

Tick-borne infections: clinical features

Lenka Krbková

Children's Clinic for Infectious
Diseases

Medical Faculty, Masaryk University
Brno

Tick as a vector: viruses

- *Flaviviridae:*
 - **TBEV (CEEV, NEEV, FEV)**
Tick-borne encephalitis virus
- *Reoviridae: (Coltivirus: Eyach virus)*
Colorado tick fever virus
- *Bunyaviridae: (Nairovirus)*
Crimean- Congo hemorrhagic fever virus

Tick-borne encephalitis

- Tick-borne infection
- Biphasic course
- Severity according to the age
- Neurologic disease accompanied by pareses
→ permanent involvement
- Prevention: vaccination

Etiology

- Flavivirus
- TBEV:
- **3 antigenic variants:**
- Central-European subtype I (CEEV)
- Near-east subtype II (NEEV)
- Far-east subtype III (FEEV)

The routes of transmission

- 1) Tick-borne (*Ixodes ricinus*)
 - Seasonal incidence (spring-summer)
- 2) Drinking of non-pasteurized milk containing the virus (family epidemics)
- 3) Breast-feeding (newborns of mothers with viremia – rare!)

Clinical course of TBE

- IP: 3 to 14 days
- I. phase: fever, myalgia, arthralgia
- ↓
- Asymptomatic interval (4-10 days)
- ↓
- II. phase: headache, fever, vomiting, meningeal signs, ataxia, disturbances of consciousness, focal neurologic signs

Clinical forms of TBE

- Inapparent
- Abortive
- Meningitis
- Encephalitis
- Encephalomyelitis
- Bulbar

Lyme borreliosis

- Lyme disease, tick-borne borreliosis
- Endemic in North America, Europe, Asia
- The most frequent tick-borne infection in Europe and USA
- Involvement of the skin, nervous and musculoskeletal system

Epidemiology

- Reservoirs: vertebrates (small mammals, rodents, birds)
- All stages of ticks play role in the transmission (larvae, nymphae, adults)
- Transstadial and transovarial transmission in ticks
- Seasonal zoonosis (spring to autumn)

Patogenic borreliae in Europe

Borrelia burgdorferi sensu lato:

- **B. afzelii**
- **B. garinii** (euroasian and asian typ)
- **B. burgdorferi sensu stricto**
- **B. valaisiana**
- **B. lusitaniae**
- **B. spielmanni** (isolat A14S)

Clinical course in LB

- **80-95 % abortive**
- **5-20 % symptomatic**
- Cutaneous manifestation: 70-75 % (mostly EM)
- Nervous manifestations: 15-20 %
- Joint manifestations: 5 %
- Cardiac manifestations: 1 %
- Chronic course: 1-2 %

Clinical stages of LB

Early localized	Erythema migrans
Early disseminated	Erythema migrans multiple Borrelial lymphocytoma Nervous and joint manifestations
Late disseminated	Acrodermatitis chronica atrophicans Chronic nervous and joint manifestations

Erythema migrans

- IP = one to several weeks
- In Europe: *B.afzelii* (88,7 %), *B.garinii*, *B.burgdorferi s.s.*
- **Expanding red or bluish-red patch with central clearing, advancing edge intensely coloured, not markedly elevated, around the tick bite**
- Laboratory evidence: none
- Clinical findings are sufficient for the diagnosis of EM





Erythema migrans multiple

- **Multiple lesions of EM, not only at the site of the tick bite**
- Secondary lesions are similar to primary EM
- Non-specific symptoms: fatigue, fever, headache, arthralgia, myalgia
- Laboratory evidence: antiborrelial antibodies positive



Borrelial lymphocytoma

- IP: several weeks to months
- Causative agent: *B. afzelii*
- **Painless bluish-red nodule, usually on ear lobe, ear helix, nipple or scrotum**
- More frequent in children
- Laboratory evidence: 1) **essential**: significant change in levels of specific antibodies
2) **supporting**: histology, culture from skin biopsy







