node aspirates more common
- Decreased absorption drugs
- Atypical mycobacteria more common
- Increased mortality
- NB causes of acute abdomen
Confirming the diagnosis

- Actively pursue microbiologic diagnosis
- Trial of therapy frequently supports a presumptive diagnosis
  - Especially in high incidence regions, classic presentation
- Monitoring:
  - Fever resolution
  - Improved nutritional status
  - Resolution ascites and masses
  - Reduction size lymph nodes
- Any uncertainty: laparoscopy/biopsy
Treatment: (1) Nutritional support

- Most respond to normal diet with supplemented calories
- Severe malabsorption:
  - hydrolysed formula
- Intestinal obstruction:
  - parenteral nutrition
- Chylous peritonitis/lymphangiectasia:
  - restricted fat, MCT based formula (Portagen)
Treatment (2) Antituberculous Drugs

- Local national/WHO guidelines
- 4 drug regimen
  - Isoniazid, rifapicin, pyrazinamide, ethambutol
  - WHO: INH, RIF only after first 2 months
- Prescribe at upper range of recommended doses

- Most respond to medical management
  - Including most strictures and fistulas and subtotal obstruction

- ?steroids – insufficient evidence
Treatment (3) Surgical

- Avoid unless clear indication
  - High rate of complications and mortality
  - Perforations and formation enterocutaneous fistulae
- Elective laparoscopy/laparotomy if diagnosis uncertain

- Indications for surgery
  - Complete obstruction
  - Perforation
  - Persistent fistula (stricturoplasty)
  - Severe intestinal bleeding
Increased morbidity/mortality

- Delayed diagnosis/initiation treatment
- Co-morbidity
  - HIV
  - Cirrhosis
  - Renal failure
- Severe malnutrition
- Disseminated disease
- Surgical intervention
  - Multiple strictures and perforations
SUGGESTIVE CLINICAL FEATURES

• abdominal pain, fever, LOW, +/- TB contact
• abdominal mass, doughy abdomen, ascites

Basic blood work + ultrasound

Suspect ATB

TB INVESTIGATIONS:
CXR, Mantoux, sputum/gastric aspirate, FNAB nodes

SUGGEST TB

Confirmatory investigations
• Ascitic tap: ADA levels, SAAG
• CT abdomen

Empiric Rx, evaluate response 2-4 weeks

Laparoscopy and biopsy if poor response or complication

UNCERTAIN OR NEGATIVE FOR TB

Confirmatory investigations
• Ascitic tap: ADA levels, SAAG
• CT abdomen

Yes

Contraindication surgery?

No

Laparoscopy and biopsy
“even in centres of excellence, early diagnosis and appropriate treatment is not infrequently delayed because of the non-specific and deceptive clinical presentation of abdominal TB”