A GIRL WITH ACUTE ABDOMEN: APPENDICITIS?
Presentation

- Case
- Background
- Take home message
Case

A girl

5½ years old
Case

- **History**
  - Since 4 days vomiting, and non bloody diarrhea
  - Feverish, anorexia, many cramps
  - GP: started 1 day before with erythromycine
    - Mother with *C. jejuni*-infection a week before
  - Vaccination according scheme

- **Physical examination**
  - Toxic ill, nasal flaring, tachypnea, dry mouth and dry lips
  - Abdomen: abdominal tenderness, hyperactive bowel sounds, no masses, no hepatosplenomegaly
Case

- **Investigations (day of admission)**
  - Laboratory testing
  - Urinalysis: negative
  - Coproculture: no viruses, no *C. jejuni*

<table>
<thead>
<tr>
<th></th>
<th>D1</th>
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</thead>
<tbody>
<tr>
<td><strong>CRP</strong></td>
<td>65</td>
<td>mg/dL</td>
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<tr>
<td><strong>Hb</strong></td>
<td>11,7</td>
<td>g/dL</td>
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<tr>
<td><strong>Trc</strong></td>
<td>393</td>
<td>x10*9/L</td>
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<tr>
<td><strong>WBC</strong></td>
<td>7,0</td>
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<tr>
<td><strong>Band cell, metamyelocytes, myelocytes</strong></td>
<td>64%</td>
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<tr>
<td><strong>Sodium</strong></td>
<td>127</td>
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<tr>
<td><strong>Potassium</strong></td>
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<td><strong>HCO3-</strong></td>
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Case

- Imaging (day of admission)
  - Ultrasound abdomen
    - Appendix is not visible
    - Large amount of fluid in the right fossa, high density, suggestive of pus
  - CT abdomen
    - Large amount of fluid in abdomen, multiple dilated small bowel loops
      - dd. perforated appendix; peritonitis
  - Thorax radiography
    - No infiltrate or other pathologic details
Consulting abdominal surgeon (day of admission)

Surgery
- Laparoscopy: inspection and obtaining fluid for culture and counting
- Conversion to limited median laparotomy
  - No Meckel’s divertikel
  - No inflammation appendix, appendectomy (histological examination)
  - No inflammatory or indurated zones in colon
  - Diffuse intra-abdominal purulent fluid
  - 2 drains left

Purulent secretion
- Counting: leucocytes ++++
- Smears: gram-positive diplococci (culture: S. pneumoniae, serotype 1)

Empirically started with amoxicillin-clavulanic-acid, switched to ampicillin (Pentrexyl) after result culture
**Case**

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- Finally...
  - D8: stop ampicillin
  - D9 and D11: removing of surgery drains
  - D12: discharged in good clinical condition
Primary peritonitis or
Spontaneous bacterial peritonitis (SBP)
SBP - definition

- Infection of the peritoneal cavity and organs without an evident intra-abdominal source
  - Infection, chemical irritation

- In contrast with secondary peritonitis
  - Perforation of appendix
  - Midgut volvulus
  - Intussusception
  - Incarcerated hernia
  - Rupture of a Meckel diverticulum
  - Inflammatory bowel disease
  - Necrotizing cholecystitis or enterocolitis
SBP - incidence

- Incidence unknown
  - Acute abdomen: 1-3% is peritonitis
  - Strict SBP without underlying disease: rare

- ↑ in early 20th century, subsequently ↓, but now ↑
- Peak incidence: 4-9 yo
- 4 > 3

- Blank history: rare
- More frequent if underlying disease
  - Nephrotic syndrome
    - Many cases presented in literature
  - Liver cirrosis
  - SLE, extra-pulmonary tuberculosis, ...

Andrade AL et al 2011; Ullo-Gutierrez R et al 2003; Sen et al 1983
McDougal WS et al 1975; Ghritlaharey RK et al 2011
SBP – clinical manifestations

- Fever, diffuse or local abdominal pain, vomiting, diarrhea, nausea
  - rebound tenderness, rigidity
  - shock, toxic appearance, hypotension, tachycardia, tachypnoea, chills, convulsions, restlessness
SBP - diagnosis

- Blood analysis
  - Hematology, biochemistry, blood culture
- Urine sediment and culture
- Plain abdominal radiograph
- Abdominal ultrasound
  - To identify the source of infection
- (Paracentesis)
- Explorative laparoscopy
SBP – causative organisms and pathogenesis

- Gram-positive cocci: *S. pneumoniae* (22-50%); *S. aureus*, *S. pyogenes*, *S. viridans*

- Gram-negative
  - Enterobacteriaceae: *E. coli*, *K. pneumoniae*
  - Other: *H. influenzae*, *N. meningitides* (1)

- Rapid progression of symptoms (<24 uur)

- Predisposing condition without an intra-abdominal source of contamination
  - Respiratory tract (hematogenously); genital tract; lymphogenic; transmural

Krensky et al 1982; Hagighat M et al 2006
Primary pneumococcal peritonitis - treatment

- **Antibiotics**
  - **Empirical:**
    - Ampicillin ± aminoglycoside or 3rd generation cephalosporin
    - Quinolones
  - Guided by culture and number of PMN after 24-48h
  - **Duration:** 1-3 weeks

- **Surgery**
  - Flushing
  - Eventually drainage of abscess
S. pneumoniae

- Pneumonia, meningitis, sinusitis, otitis media
- Colonisation of colon and female reproductive tract
  - Sec. infection with tubo-ovarian abscess
  - Streptococci: inhibited in acidic environment of the vagina
    - Pregnant women, prepubertale girls: ↑pH
- If invasive pneumococcal disease (IPD): 1,3% peritonitis

- Serotype included in vaccin, or not?
  - 66% serotype 1; mostly woman; PCV-7
  - Almost complete coverage if included in vaccin
  - Our patient: serotype 1 and vaccinated

  PCV7: 4, 6B, 9V, 14, 18C, 19F, 23F
  PCV13: 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F

Take home message

- If acute abdomen... peritonitis represents 1-3% of all cases
- Rapid clinical progression, it mimics appendicitis
- Primary pneumococcal peritonitis: rare
- Not all serotypes included in vaccin
  - pneumococcus is still the most important etiologic agent for peritonitis in children
- Adequate therapy: explorative laparoscopy with antibiotics covering Gram-positive and Gram-negative
Thanks for the attention!