

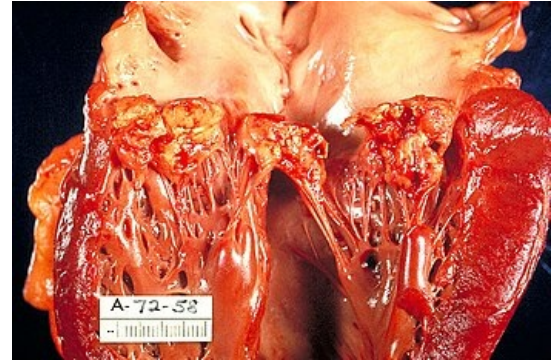
# Agents of cardiovascular infections

Heart infections include infectious endocarditis, myocarditis and pericarditis; vascular infections include focal infections of large blood vessels, infections affecting the endothelium of small vessels and catheter infections.

## Heart infections

### Infectious endocarditis

- Serious disease, infected thrombus is attached to the heart valve or wall endocardium, there is a risk of embolization.
- Nosocomial infections – in developed countries 5–29% of cases (risk of invasive procedures).
- Intact endothelium is resistant to all pathogens except *S. aureus*.



Infectious edocarditis. Cause: *Haemophilus parainfluenzae*.

### Ethiological agents

#### Staphylococcus aureus

- Affects altered and healthy valves both, also valve replacements;
- the risk of embolization into distant organs;
- isolated in 20% of cases.

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

- Commensal skins, high **affinity for artificial surfaces**;
- the most common cause of endocarditis on an artificial valve, pacemaker, the cause of catheter sepsis;
- most times without embolization;
- less sensitive to ATB.

#### Streptococci

- Viridans i hemolytic streptococci;
- *S. pneumoniae* – etiological agent in 60% of cases;
- Capture in **anaerobic blood culture vessels**, cultivation on enriched medium;
- They damage already pre-affected valves;
- *S.mitis*, *S.sanguis*, *S.mutans*, *S.bovis*.

#### Enterococci

- They enter the bloodstream after urinary tract or bile duct infections;
- Complication is resistance to ATB.

#### Gram-negative bacteria

- *E.coli*, salmonella, Klebsiella.

#### Pseudomonads

- Nosocomial endocarditis, common in polymorbid patients;;
- high lethality (up to 80%);
- treated with an emergency surgery.

#### Candida, Aspergillus

- Infectious agents in immunodeficient and immunosuppressed individuals;
- large vegetation (up to several cm) → risk of valve obturation, massive emboli;
- complicated identification from blood culture.

### Diagnostics

- Echocardiography, blood cultivation (taking at least two samples).

### Therapy

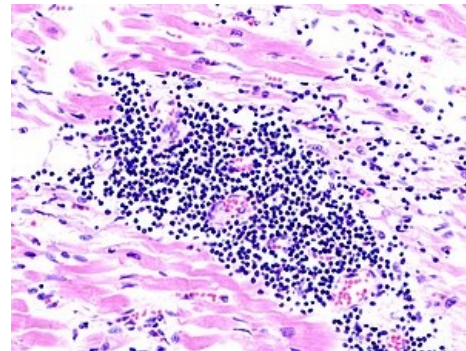
- ATB according to infectious agent, usually given in high doses;
- hospitalization required, in some cases surgery.

## Myocarditis

- Inflammatory myocardial infarction.

### Etiology

- Most often of viral origin;
- Coxsackie B viruses, adenoviruses, enteroviruses, Borrelia burgdorferi, leptospira, treponema, diphtheria toxin;
- fungal myocarditis;
- parasitic myocarditis - rare in the Czech Republic, higher incidence in tropical areas, in recent years complications of toxoplasmosis in AIDS patients.



Viral myocarditis.

### Diagnostics

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

### Therapy

- Anti-infective preparations according to the infectious agent.

## Pericarditis

- Serous Pericarditis – of viral origin, spirochetes;
- purulent pericarditis - complications of bacterial sepsis, *S.aureus*, gram-positive bacteria;
- giant cell pericarditis of tuberculosis origin.

### Diagnostics

- CG, CT, etiological agents are identified by examination of punctured fluid.

**Therapy** according to etiology.

## Clinical specimens for heart infections

- **Blood culture:** blood culture vessels with broth, if there are signs of growth, the sample is further examined microscopically and by culture;
- **cultivation:** blood agar with staphylococcal line, cultivation in atmosphere with 5% CO<sub>2</sub>, End's soil or MacConkey agar, anaerobic cultivation, Sabouraud's agar;
- if slow-growing bacteria are suspected, the seemingly negative blood culture must be examined microscopically, inoculated on chocolate agar, after three weeks, incubated in an atmosphere with 5% CO<sub>2</sub> for three to four weeks.

## Vascular infections

### Focal vascular infections

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

### Nosocomial catheter infections

- Central venous catheter infections in particular, peripheral venous catheter infections more frequent but less severe;
- *S. epidermidis*, coagulase-negative staphylococci, *S. aureus*, *E. faecalis*, *E. coli*, *Candida albicans*,...

## Links

### Related articles

- Infectious endocarditis
- Myocarditis
- Pericarditis

### Used literature

- BENEŠ, Jiří, et al. *Infekční lékařství*. 1. edition. Galén, 2009. vol. 651. ISBN 978-80-7262-644-1.

- POVÝŠIL, Ctibor – ŠTEINER, Ivo – DUŠEK, Pavel, et al. *Speciální patologie*. 2. edition. Praha : Galén, 2007. vol. 430. ISBN 978-807262-494-2.