

# Causative agents of cardiovascular infections

thumb | 350px| Infekční endokarditida. Původce: *Haemophilus parainfluenzae*. Heart infections include infectious endocarditis, myocarditis and pericarditis. Vascular infections include the focal infections of great blood vessels, infections regarding endothelium of small vessels and infections due to catheterisation.

## Heart infections

### Infectious endocarditis

- Severe illness, infected thrombus is attached to the heart valve or mural endocardium, with risk of embolisation.
- Nosocomial infections – in developed countries 5–29 % of the cases (the risk of invasive procedures).
- Intact endothelium is resistant to all pathogens except for *S. aureus*.

### The etiological agent

#### Staphylococcus aureus

- Affects both altered and healthy valves, as well as valve replacements;
- at risk of embolisation to distant organs;
- isolated in 20% of the cases.

#### Coagulase-negative staphylococci (*St. epidermidis*, *St. haemolyticus*, *St. hominis*)

- Commensals of the skin with great **affinity for artificial surfaces**;
- most frequent causes of endocarditis regarding artificial valve, pacemaker, sepsis after catheterisation;
- usually without embolisation;
- less sensitive to ATB.

#### Streptococci

- Viridans and hemolytic streptococci;
- *S. pneumoniae* – etiological agent in 60 % of the cases;
- Trapping in **anaerobic hemoculture bottles**, cultivation on enriched medium;
- they disrupt valves that were damaged prior to that;
- *S.mitis*, *S.sanguis*, *S.mutans*, *S.bovis*.

#### Enterococci

- Enter the bloodstream after uroinfections or infections of biliary tract;
- ATB resistance as a main complication.

#### Gram-negative bacteria

- *E.coli*, salmonella, klebsiella.

#### Pseudomonas

- Nosocomial endocarditis, commonly occurs in polymorbid patients;
- high lethality (up to 80 %);
- treated with an urgent surgical procedure.

#### Candida, Aspergillus

- Infectious agent in immunodeficient or immunosuppressed patients;
- large vegetations (several cm) → risk of valve obturation, massive embolism;
- difficult to identify from hemoculture.

### Diagnostics

- Echocardiography, hemoculture (at least two samples must be obtained).

### Therapy

- ATB based on infectious agent, usually high dosage;
- hospitalisation is mandatory, surgical procedure in some cases.

## Myocarditis

thumb | 300px | Virová myokarditida.

- Inflammation of myocardium.

## Etiology

- Most common are viral infections;
- virus Coxsackie B, adenovirus, enterovirus, borrelia, leptospira, treponema, diphtheria toxin;
- fungal myocarditis;
- parasitic myocarditis – rare in CxR, higher occurrence in tropical areas, lately a complication of toxoplasmosis in AIDS positive patients.

## Diagnostics

- Echocardiography, CRP, histological analysis of punctured tissue;
- for now, there is no reliable test for *in vitro* diagnosis.

## Therapy

- Anti-infectives according to the infectious agent.

## Pericarditis

- Serous pericarditis – of viral origin, spirochetes;
- purulent pericarditis – as a complication of bacterial sepsis, *S.aureus*, gram-positive bacteria;
- giant cell pericarditis due to tuberculosis.

## Diagnostics

- EKG, CT, etiological agents are identified by examination of punctured liquid sample.

**Therapy** according to etiology.

## Clinical samples in cardiac infections

- **Hemocultures:** hemoculture bottles with broth, when signs of growth are present, the sample is examined under the microscope and by cultivation test;
- **Cultivation:** blood agar with staphylococcal line, cultivation in 5 % CO<sub>2</sub> atmosphere, Endo's medium or McConkey agar, anaerobic culture, Sabouraud agar;
- in suspicion of slowly growing bacteria it is crucial to examine the seemingly negative hemoculture under the microscope, chocolate agar inoculation after 3 weeks, incubation in 5 % CO<sub>2</sub> atmosphere for 3 - 4 weeks

## Vascular infections

### Focal infections of blood vessels

- Infectious aneurysm – streptococci, *S. aureus*;
- endarteritis – *S. aureus*;
- infected thrombus in aortic bulge – salmonella;
- purulent thrombophlebitis – streptococci, anaerobic bacteria.

### Nosocomial catheter infections

- Dangerous mainly regarding central venous catheter, infection of peripheral venous catheters is more frequent, yet less severe;
- *S. epidermidis*, coagulase-negative staphylococci, *S. aureus*, *E. faecalis*, *E. coli*, *Candida albicans*,...

## Links

### Related articles

- Infectious endocarditis
- Myocarditis
- Pericarditis

### Použitá literatura

- 
-

