VECTOR-BORNE INFECTIONS

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ESCMID Postgraduate Training Course

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Presentation Plan

♣ Definition
♣ Vectors
♣ Overview
♣ European perspective
   ♣ Hantavirus infections
   ♣ Tularemia
♣ Q fever
♣ Congo Crimean HF
A vector is any viable agent that carries and transmits an infectious pathogen into another living organism.
Mosquito Borne Infections

- Malaria
- Dengue
- Yellow fever
- Lymphatic filariasis
- Chikungunya
Tick-Borne Infections

TICKS

- Tularemia
- Babesiosis
- Lyme disease
- Rickettsiosis (Q-fever)
- Ehrlichiosis
- Congo Crimean HF
Schistosomiasis

Freshwater snails
Dracunculiasis

Water fleas
Human African Trypanosomiasis

Tsetse fly
Leishmaniasis

Phlebotomine Sandflies

- Cutaneous Leishmaniasis
- Diffuse Cutaneous Leishmaniasis
- Mucocutaneous Leishmaniasis
- Visceral Leishmaniasis
Hantavirus, 2923

Q fever, 759

CCHF Turkey and Balkans

West Nile, 131

Tularemia, 724

MOST PROBLEMATIC VECTOR BORNE INFECTIONS IN EUROPE

ECDC, Annual epidemiological report, 2013
Hantavirus Infections

♣ Hemorrhagic fever with renal syndrome
   ♣ Viruses of the old world
   ♣ Eurasia
♣ Hantavirus pulmonary syndrome
   ♣ Viruses of the new world
   ♣ Americas
HFRS, Clinical Presentation

- Clinical course, extremely variable
- Mortality 0.5-10%

HFRS

Field mice

Inhalation

Urine

Feces

Saliva

Bites, rarely
Hantavirus Infections, Diagnosis

**SEROLOGY**
- ELISA
  - Western Blot
    - CFT
      - IFA
        - HI
  - CFT

**PCR**
- RT-PCR

**AUTOPSY TESTING**
- Immunohistochemistry
  - Nested RT-PCR
HFRS, Treatment

- No specific antiviral therapies
- Therapy, restricted to supportive care
- Headache and backache, analgesics
  - NSAIDS should be avoided
- Thrombocytopenia, platelet transfusion
- Dialysis, for the usual indications
Diagnosis of Tularemia-1

Tube or microagglutination

♠ A single test, supportive of the diagnosis
  ♠ Tube agglutination titer ≥1:160
  ♠ Microagglutination titer of ≥1:128
♠ ≥ 4-fold rise in 2-4 weeks

Gram-stain, tissue bx

♠ Rarely demonstrate the organism
Diagnosis of Tularemia-2

- Routine cultures, frequently negative
- Cysteine rich media
- Real-time PCR assay
Treatment of Tularemia

The first choices
- Bactericidal antibiotics, 10 d
  - Streptomycin
  - Gentamicin