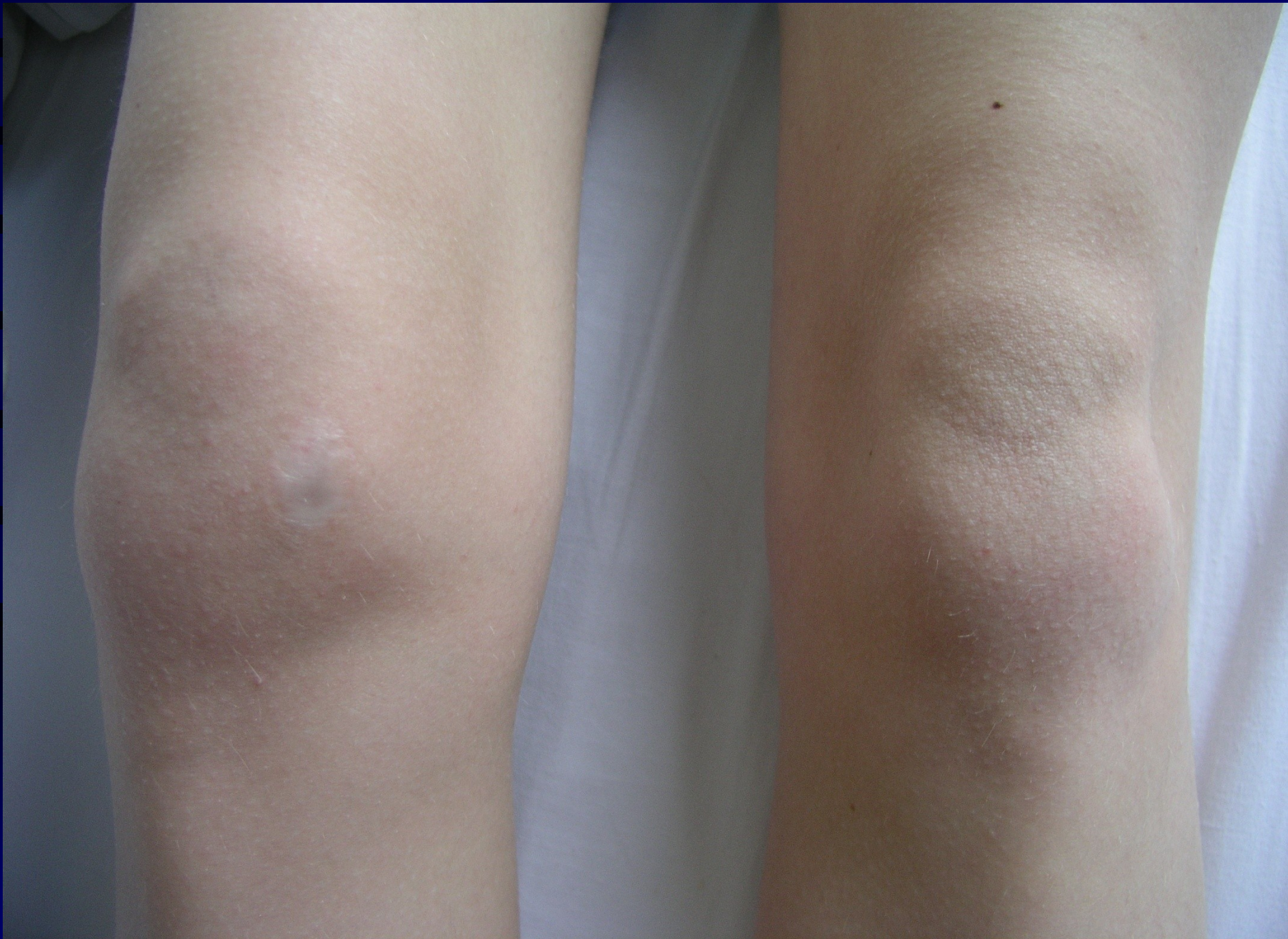
Acrodermatitis chronica atrophicans

- IP = several months to years
- **Long-lasting red or bluish-red lesions, usually on the extensor surfaces of extremities. Initial doughy swelling. Lesions become atrophic. Possible skin induration over bony prominences.**
- Laboratory evidence: high level of specific serum IgG antibodies

Lyme arthritis

- **Recurrent brief attacks of objective swelling in one or a few of large joints, occasionally progressing to chronic arthritis**
- Autoimmune Lyme arthritis (LFA-1, HLA-DRB1*0401 a 0101), resistant to ATB therapy
- Laboratory evidence: 1) **essential**: high level of specific serum (or/and synovial) IgG antibodies
2) **supporting**: culture from synovial fluid and/or tissue





Neuroborreliosis

- IP = one to twelve weeks
- Causative agent: *B.garinii*
- Neurologic involvement: primary meningitis
- **Minimal clinical signs can lead to dramatic inflammatory changes in subarachnoidal space !!!**

Clinical syndromes in NB

- Aseptic meningitis
- Garin-Bujadoux-Bannwarth syndrome (=meningopolyradiculoneuritis) in adults
- Disseminated encefalomyelitis (rare)
- Cranial neuritis (facial palsy): isolated or with meningitis (90 % of all cases with NB)
- Radiculoneuropathies

Ehrlichiosis

Anaplasmosis

- **Seasonal tick-borne zoonosis with the tropism of etiologic agent to white blood cells**
- **Ehrlichia spp.** – intracellular bacteriae (Rickettsiae, Coxiellae, Chlamydiae)
- 1986 – first infection by Ehrlichia in Fort Chaffee, Arkansas
- 1991 – isolation and classification of the agent = *E.chaffeensis*

HME

(human monocytic ehrlichiosis)

- Emerging human pathogen
- Transmission: tick *Amblyoma americanum*, only in the USA
- Etiologic agent: *Ehrlichia chaffeensis*
(Rickettsiaceae)
- Infection of ticks: in the USA 32,5 %
- Reservoirs: deer

HGA

(human granulocytic anaplasmosis)

- Formerly known as HGE
- Transmission: *I. scapularis* - USA
I. ricinus - Europe
- Etiological agent: *Anaplasma phagocytophilum*
(*Rickettsiaceae*), intracellular pathogen
- Infection of ticks: USA 50 %, Europe:
Switzerland - 26 %, CZ – 16 %

Clinical symptoms (similar in HME and HGA)

- IP = 7 to 14 days (3 – 10 days)
- Fever $\geq 38,5$ st. C (100 %)
- Myalgia (100 %)
- Headache (100 %)
- Chills (100 %)
- Hepatomegaly
- Rash (petechial, maculopapular)
- Erythema

Laboratory findings

- Leukopenia - neutropenia, lymphopenia
- Trombocytopenia
- Anemia
- Liver enzymes elevation
- High sedimentation rate and CRP

Complications

- Respiratory abnormalities (ARDS)
 - Renal failure (anuria)
 - Gastrointestinal bleeding
 - Hepatocellular necrosis
 - Aseptic meningitis
-
- **fatal course in 2 % of cases (ehrlichiae in lungs, liver, spleen)**

Differential diagnosis after a tick bite

- **Lyme borreliosis**
- **Tick-borne encephalitis**
- **Tularemia**
- **Q Fever**
- **Bartonellosis (cat scratch fever)**
- **TIBOLA (tick-borne lymphadenopathy)**
- **HGA (granulocytic anaplasmosis)**
- **Boutonneuse fever**
- **Babesiosis**
- **Rocky Mountain spotted fever (USA)**
- **Colorado tick fever (USA)**