Alternative choices
- Doxycycline, 15 d
- Ciprofloxacin
- Surgical drainage

Therapeutic Course of the Disease

TABLE 4. Distribution of antibiotics with respect to duration of treatment

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>n (%)</th>
<th>Missing</th>
<th>&lt;7</th>
<th>7-14</th>
<th>15-21</th>
<th>22-30</th>
<th>&gt;45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monotherapy, no. (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Streptomycin</td>
<td>291 (28)</td>
<td>2 (0.2)</td>
<td>266 (26)</td>
<td>18 (2)</td>
<td>4 (0.4)</td>
<td>1 (0.1)</td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>188 (18)</td>
<td>-</td>
<td>-</td>
<td>141 (14)</td>
<td>47 (5)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>127 (12)</td>
<td>-</td>
<td>-</td>
<td>41 (4)</td>
<td>80 (8)</td>
<td>2 (0.2)</td>
<td>2 (0.2)</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>85 (8)</td>
<td>-</td>
<td>-</td>
<td>83 (8)</td>
<td>-</td>
<td>2 (0.2)</td>
<td>-</td>
</tr>
<tr>
<td>Mexifloxacin</td>
<td>17 (2)</td>
<td>-</td>
<td>-</td>
<td>6 (1)</td>
<td>-</td>
<td>1 (0.1)</td>
<td>-</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>5 (0.5)</td>
<td>-</td>
<td>-</td>
<td>5 (0.5)</td>
<td>-</td>
<td>1 (0.1)</td>
<td>3 (0.3)</td>
</tr>
<tr>
<td>Combination therapy, no. (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Streptomycin + doxycycline</td>
<td>104 (10)</td>
<td>-</td>
<td>41 (4)</td>
<td>54 (5)</td>
<td>8 (1)</td>
<td>1 (0.1)</td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin + doxycycline</td>
<td>71 (7)</td>
<td>-</td>
<td>1 (0.1)</td>
<td>12 (1)</td>
<td>57 (6)</td>
<td>1 (0.1)</td>
<td></td>
</tr>
<tr>
<td>Gentamicin + doxycycline</td>
<td>30 (3)</td>
<td>-</td>
<td>-</td>
<td>2 (0.2)</td>
<td>27 (3)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Mexifloxacin + doxycycline</td>
<td>10 (1)</td>
<td>-</td>
<td>-</td>
<td>1 (0.1)</td>
<td>9 (1)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Streptomycin + ciprofloxacin</td>
<td>35 (3)</td>
<td>-</td>
<td>29 (3)</td>
<td>4 (0.4)</td>
<td>-</td>
<td>2 (0.2)</td>
<td></td>
</tr>
<tr>
<td>Gentamicin + ciprofloxacin</td>
<td>41 (4)</td>
<td>-</td>
<td>-</td>
<td>1 (0.1)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Doxycycline + rifampicin</td>
<td>3 (0.3)</td>
<td>-</td>
<td>-</td>
<td>1 (0.1)</td>
<td>3 (0.3)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Streptomycin + doxycycline + ciprofloxacin</td>
<td>5 (0.5)</td>
<td>-</td>
<td>-</td>
<td>2 (0.2)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Sequential therapy (total days), no. (%)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Streptomycin + doxycycline</td>
<td>4 (0.4)</td>
<td>-</td>
<td>-</td>
<td>1 (0.1)</td>
<td>1 (0.1)</td>
<td>2 (0.2)</td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin + doxycycline</td>
<td>3 (0.3)</td>
<td>-</td>
<td>-</td>
<td>3 (0.3)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Gentamicin + ciprofloxacin</td>
<td>2 (0.2)</td>
<td>-</td>
<td>1 (0.1)</td>
<td>2 (0.2)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Total, no. (%)</td>
<td>1034 (100)</td>
<td>16 (0.5)</td>
<td>2 (0.2)</td>
<td>593 (57)</td>
<td>389 (38)</td>
<td>24 (2)</td>
<td>10 (1)</td>
</tr>
</tbody>
</table>

Q Fever

Coxiella burnetii

Inhalation

Contact with infected animals

Ticks
Acute Q-fever

- Pneumonia
- Hepatitis
- Self-limited flu-like illness
- Fever of unknown origin
Chronic Q-fever

- Infection > 6 mos
- 1-5% *C. burnetii* pts
- Most likely in
  - Pregnant
  - Immunocompromised
  - Underlying valvular or vascular disease

Organ involvement
- Most commonly heart
- Followed by arteries
Chronic Q fever-2

- Multiplies in macrophages
- Prolonged bacteremia
- Immune complexes
- High ab levels
- Organ involvement
Q fever

WHO TO TEST

Risk Factors
- Workers
  - Abattair workers
- Lab staff
- Animal contact
- Farmers
  - People living downwind

Clinical Perspective
- Consistent symptoms
- Endocarditis
- Osteomyelitis
- Aortic aneurism
  - AMA, ASMA (+), no clear diagnosis

Chronic conditions

Manure
Straw

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QF, Diagnosis-2

- **Serology**
  - IFA
- **PCR**
- **Culture**
  - BSL-3 lab
  - Embryonated eggs
  - Cell culture

≥200 for IgG

≥50 for IgM

4-fold rise in 3-6 wks apart

Acute infection

C. burnetii DNA (+)

Chronic CVS infection

≥800 for IgG

≥800 for IgG 6 mos after therapy
Q Fever Treatment

Acute Q fever
- Doxycycline 2x100 mg 14d

Q fever endocarditis
- Doxycycline
- Hydroxychloroquine
- 18 mos

Valvular, prophylaxis
- Doxycycline
- Hydroxychloroquine
- 12 mos
DIAGNOSIS

- Antibody detection
  - ELISA
    - IFA
      - HI
      - CFT
  - IFA

- Antigen detection
  - ELISA

- PCR

- Virus isolation
Diagnosis, Cornerstones

- ELISA, 6th day , delayed...
- RT-PCR
  - Rapid, effective, quantification
  - Viral isolation, most definite
  - Takes time, 2-5 days
  - Detect only high viral cons
  - BSL-4 laboratory
- Identification of viral antigens, ELISA
  - Less sensitive than PCR
CCHF, Treatment

- No specific antiviral therapies
  - Ribavirin?
- Therapy, restricted to supportive care
- Blood and blood products
Thanks... hakanerdem1969@yahoo.com